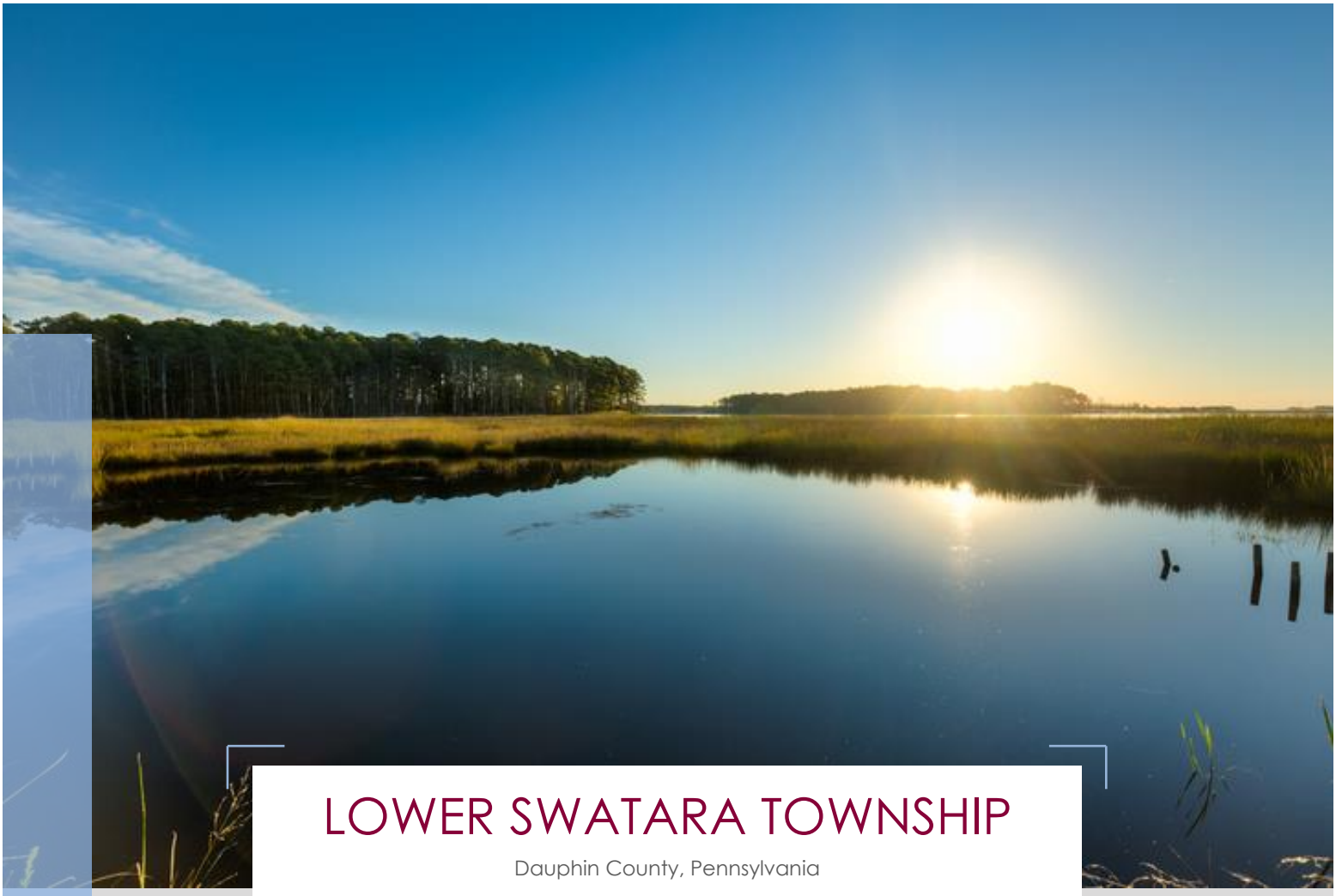

LOWER SWATARA TOWNSHIP

Dauphin County, Pennsylvania

Chesapeake Bay Pollutant Reduction Plan

Amendment 1

February 2023

HRG Project No. R000257.0439

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

Chesapeake Bay Pollutant Reduction Plan

LOWER SWATARA TOWNSHIP

DAUPHIN COUNTY, PENNSYLVANIA

TABLE OF CONTENTS

INTRODUCTION

Lower Swatara Township (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].

General Information	
Permittee Name: Lower Swatara Township	**NPDES Permit No.:** PAG133543
Mailing Address: 1499 Spring Garden Drive	**Effective Date:** July 1, 2018
City, State, Zip: Middletown, PA 17057	**Expiration Date:** March 15, 2025
MS4 Contact Person: Brian Davis	**Renewal Due Date:** September 2024
Title: MS4 Coordinator	**Municipality:** Lower Swatara Township
Phone: (717) 939-9377 ext. 3041	**County:** Dauphin
Email: bdavis@lowerswatara.org	**Consultant Name:** Herbert, Rowland & Grubic, Inc.
Co-Permittees (if applicable): N/A	**Consultant Contact:** Shawn E. Fabian, CPESC, CPSWQ 369 East Park Drive Harrisburg, PA 17111 (717)564-1121

Lower Swatara Township is a small MS4 community that will be starting its second permit term in March 2018. According to the United States Census Bureau's 2010 census, 100% of the Township (7,943.2 acres) is classified as urbanized area (UA).

The municipal UA is split between the Swatara Creek-Susquehanna River and Laurel Run-Susquehanna River HUC-12 Watersheds. The Laurel Run-Susquehanna River has been classified as impaired by PADEP. The Pollution Reduction Plan (PRP) requirements for this impaired watershed are included as part of this CBPRP.

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

SUMMARY OF PROPOSED AMENDMENTS

All proposed amendments are included in the following pages. They have been structured so that once approved, they can fully replace the equivalent section, figure, or table in the original PRP. The original PRP is included at the end of this list for the sake of comparison, though no other changes other than the following amendments are proposed.

Section A: Public Participation
Amended to meet the requirements for public comment on the Amendment 1 portion of the Chesapeake Bay Pollutant Reduction Plan.

Section B: Mapping
No amendments proposed.

Section C: Pollutants of Concern
No amendments proposed.

Section D: Determine Existing Loading for Pollutants of Concern
No amendments proposed.

Section E: BMPs to Achieve Required Pollutant Load Reductions
Amended to show updated proposed BMPs.

Section F: Identify Funding Mechanisms
No amendments proposed.

Section G: BMP Operation and Maintenance (O&M)
Amended to show updated O&M plans.

Appendix A: Public Participation Documentation
Amended to display updated documentation of public participation for Amendment 1.

Appendix B: Mapping
Amended to show updated proposed BMP locations.

Appendix C: PADEP Municipal MS4 Requirements Table
No amendments proposed.

Appendix D: Existing Pollutant Loading Calculations
No amendments proposed.

Appendix E: Proposed BMP Pollutant Load Reduction Calculations
Amended to show updated proposed BMP load reduction calculations.

Appendix F: Agreements
New section added to show details of WREP Program and Agreement between Lower Swatara Township and Dauphin County and Statewide Contract for the Chesapeake Bay Watershed between Lower Swatara Township and PennDOT

SECTION A: PUBLIC PARTICIPATION

A complete copy of this CBPRP was made available for the public to review at the Lower Swatara Township municipal office from XXXX XX, 2023 to XXXX XX, 2023. The availability of the document was publicized on the Township's website and in The Patriot News on XXXX XX, 2023. 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. Public comments were accepted for 30 days following the publication date of the public notice.

The public notice (newspaper and municipal website post), public comment and response, and public meeting presentation are included in Appendix A.

SECTION E: BMPS TO ACHIEVE THE REQUIRED POLLUTANT LOAD REDUCTIONS

E.1 Required Pollutant Load Reduction Calculation

No proposed changes for this section.

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. These proposed BMPs revise what was shown in the original PRP as projects, so some BMP numbering has been reused from that original plan. A map of the new BMP locations has been provided in Appendix B for easy reference.

The proposed strategy (Table 7) includes multiple BMP types including bioretention (rain gardens), stream restoration, and riparian buffer plantings. The pollutant loading reduction for each proposed BMP was calculated in terms of pounds per year using PADEP's standard BMP Effectiveness Values[3] and Master Stream Restoration Crediting Guide[4]. Complete calculations for the anticipated pollutant load reductions for each of the BMPs listed below is provided in Appendix E.

Table 7: BMP Strategy Summary

Site	BMP ID	BMP Type	Planning Area	Drainage Area (acres)	Length (ft)	Load Reduction TSS (lbs/yr)
Old Reliance Park	BMP-1	Bioretention	CBPRP	1.11	n/a	621
Shope Gardens Park	BMP-2	Bioretention	CBPRP	1.33	n/a	1,458
Greenfield Park	BMP-3	Basin Retrofit	CBPRP	8.65	n/a	4,452
***WREP Program (Londonderry Township)**	BMP-4	Conewago Creek Stream Restoration (Including Brills Run)	CBPRP	n/a	6,382	234,163
****Richardson Road Stream Restoration**	BMP-5	Stream Restoration	Laurel Run PRP	n/a	830ft	37,250
****PennDOT Rosedale Project**	BMP-6	Stream Restoration/ Floodplain Reconnection	CBPRP	n/a	2,315ft	120,000
Total						**397,944**

*** Lower Swatara Township is partnering with Londonderry Township for the Conewago Creek Stream Restoration project and will be receiving a portion of the sediment reduction of the complete project sediment load reduction.**

**** These projects are planned for design, permitting and construction 2023 and will be credited to the next permit term covering 2025-2030.**

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

[4] A Unified Guide for Crediting Stream and Floodplain Restoration Projects in the Chesapeake Bay Watershed (Wood, Schueler and Stack, 2021).

Table 7 has been updated per PADEP's request as of May, 2018. New calculations were completed using WikiWatershed "Model my Watershed" tool to determine the land use included within the BMP drainage area. The impervious and pervious areas were determined using the percentage information provided in each land use definition.

Table 8: Proposed BMP Load Reductions by Planning Area

Planning Area	Load Reduction from Proposed BMPs TSS (lbs/yr)	Required Load Reduction TSS (lbs/yr)	Percent of Goal Achieved
Laurel Run PRP	156,296	37,250	24%
CBPRP	360,694	242,238	149%

E.3 BMP Project Descriptions

Old Reliance & Shope Gardens Park Bioretention – Both Old Reliance Park and Shope Gardens Park have received recent upgrades in park facilities. New play structures and swing sets have been installed at each park. A small bioretention basin (raingarden) was installed at each park next to the playground areas to manage runoff from the play structure and swing set area. The rain garden was designed as excavated shallow surface depressions with amended soil media (a mixture of soil, and organic material) and planted with specially selected native vegetation to treat and capture runoff. The bioretention basin design also include educational signage.

Greenfield Park Basin Retrofit– Greenfield Park is a municipally-owned community park located in the central portion of the Township. The 25-acre park contains several soccer fields and three small parking areas. A siltation-impaired unnamed tributary is located in a wooded area along the northern part of the park.

The existing stormwater basin adjacent to the parking lot was originally designed as a bioretention basin but it was installed as a detention basin. As originally designed, the detention basin received, temporarily held, and discharged stormwater at a controlled rate. While this can provide rate control, the basin offered only a limited water quality benefit. The only water quality benefit is realized through minimal infiltration. This project retrofitted the existing basin with bioretention features to transform the basin from a simple catch, store, and release pond into a BMP which provides 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 basin with native and/or wetland plant species.

WREP Program/Conewago Creek Stream Restoration – This project proposes a partnership with the Dauphin County WREP Program and consists of a stream and floodplain restoration along 4,960-LF of the Conewago Creek and 1,422-LF of the tributary Brills Run. The restoration originates immediately downstream of the Hertzler Rd bridge on Brills Run, and approximately 3,500-LF downstream of the Mill Rd bridge on the mainstem. The restoration continues through the Brills Run-Conewago Creek confluence and downstream through an existing farm bridge to its terminus approximately 750-LF upstream of the PA-230 bridge in Londonderry Township.

The purpose of this project is to restore Conewago Creek, Brills Run, the associated floodplain, and existing wetland system as close as possible to historical pre-settlement conditions by removing legacy sediment from the floodplain. The stream restoration will include both structural repairs (as needed), in-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.

Richardson Road Stream Restoration– This project proposes to restore an approximate 830 ft stretch of stream with in-stream structures and riparian buffer restoration techniques. The stream between the box culvert on Richardson Road and the outfall from S. Eisenhower Blvd is eroding badly and starting to infringe upon nearby trailers. Restoration of this stream will address these points of erosion, which have been clogging the box culvert with sediment. The stream restoration will include both structural repairs (as needed), in-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 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.

PennDOT Rosedale Project– This project proposes design and construction of a full floodplain restoration project south of Rosedale Avenue and east of Whitehouse Lane. PennDOT is working with RES for the design and construction and have reached out to the Township to partner on the project since it is in their municipality.

Table 9: BMP Implementation Schedule

Site	BMP ID	BMP Type	Permitting & Engineering Design (Permit Year)	Construction/ Reporting (Permit Year)
Old Reliance Park	BMP-1	Bioretention	1	2
Shope Gardens Park	BMP-2	Bioretention	1	2
Greenfield Park	BMP-3	Basin Retrofit	3	3
WREP Program (Londonderry Township)	BMP-4	Conewago Creek Stream Restoration (Including Brills Run)	2/3	4/5
Richardson Road Stream Restoration	BMP-5	Stream Restoration	5	6
PennDOT Rosedale Project	BMP-6	Stream Restoration/ Floodplain Reconnection	5	5

SECTION G: BMP OPERATIONS AND MAINTENANCE (O&M)

Bioretention Areas/Basin 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.

WREP Program/Conewago Creek Stream Restoration

Through the Intergovernmental Cooperation Agreement (Appendix F) between Lower Swatara Township and Dauphin County, all perpetual long-term maintenance of the stream restoration will be completed by Londonderry Township. Lower Swatara Township has no responsibility for long-term O&M for the Conewago Creek Restoration Project.

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.

PennDOT Rosedale Project

Through the Statewide Contract for the Chesapeake Bay Watershed (Appendix F) between Lower Swatara Township and PennDOT, all perpetual long-term maintenance of the stream restoration will be completed by PennDOT. Lower Swatara Township has no responsibility for long-term O&M for the Rosedale Restoration Project.

APPENDIX A

Public Participation Documentation

Notice of Public Participation & Public Meeting Notice Published on Township Website
(http://lowerswatara.org/stormwater.php)

Posting to be added

Notice of Public Participation & Public Meeting Notice from Patriot News (Date of Publication to be added)

Proof of Publication to be added

Replace page with public meeting agenda and minutes

PUBLIC COMMENTS

Written:

1. Written Public Comments to be added.
    a. Response to Comments to be added.

Verbal:

1. Verbal Public Comments to be added
    a. Response to Comments to be added.

APPENDIX B

Mapping

1,200 0 1,200 Feet

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

2/8/2023	PM: EGL	GIS: ALV	QA: TE	R000257.0464

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Engineering & Related Services
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Harrisburg, PA 17111
717.564.1121 [phone]
717.564.1158 [fax]
www.hrg-inc.com

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

CBPRP Planning Area

Lower Swatara Township
Dauphin County, Pennsylvania

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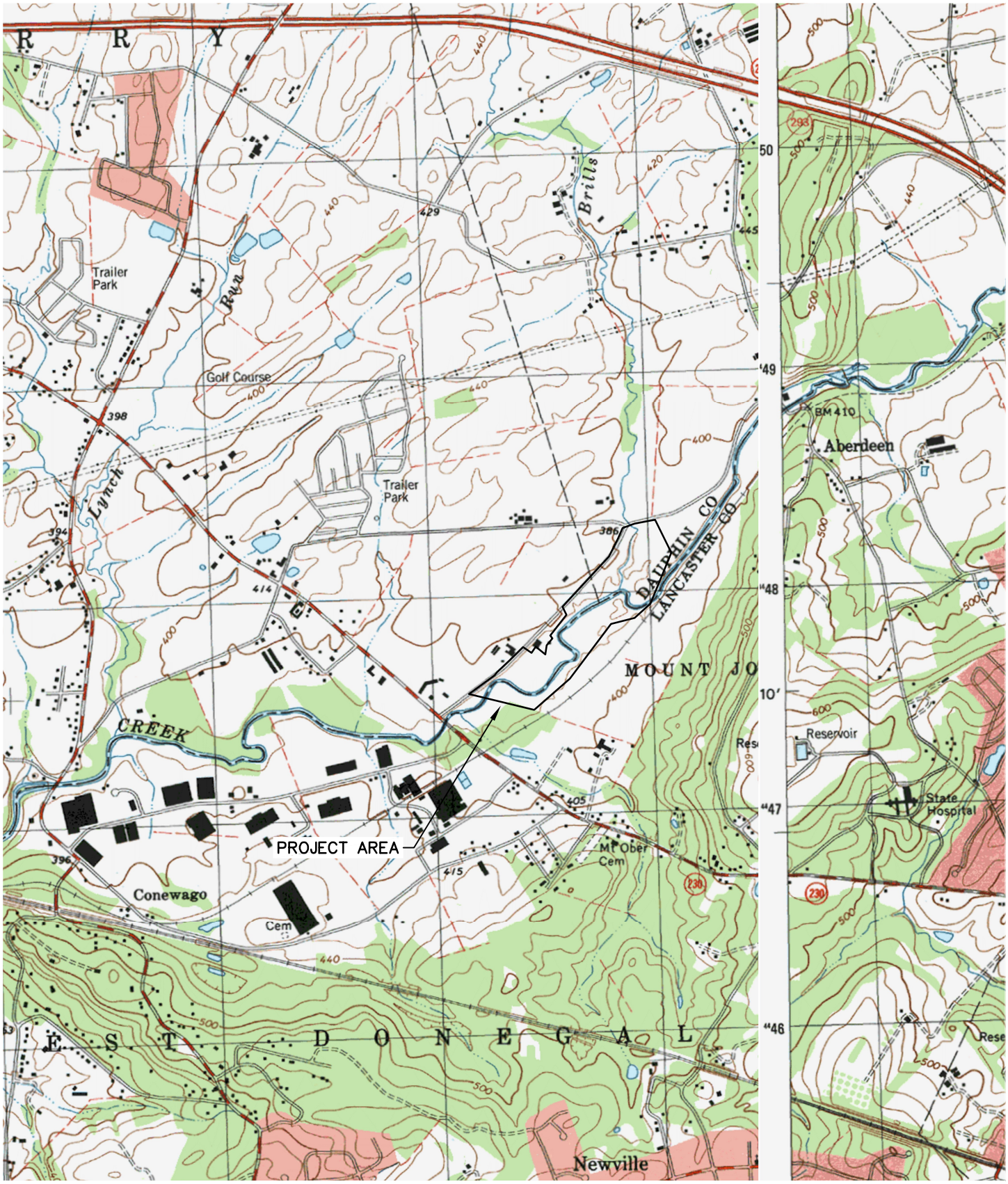

USGS QUADMAP: MIDDLETOWN/ELIZABETHTOWN

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www.hrg-inc.com

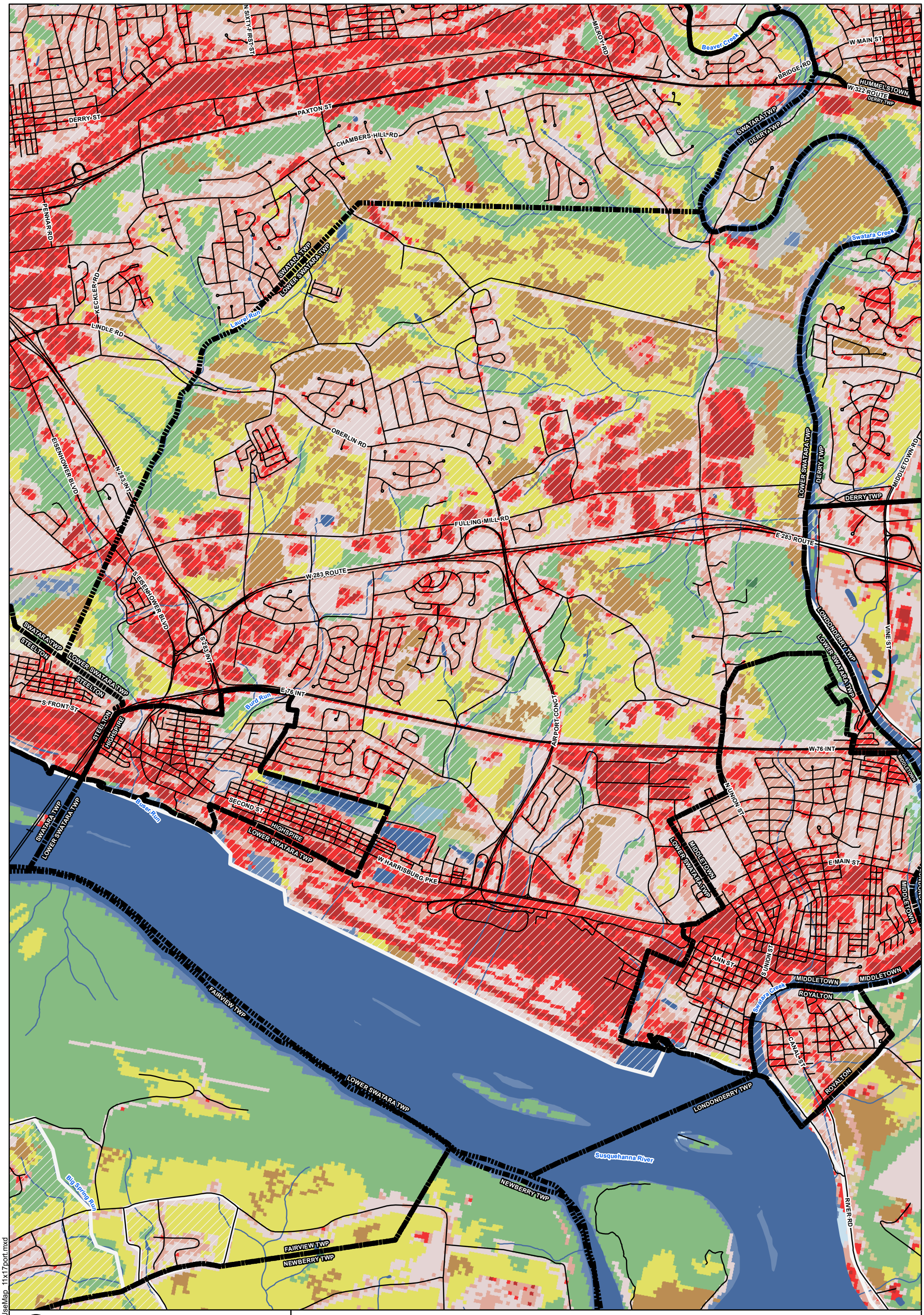
PROJECT LOCATION MAP
FOR
CONEWAGO CREEK STREAM RESTORATION

LONDONDERRY TWP
CONEWAGO TWP
MOUNT JOY TWP
DAUPHIN COUNTY
LANCASTER COUNTY
PENNSYLVANIA

PROJ. MGR. –	SEF
DESIGN–	ILU
CADD–	ILU
CHECKED–	
SCALE–	1" = 2000'
DATE–	APRIL 2020

DRAWING NO.
LOC-1
SHEET NO.
1 OF 1
PROJECT R001068.0521

File name: P:\0010\001068_0521\Admin\Permits\Waiver 16 and NWP 27\Waiver 16\Location Map.dwg Layout:Layout1 Apr 21, 2020–4:46pm lundenhill



2,500 0 2,500 Feet

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

5/5/2017	PM: EGL	GIS: BLS/HMG	QA: HSH	R000257.0439

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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

Lower Swatara Township
Dauphin County, Pennsylvania

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APPENDIX E

Proposed BMP Pollutant Load Reduction Calculations

Appendix E – Table 1: Proposed BMPs

Site	Map ID	BMP Type	Location	Lat	Long	Drainage Area (acres)	Length (ft)	Drainage Area Characteristics*				Loading Rate** TSS (lbs/yr)		Total Load TSS (lbs/yr)	BMP Effectiveness	Pollutant Load Reduction TSS lbs/yr
								% Imperv.	Imperv. (acres)	% Perv.	Perv. (acres)	Imperv.	Perv.			
Old Reliance Park	BMP-1	Rain Garden	Powderhorn Road	40.237214	-76.760967	1.11	n/a	19%	0.21	81%	0.90	1,999.14	299.62	690.094	90%	621
Shope Gardens	BMP-2	Rain Garden	Theodore Ave, Middletown	40.214081	-76.772251	1.33	n/a	54%	0.72	46%	0.61	1,999.14	299.62	1619.387	90%	1,458
Greenfield Park	BMP-3	Basin Retrofit	Greenfield Drive	40.2134345	-76.750750	8.65	n/a	20	1.71	80	6.94	1999.14	299.62	5495.788	90	4,452
WREP Program (Londonderry Township)	BMP-4	Conewago Creek Stream Restoration (Including Brills Run)	Londonderry Township	40.16754	-76.638351	n/a	6,382	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Reference Londonderry Township's PRP	234,163
Richardson Road Stream Restoration	BMP-5	Stream Restoration	Richardson Road	40.220909	-76.794190	n/a	830	n/a	n/a	n/a	n/a	n/a	n/a	n/a	44.88 lbs/ft	37,250
PennDOT Rosedale Project	BMP-6	Stream Restoration/ Floodplain Reconnection	Rosedale Ave	40.207084	-76.765357	n/a	2,315	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Reference PennDOT's PRP	120,000
Total																**397,944**

* Land Cover Estimates calculated using WikiWatershed "Model My Watershed" tool
**PADEP PRP Instructions - Attachment B, Developed Land Loading Rates for PA Counties
***PADEP – BMP Effectiveness Values

APPENDIX F

Letter to PADEP Regarding Eligibility for Joint Project

Intergovernmental Cooperation Agreement between Lower Swatara Township and Dauphin County.

Statewide Contract for the Chesapeake Bay Watershed between Lower Swatara Township and PennDOT.

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December 19, 2022

Mr. Scott Arwood
Pennsylvania Department of Environmental Protection
Southcentral Regional Office
909 Elmerton Avenue
Harrisburg, Pennsylvania 17110

Re: Conewago Creek Restoration Project Partnerships
Dauphin County Water Resource Enhancement Program (WREP)

Dear Mr. Arwood:

Chesapeake Bay Pollutant Reduction Plan (CBPRP) implementation has been challenging for municipalities to afford or logistically complete in the Lower Susquehanna watershed. Over the previous years, municipalities have completed field evaluations, desktop analysis, and explored partnership opportunities to meet the 10% Total Suspended Solids (TSS) reduction goals. Despite continued efforts, many municipalities have been unable to find project locations that can meet these goals in a way that meet site and budget constraints.

The Conewago Creek Restoration Project proposed by Londonderry Township provides a significant excess of TSS reduction and a unique opportunity for partnership. Dauphin County has recently established a Water Resource Enhancement Program (WREP) to provide the framework for partnership associated with this project. Currently, the following municipalities are expected to partner on this project via the WREP program:

- Lower Swatara Township
- New Cumberland Borough
- Middletown Borough
- Steelton Borough

In addition to the White Paper provided to you on January 4, 2022, regarding Steelton Borough's eligibility to partner on this project, we respectfully request that you consider the following information which demonstrates a watershed approach for the partnership.

PROXIMITY EVALUATION

Neighboring HUC 12 Watersheds

An evaluation of neighboring HUC 12 watersheds demonstrated that the following watersheds bordered the Laurel Run-Susquehanna River HUC 12 watershed which includes a significant portion of both Lower Swatara Township and New Cumberland Borough, additionally the Southwestern portion of Middletown Borough (as highlighted on the attached map):

- Bennett Run-Conewago Creek (York County)
- Salem Run-Fishing Creek (York County)
- Conodoguinet Creek-Susquehanna River (Cumberland County)
- Lower Yellow Breeches Creek (York and Cumberland Counties)
- Cove Creek-Susquehanna River (multiple upstream counties)
- Paxton Creek (Dauphin County)
- Spring Creek (Dauphin County)
- Iron Run - Swatara Creek (Dauphin County)

- Conewago Creek (Dauphin County)
- Hartman Run-Susquehanna River (multiple downstream counties)

The portions of Lower Swatara Township and Middletown Borough that are not within the Laurel Run-Susquehanna River watershed are located within the Iron Run-Swatara Creek Watershed. The portion of New Cumberland Borough outside of the Laurel Run-Susquehanna River Watershed is located within the Lower Yellow Breeches Creek Watershed.

As shown on the attached Watershed Map, the sediment load from Lower Swatara Township, Middletown Borough, and New Cumberland Borough will flow to the same discharge point for the Conewago Creek HUC 12 within the same Laurel Run-Susquehanna River HUC 12. So, the sediment load from the Conewago Creek HUC 12 will influence the same receiving Susquehanna River segment as Lower Swatara Township, Middletown Borough, and New Cumberland Borough.

SUMMARY

Lower Swatara Township, Middletown Borough, and New Cumberland Borough have done their due diligence regarding CBPRP implementation challenges and suitable alternatives, and a more innovative solution to meeting water quality goals is necessary for the municipalities to meet their MS4 permit obligations. Therefore, this joint project is being proposed with Londonderry Township via the Dauphin County WREP Program. The Conewago Creek Stream Restoration project has an opportunity to decrease sediment loading into a shared waterway, the Susquehanna River, that exceeds the municipalities' combined requirements under their CBPRPs. This project is also currently in construction, with approximately 60% of the project completed and the remaining portion anticipated to be completed in early 2023.

We recognize that an intergovernmental cooperative agreement, or its equivalent, will be required to be submitted to PADEP. The Dauphin County WREP Program outlines the sediment reduction commitment, cost, and long-term operation and maintenance responsibilities for each party. Once all agreement documentation between these partners and the County are signed, they will be provided to PADEP as part of the annual report.

It is respectfully requested that you allow the Lower Swatara Township, Middletown Borough, and New Cumberland Borough to partner with Londonderry Township via Dauphin County WREP to meet the sediment reduction requirements for this permit term. To avoid additional timeline constraints, a timely response is greatly appreciated.

Sincerely,

HERBERT, ROWLAND & GRUBIC, INC.

Shawn E. Fabian, CPESC, CPSWQ
Project Manager

TME/SEF/pk
R001068.0521
P:\0010\001068_0521\Admin\Grant Administration\WREP-PADEP Coordination for New Partners\WREP Justification Letter.docx

Enclosures (Watershed Map)
c: File
Shawn Fabian – HRG (via e-mail)
Adrienne Vicari – HRG (via e-mail)
Erin Letavic – HRG (via e-mail)
Randy Watts – HRG (via e-mail)
Joshua Sheetz – HRG (via e-mail)
Jacob Rakowsky, Environmental Engineering Specialist – PADEP (via e-mail)
Leah Staley, Civil Engineer Trainee - PADEP (via e-mail)

Watershed Map

Lower Swatara Township
Dauphin County, Pennsylvania

Middletown Borough
Dauphin County, Pennsylvania

New Cumberland Borough
Cumberland County, Pennsylvania

HUC 12 Watershed Boundary

Municipal Boundary

2 0 2 Miles

Mapping derived from data provided by PASDA & ESRI.

12/13/2022	PM: SEF	GIS: MSM	QA: TME	R000257.0439

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INTERGOVERNMENTAL COOPERATION AGREEMENT FOR THE CREATION AND IMPLEMENTATION OF THE DAUPHIN COUNTY REGIONAL WATER RESOURCE ENHANCEMENT PROGRAM

This **AGREEMENT** is made this 14 day of December, 2022 pursuant to the Pennsylvania Intergovernmental Cooperation Act, 53 Pa.C.S.A. § 2301, *et. seq.*, (hereinafter referred to as the "Agreement") by and between the County of Dauphin, Pennsylvania (hereinafter referred to as "Dauphin County"), a County of the third class having its principal office at the Office of the County Commissioners, 4th floor, Dauphin County Administration Building, 2 South Second Street, Harrisburg, Pennsylvania 17101, and all of the local governments (hereinafter collectively referred to as "Municipalities" or "Participants" or singularly as "Municipality" or "Party") properly executing this Intergovernmental Cooperation Agreement (together hereinafter referred to as the "Parties"), jointly, for the implementation of a regional stormwater management program to for the improvement of watercourses in the County of Dauphin and its associated watersheds.

WITNESSETH

WHEREAS, the Pennsylvania Intergovernmental Cooperation Act, 53 Pa.C.S.A. § 2301, *et. seq.*, authorizes two or more "local governments" and certain Municipal Authorities in this Commonwealth to jointly cooperate in the exercise or in the performance of their respective governmental functions, powers or responsibilities, 53 Pa.C.S.A. § 2303(a), and pursuant to 53 Pa.C.S.A. § 2303(b) to enter into a written agreement for intergovernmental cooperation with, or delegate any functions, powers or responsibilities to, another local government upon the passage of an ordinance or resolution by its governing body; and

WHEREAS, the Parties hereto are defined by the Intergovernmental Cooperation Act as "local governments", 53 Pa.C.S.A. § 2302; or an Authority eligible to participate in intergovernmental cooperation, 53 Pa.C.S.A. § 2305(b); and

WHEREAS, the Parties have a mutual public interest in working together in a cooperative manner to manage stormwater and improve water quality including regional stormwater infrastructure projects, implementation of Regional Plans which identify and fund cost effective best management practices (hereinafter referred to as "BMP(s)"), and flood mitigation, to reduce the annual amount of nitrogen, phosphorous and sediment entering impaired and non-impaired surface waters in Dauphin County, Pennsylvania as efficiently as possible, to work together in a cooperative manner to reduce flooding, and achieve the objectives set forth in this Agreement; and

WHEREAS, water quality and stormwater management were identified as Dauphin County priority issues in the 2017 Dauphin County Comprehensive Plan, and

WHEREAS, Pennsylvania is under pressure from its Chesapeake Bay Agreement partners to implement its Phase 3 Watershed Implementation Plan (Phase 3 WIP) by 2025, and Dauphin County has developed and is implementing a Countywide Action Plan, which will further Pennsylvania's overall nutrient reduction progress; and

WHEREAS, Municipalities that hold a Pennsylvania Department of Environmental Protection (hereinafter referred to as "DEP") Municipal Separate Storm Sewer System (hereinafter referred to

as "MS4") Permit (regarding stormwater discharges) within the Chesapeake Bay watershed are required to prepare and implement a Chesapeake Bay Pollutant Reduction Plan for the current permit term and it is anticipated similar Plans will be required for future permit cycles; and

WHEREAS, a new MS4 permit term is expected to commence in 2023 and may impose additional requirements on municipalities, especially with respect to nutrients (nitrogen and phosphorus); and

WHEREAS, certain BMPs are designed to control stormwater and improve water quality, and are required to be implemented as part of a pollutant reduction plan; and

WHEREAS, MS4 Municipalities are required to comply with certain stormwater related Minimum Control Measures (hereinafter referred to as "MCM") as mandated by law; and

WHEREAS, Projects and MCM work require capital expenditures, in some cases, significant capital expenditures; and

WHEREAS, the mileage of impaired streams within Dauphin County remains relatively unchanged despite many individual initiatives; and

WHEREAS, a majority of municipalities who participated in County-led outreach activities in 2019 and 2020 indicated an interest in a regional stormwater solution that tackles water quality, MS4 compliance, stream restoration, infrastructure resilience, flood mitigation; and

WHEREAS, the Parties anticipate that municipal cooperation will produce higher quality results at a reduced per participant cost; and

WHEREAS, by fostering a collaborative approach in advance of new MS4 permit and Countywide Action Plan implementation, the participating municipalities will be positioned to cost effectively comply while improving grant program success; and

WHEREAS, regional water quality improvements can be designed to improve localized flooding; and

WHEREAS, stormwater flooding has impacted properties throughout the County and Municipalities realize regional Flood Mitigation Projects can help to minimize the occurrence and extent of flooding; and

WHEREAS, Municipalities remain committed to enforcing their individual stormwater ordinances and accompanying obligations, and complying with their MS4 permit requirements, as applicable, and are interested in solutions that can increase their level of service and/or decrease their level of stormwater funding (through taxes or fees); and

WHEREAS, it is recognized that cost drivers associated with flooding, water quality and MS4 permit compliance correlate to a municipality's urbanized area (designated through the U.S. Census Bureau), non-urbanized area, and pollutant reductions required by the existing and future MS4 permit; and

WHEREAS, existing and future permit compliance costs can be estimated according to publicly available models, which regulators use to develop future permit requirements; and

WHEREAS, Dauphin County has developed a regional water resource enhancement program that is flexible so that it continually meets the needs of the Parties; and

WHEREAS, the Parties desire to cooperate to effectuate the cost-effective installation, operation, and maintenance of certain Projects to accomplish annual reduction(s) of nitrogen, phosphorous and sediment discharges into surface waters in the Dauphin County region; and

WHEREAS, Municipalities desire that Dauphin County will engage in stormwater management activities and provide assistance including facilitating the development and implementation of Regional Chesapeake Bay Pollution Reduction Plans for future permit cycles and the Countywide Action Plan ("Regional Plans"), along with the creation, operation, and maintenance of certain BMPs on behalf of the Participants as more specifically set forth herein; and

WHEREAS, as set forth in this Agreement, all Municipalities shall share in the cost to develop and implement the Regional Plans and BMPs through financial contributions as set forth in this Agreement in accordance with 53 P.S. § 2862; and

WHEREAS, the Municipalities desire to coordinate and cooperate with Dauphin County in efforts to plan, implement, fund, and operate certain water resource-related services at a regional level; and

WHEREAS, Dauphin County shall, with the Municipalities, develop new stormwater and water quality BMP Projects, including stormwater infrastructure construction and improvements, (individually referred to as a "BMP Project" or collectively "BMP Projects") to be identified in future Regional Plans and will fund the cost of doing so, along with providing the Municipalities with the related MS4 Permit administration information, through funds received annually from participating Municipalities consistent with this Agreement; and

WHEREAS, it is intended that Municipalities holding an MS4 Permit report the pollutant reductions achieved by construction of the Projects and that such pollutant reductions may be reported in each Municipality's MS4 Annual Status Report to DEP in accordance with the approved Regional Plans; and

WHEREAS, the content of the Regional Plans, including Project selection and the level of funding for Projects and other regional stormwater management program efforts, shall be determined as set forth herein; and

WHEREAS, the purpose of this Agreement is to set forth the understanding of the Participants as to how, *inter alia*, the Participants will cooperate to create and revise the Regional Plans, manage Projects throughout Dauphin County, interact with the regulatory agencies regarding MS4 permit requirements, implementation of the Regional Plans, and the obligations of each Municipality and Dauphin County; and

WHEREAS, the Participants agree and acknowledge that nothing in this Agreement or the resultant actions therefrom, shall prohibit, prevent, or interfere with any Participant's ability or obligation to

comply with applicable Pennsylvania law and regulation, Federal law and regulation, applicable regulatory agency rules and policies, permit requirements, DEP directives, or United States Environmental Protection Agency (hereinafter referred to as "EPA") directives, and local ordinances; and

WHEREAS, the Parties hereto believe that a regional approach to water resource management will result in significant cost savings through economies of scale, elimination of redundancy, and increased effectiveness of larger regional BMPs, and that such savings should be returned to the taxpayers or rate-payers in the form of reduced rates or enhanced investment in local infrastructure.

NOW, THEREFORE, the Parties hereto, in consideration of the mutual promises, covenants, and undertakings herein contained, each binding itself and representing that each has proper legal authority to enter into this Intergovernmental Cooperation Agreement, and intending to be legally bound, agree as follows:

ARTICLE I

Background and Definitions

1.01 Recitals.
The above recitals are incorporated herein by reference.

1.02 Definitions.
For purposes of this Agreement, the terms and phrases defined in this Section shall have the following meanings unless the context clearly otherwise requires:

"Administrative Expenses" shall mean the ordinary and usual expenses included in the general costs necessary to manage this Agreement.

"Authority" shall mean a governmental body created pursuant to the Pennsylvania Municipality Authorities Act, 53 Pa.C.S.A. § 5601, *et. seq.*, to finance and/or operate specific public works projects without using the general taxing powers of the municipality.

"Best Management Practices (BMP)" shall mean structural (including but not limited to the devices listed in the Pennsylvania Stormwater Best Management Practices Manual) and non-structural (design standards and planning concepts) items used to control the volume, rate and water quality of post construction stormwater runoff so as to protect and maintain the chemical, physical and biological properties of waters of the Commonwealth. BMP's must, at a minimum, protect and maintain water resources, preserve water supplies, maintain stream base flows, preserve and restore the flood carrying capacity of waters, preserve to the maximum extent practicable the natural stormwater runoff regimes and natural course, current and cross section of waters of the Commonwealth, and/or protect and conserve ground water and ground-water recharge areas.

"Chesapeake Bay Agreement" shall mean the Chesapeake Watershed Agreement of June 16, 2014, as amended January 24, 2020, for the restoration and protection of the Chesapeake Bay.

"Commonwealth" shall mean the Commonwealth of Pennsylvania.

"Consulting engineers" shall mean licensed experts in the fields of planning, design, and construction of public and private infrastructure.

"County Commissioners" shall mean the Board of Commissioners of the County of Dauphin.

"Flood Mitigation Projects" shall mean local level drainage and flood control projects that improve drainage and reduce flood risk for communities. It includes activities such as drainage pipes, topographic grading, wetland restoration, and other nature-based solutions.

"Minimum Control Measures (MCM)" shall mean the six categories required by DEP and EPA, as may be amended from time to time, to be addressed in municipal stormwater management programs, specifically: public education and outreach; public participation/involvement; illicit discharge detection and elimination; construction site runoff control; post-construction runoff control; and pollution prevention/good housekeeping.

"Municipal Separate Storm Sewer System (MS4)" shall mean all separate storm sewers that are defined as "large" or "medium" or "small" municipal separate storm sewer systems pursuant to 40 CFR §§ 122.26(b)(4), (b)(7), and (b)(16), respectively, or designated under 40 CFR § 122.26(a)(1)(v). (25 Pa. Code § 92a.32(a) and 40 CFR §122.26(b)(18)) including a conveyance or system of conveyances owned by a state, city, town, village, or other public entity that discharges waters of the Commonwealth; designed or used to collect or convey stormwater (including storm drains, pipes, ditches, etc.); not a combined sewer; and not part of a Publicly Owned Treatment Works (sewage treatment plant).

"Municipality(ies)" shall mean a city, borough, or township situate or draining to watersheds within Dauphin County Pennsylvania, or a municipal sewer, water, stormwater, or other Authority within Dauphin County Pennsylvania having the function, power or responsibility for stormwater management germane to this Agreement authorized by both the law under which the authority was created and the powers or purposes of the authority contained within its articles of incorporation.

"National Pollutant Discharge Elimination System (NPDES)" shall mean the federal government and Commonwealth of Pennsylvania's system for issuance of discharge permits under the federal Clean Water Act (CWA), the Pennsylvania Clean Streams Law and Storm Water Management Act.

"Nutrient Reduction Process" shall mean the process used for nitrogen and phosphorus removal from wastewater before it is discharged into surface or groundwater.

"Project" shall mean a structural Regional BMP Project, Flood Mitigation Project or MCM, implementation of a Regional Plan, or other activity under this Agreement for which the County may issue debt.

"Pollutant" shall mean any contaminant or other alteration of physical, chemical, biological, or radiological integrity of surface water which causes or has the potential to cause pollution.

"Regional BMP Project" shall mean a project of such scale that the results of the project (including but not limited to MS4 credit, water quality, flood mitigation, organizational capacity, recreation,

education, environmental) benefits multiple Municipalities while being impractical and/or unaffordable for each Participant to do by itself.

"Total Maximum Daily Load (TMDL)" shall mean the sum of individual waste load allocations for point sources, load allocations for nonpoint sources and natural quality and a margin of safety expressed in terms of mass per time, toxicity, or other appropriate measures.

"Watercourse" shall mean a distinct natural or artificial body of water flowing perennially or intermittently in a defined channel with bed and banks. The term includes a river, creek, stream, slough or canal.

"Watershed" shall mean the drainage area of a watercourse of a minimum drainage area determined in accordance with guidelines developed pursuant to 27 Pa.C.S.A. § 3115(a)(2) (relating to development, adoption, amendment and periodic review of State water plan).

"Watershed Implementation Plan (WIP)" shall mean plans for how the Chesapeake Bay watershed jurisdictions, in partnership with the federal government, will achieve the Chesapeake Bay TMDL allocations and planning targets.

"WREP" shall mean this Water Resource Enhancement Program.

ARTICLE II

Establishment and Organization

2.01. Establishment.

The Municipalities agree that Dauphin County shall be responsible for coordinating (1) the development and implementation of certain Projects, (2) the Regional Plans, (3) the creation, operation, and maintenance of certain Projects based upon their design and performance lifespan, and (4) select MCMs, as further set forth in this Agreement. All of these activities collectively shall be known as the "Dauphin County Regional Water Resource Enhancement Program" (hereinafter the "Program").

2.02. Authorization.

The Parties certify that they are authorized to enter into and execute this Agreement in the exercise and/or performance of their governmental functions, powers, or responsibilities. Participants further certify that they are not the subject of any pending lawsuits, regulatory actions, consent decrees, or other similar sanction of whatever kind related to stormwater, including but not limited to stormwater regional BMPs, Flood Mitigation Projects, and MCMs located within the Participants' municipal boundaries that would compromise or jeopardize the goals of this Agreement or any of the duties to be performed hereunder. Such Municipalities shall undertake best efforts to resolve any and all such lawsuits, fines, consent decrees, or similar sanctions prior to that Municipality's execution of this Agreement. In the event such a Municipality is unable to resolve such lawsuits, fines, consent decrees, or similar sanctions prior to execution of this Agreement, the Municipality agrees to fully indemnify and defend the Participants against any associated damages and liability incurred by Participants by virtue of said Municipality's lawsuits, fines, consent decrees, or similar sanctions to the extent permitted by law.

2.03 Delegation.
The Municipalities properly adopting and executing this Agreement herby delegate such functions, powers, and responsibilities exclusively to Dauphin County only to the extent necessary to effectuate the Projects in which they have elected to participate, or work permitted, agreed to, or required herein.

2.04. Participant Representation.
Each Municipality shall designate a primary voting representative and an alternate to serve as the contact person(s) on all matters related to the Program. The name and contact information for the representative and alternate shall be provided to the Tri-County Regional Planning Commission in writing, as well as any subsequent changes, within 15 days of final execution of this Agreement by the Municipality.

2.05. WREP Advisory Committee.
Each Municipality adopting this Agreement by September 30, 2022, shall be considered a "Founding Municipality." The WREP Advisory Committee tasked with determining the initial Tier Levels of Service shall be comprised only of the representatives designated by the Founding Municipalities, a representative designated by the Dauphin County Conservation District, the County Commissioners, and the Dauphin County Planning Commission. Municipalities electing to participate in the Program after September 30, 2022 will become voting members of the WREP Advisory Committee following the promulgation of the inaugural Tier Level of Service options. Alternates may attend all Committee meetings but may participate and vote only when the designated representative is unavailable. Unless a different person is designated from time to time by the County Commissioners, the Executive Director of the Tri-County Regional Planning Commission, *ex officio*, shall serve as Administrator for the Committee. The Administrator shall be a participating and voting member of the Advisory Committee and shall chair all meetings. The Administrator shall receive no additional compensation for performing these duties.

2.05.1. Advisory Committee Duties.
The WREP Advisory Committee shall provide input to Dauphin County staff, consultants, and consulting engineers on the service offerings, cost share formula, Project costs, proposed financing, Tier Level of Service offerings, and selection of Projects. The initial service offerings and cost share formula shall be recommended to the County Commissioners by December 31, 2022.

2.05.2. Advisory Committee Recommendations.
Only those Project recommendations made by a majority vote of the WREP Advisory Committee will be sent for review by the Dauphin County Planning Commission and the Dauphin County Conservation District for ultimate submission and consideration by the County Commissioners. Nothing herein shall limit or restrict Dauphin County or a Participant from implementing stormwater projects independently of this Agreement or its Participants.

ARTICLE III
Functions, Powers and Responsibilities

3.01. Dauphin County Functions, Powers and Responsibilities.
Among other things, Dauphin County shall be responsible for the following Program tasks:

3.01.1. Regional Plans and Regional Flood Mitigation Projects.

3.01.1.1. Prepare and make available to all Municipalities minutes from all Dauphin County and Tri-County Regional Planning Commission (TCRPC) meetings related to the Program, and any Projects thereunder, including Regional Plans, Projects, Flood Mitigation Projects, and other material matters contemplated by this Agreement.

3.01.1.2. Arrange, plan, and coordinate all meetings and/or conference/video calls regarding the Program, and any Projects thereunder, including, Regional Plans, Projects, Flood Mitigation Projects, and MCMs as deemed necessary by Dauphin County.

3.01.1.3. Prepare the Regional Plans, and any and all drafts, revisions, updates, or other amendments to the same.

3.01.1.4. Administer and implement the Regional Plans and conduct a review of the Regional Plans as deemed administratively necessary or otherwise required by law.

3.01.1.5. Oversee, supervise, and administer Projects, including ensuring that these projects are constructed as approved by Dauphin County. A description of services for the first project ("Project 1") is attached hereto and incorporated herein as Appendix A.

3.01.1.6. Approve for payment and pay appropriate invoices submitted for Projects.

3.01.1.7. Provide Program supplemental information as necessary for each Municipality to submit its MS4 Annual Status Report.

3.01.1.8. Arrange for the management and administration of the Program related funds including, but not limited to, Municipality contributions, grant monies, or any other similar funds of Dauphin County related to the Regional Plans, Projects, and MCM work.

3.01.1.9. Prepare or cause to be prepared an annual Financial Report of the Dauphin County Stormwater Account and all expenditures related to the Regional Plans, Projects, and MCM work.

3.01.1.10. Dauphin County shall be responsible for the implementation of new Projects (including, but not limited to, funding, design, permitting, construction, operation, monitoring, and maintenance). Dauphin County may contractually transfer such obligations for design, construction, operation and maintenance, and monitoring to qualified third parties, but Dauphin County shall remain responsible to ensure that the contracted third parties are performing the required tasks satisfactorily.

3.01.1.11. Dauphin County shall maintain the Program and Project documentation in accordance with applicable laws and regulations and shall provide copies of the same and updates to Municipalities upon request as more specifically set forth herein.

3.01.1.12. Dauphin County shall be responsible for any regulatory fines occasioned by actions taken under this Agreement to the extent of their responsibility as defined under this Agreement.

3.01.2. Minimum Control Measures (MCMs).
A Municipality may delegate responsibility for implementation of MCMs to the Program if approved by a majority vote of the WREP Advisory Committee and subsequent written approval of the County Commissioners for integration into this Agreement.

3.01.3. Other Dauphin County Tasks.

3.01.3.1. Dauphin County shall ensure that all applicable notice requirements are satisfied, and all required advertisements are drafted and published, at Dauphin County's expense, as required by applicable laws, including, but not limited to, the Pennsylvania Sunshine Act, 65 Pa.C.S.A. § 701, *et. seq.* Dauphin County shall not be responsible for any notices or advertisements for anything not related to this Agreement or anything required by law to be done by the Municipality.

3.01.3.2. Dauphin County shall retain all records, as that term is defined by the Pennsylvania Right-to-Know Law, 65 P.S. § 67.102, for the time period required by the County Records Manual or applicable law, whichever is longer, but in no event for less than six (6) years. Such records related to the Regional Plans, Projects, MCM work, or other activities undertaken pursuant to this Agreement shall be available for review and copying by any Municipality at Dauphin County offices upon request.

3.01.3.3. Dauphin County shall undertake other actions that may be necessary or convenient to implement the provisions and intent of this Agreement.

3.01.3.4. Dauphin County shall perform its obligations and duties under this Agreement in a competent and business-like manner and shall exercise due care, diligence, and control in connection with costs, fees, and expenses related to such performance so that the ratepayers that it serves will receive the benefits accruing from proper and efficient implementation of the Regional Plans, construction, operation and maintenance of Projects, and providing MCM support as contemplated by this Agreement.

3.01.4. Designated Representatives.
Dauphin County reserves the right to authorize any of its officers, employees, representatives or agents to administer this Agreement and exercise its rights under this Agreement.

3.02. Municipality Functions, Powers and Responsibilities.
The Municipalities' functions, powers and responsibilities shall be as follows:

3.02.1. Municipalities agree to act in good faith and to cooperate in all reasonable respects with Dauphin County so that Dauphin County may perform the obligations and duties assumed and undertaken under and by virtue of this Agreement in a proper and satisfactory manner.

3.02.2. Municipalities agree to take any and all legislative or other acts necessary to confirm Program participation and Project participation, as elected by each Municipality in accordance with this Agreement, in a timely manner and to not delay implementation of the Program or any Project elected by the Municipality.

3.02.3. Municipalities shall perform their obligations and duties under this Agreement in a competent and business-like manner and shall exercise due care, diligence, and control in connection with costs, fees, and expenses related to such performance so that property owners within the Municipalities will receive the benefits accruing from proper and efficient implementation of the Regional Plans, construction, operation and maintenance of Projects, and work related to covered MCMs.

3.02.4. To the extent they elect to participate in the Projects pursuant to this Agreement, Municipalities consent to the placement, construction, ownership, continued operation, and ongoing maintenance of new Projects by Dauphin County within their municipal borders consistent with the Regional Plans. Dauphin County may purchase or otherwise acquire any real property necessary to effectuate the purposes set forth herein, unless a Municipality otherwise agrees to acquire real property. If necessary, Municipalities agree to cooperate fully with Dauphin County's efforts in obtaining real property, which may include, at the Municipality's discretion, the use of eminent domain pursuant to the Eminent Domain Code, 26 Pa.C.S.A. § 101, *et seq*. In the event it is deemed preferable for a Municipality to acquire real property for a Project, a Municipality must act through its governing body or by referendum. Nothing in this section shall prevent a Municipality from being the Condemnor for a Project if mutually agreed to by the Municipality and Dauphin County.

3.02.5. Municipalities agree to continue the operation and maintenance and regulatory compliance requirements with respect to any and all existing BMPs and stormwater infrastructure for which they were responsible before the formation and implementation of this Agreement. All aspects of said operation and maintenance, including all administrative and document related tasks, shall be solely the Municipality's responsibility, to be performed at the Municipality's sole cost and expense. The Parties may, upon mutual agreement, elect to transfer responsibility for operation and maintenance, including all associated administrative functions, of existing BMPs to Dauphin County. Unless otherwise agreed upon, Dauphin County shall be responsible only for the placement, construction, ownership, operation, and maintenance of new Projects created pursuant to this Agreement and consistent with the Regional Plans.

3.02.6. Municipalities shall timely submit MS4 Annual Status Reports as required by existing law and regulations. Each Municipality shall, contemporaneously upon submission to DEP, provide to Dauphin County a digital or hard copy of the Municipality's MS4 Annual Status Report as well as reporting to Dauphin County on retained responsibilities relative to MS4 compliance.

3.02.7. Municipalities agree to cooperate fully in Dauphin County's acquisition of any easement or right-of-way necessitated by Dauphin County's administration of this Agreement and its creation, operation, and maintenance of any Project or other function covered by this Agreement.

3.02.8. Municipalities shall cooperate in any application by Dauphin County for grants or other

funding that can be used to fund the Regional Plan's implementation, Projects, and/or the actions and activities undertaken pursuant to this Agreement.

ARTICLE IV

Finance and Accounting

4.01. Municipality Contributions.

4.01.1. Initial Contribution.

Each Founding Municipality shall make an initial contribution for $500, payable to "Dauphin County," for purposes of financing the work items described in this Agreement ("Initial Contribution"). The Initial Contribution shall be tendered no later than sixty (60) days after the Effective Date of this Agreement.

4.01.2. Future Tier Level of Service Selection.

The Program, starting in 2023, will include a range of tiered services ("Tier Level of Service") to be developed by the WREP Advisory Committee by the end of 2022 for approval by the Dauphin County Commissioners during the first quarter of 2023, with said Tier Level of Service schedule being integrated into this Agreement upon approval by the Dauphin County Commissioners. At that time, Dauphin County will offer a 120-day period in which a Municipality may select to enroll in a Tier or withdraw from this Agreement and participation in the Program. The Tier Levels of Service may not include participation in Projects. Beginning in year 2025, Municipalities must select the desired Tier Level of Service for the subsequent two calendar years by December 1st of the preceding year. Any subsequent changes in Tier selection may result in additional charges borne by the Municipality.

4.01.3. Project Contribution.

Municipalities may elect to participate in Projects as distinct proposals offered to Participants. Participation in such Projects shall be offered by Dauphin County through the distribution of a specification report detailing the material Project information, including, but not limited to, total Project cost, anticipated MS4 credits available, if any, timelines of any phases and for completion, and reasonable estimations as to operation and maintenance costs. Project participation is distinct from Program participation. Municipalities must elect to participate in individual Projects and take any necessary legislative action to authorize each Project in which a Municipality elects to participate. Project costs will be billed to participating Municipalities in accordance with the details accompanying the Project specifications.

4.01.4. Annual Contribution.

For each year following 2023, Dauphin County will distribute annual invoices to each Municipality for the charges corresponding to each Municipality's selected Tier Level of Service. Dauphin County shall adopt and notify the Municipalities of the costs assigned to each Tier Level of Service not later than July 1 of each year, after which, the associated cost of each Tier may only be reduced.

4.01.5. Add-On Services Contribution.
In the event the Program offers Municipalities additional services separate from services provided in a Tier Level of Service (hereinafter "Add-On Services") and a Municipality selects one or more of the Add-On Services, the County will invoice each Municipality annually for the cost of those Add-On Services payment thereof net sixty (60) days unless an alternative financing plan is arranged with Dauphin County.

4.01.6. In-Kind Contributions.
A Municipality may choose to provide services to the benefit of the Program and the stormwater management services described herein in complete or partial payment of its required contribution. The value of any such service or services provided in lieu of a cash payment or contribution may be used as an offset to the contribution obligations provided in this Agreement. In-kind services may include, but are not limited to, peer to peer training, coordination of inspection services, hosting or inputting of regional Geographic Information System data and the like. The level and type of service to be provided and the level of credit would be mutually agreed upon by Dauphin County and the Municipality in advance of providing such service. Any offset of the Municipality's contribution would be reflected in the Municipality's contribution in the following year of the Program. If an offset to a Municipality's contribution is to occur in the final year of the Municipality's participation in the Program, Dauphin County will reimburse the Municipality in full not later than March 1st following the year the Municipality elected to terminate this Agreement.

4.01.7. Subsequent Participant ("opt in").
Dauphin County shall develop a separate policy with the input of all Founding Municipalities regarding the contribution required to be made by any local government that chooses to opt in/execute this Agreement after September 30, 2022. Any Subsequent Participant shall, however, contribute a one-time payment in an amount not less than the amount of any administrative costs and expenses occasioned on Dauphin County by virtue of the Subsequent Participant's opt-in (i.e., a "Plan Revision Fee"). Any initial contribution required of a Subsequent Participant shall not reduce the other Participants' Initial Contribution or entitle any Participant to a refund of the same.

4.02. County Contributions.

4.02.1. County Funding.
Dauphin County, in its sole discretion, may appropriate funds to the Program from time to time. Nothing herein shall be construed to require Dauphin County to make appropriations, or to guarantee any level of appropriation, to the Program. The award of Program grants shall be made in the sole discretion and approval of the County Board of Commissioners, upon recommendation of its Planning Commission and the WREP Advisory Committee.

4.02.2. County Indebtedness.

4.02.2.1. The County may, in its sole discretion, incur or guarantee indebtedness for the benefit of Projects undertaken in furtherance of the Program, including establishment of a Line(s) of Credit, the issuance of General Obligation Notes, or other instruments of indebtedness allowable for a County government, the proceeds of which will be used to (i)

provide funding to the Program for planning, designing, permitting, acquiring, constructing and installing certain approved Projects and (ii) paying the costs of issuance of the instrument, all of which constitute a valid governmental purpose.

4.02.2.2. The debt service for any County indebtedness for the benefit of Projects shall be paid exclusively by Municipality contributions and any grants awarded to the Program if allowable by the terms of the grant. Municipality contributions will only be required in support of Project indebtedness for Projects in which the Municipality has elected to Participate pursuant to 4.01.3.

4.02.2.3. Dauphin County shall present to the WREP Advisory Committee the details of any debt intended to be incurred requiring a multi-year contribution by the Municipalities at least ninety (90) days prior to entering a binding commitment to incur said debt. Municipalities must exercise proportional legislative authority necessary to incur debt prior to being held subject to any debt or debt service costs.

4.02.3. County Staffing.
Dauphin County shall provide, either directly or through delegation and/or subcontract, sufficient staff to administer the Program.

4.02.4. County Grant Management.
Dauphin County shall use best efforts to secure grant funding for the construction, operation and maintenance of Projects.

4.03. Accounting.

4.03.1. Dauphin County Stormwater Account.
Dauphin County shall establish a separate account (the "Dauphin County Stormwater Account") for the deposit of all funds related to or contemplated by this Agreement, including the Municipalities' Initial Contributions, Annual Contributions, and all other monies received by Dauphin County related to this Agreement from whatever source.

4.03.2. Initial Contribution Fund.
Municipality Initial Contributions shall be accounted for in the Dauphin County Stormwater Account in a separate and dedicated fund and shall be used solely for reimbursement for eligible Dauphin County administrative costs and expenses related to the operation and administration attributable to establishing the Program which includes the development and implementation of the Regional Plans. Future administrative expenses will be determined and allocated on a Project and Program basis as recommended by the WREP Advisory Committee and approved by the County Commissioners.

4.03.3. Other Revenues.
Any and all other revenues that may be acquired or used by Dauphin County under this Agreement related to stormwater management, including, but not limited to, grants, loans, or donated funds shall be accounted for separately from the Municipality Contributions. Said funds shall be used for the development and implementation, including but not limited to, construction, operation and maintenance of Projects, and MCMs identified in the Regional

Plans.

4.03.4. Fund Administration.
Administration of these funds to pay for proper expenses under this Agreement shall be the responsibility of Dauphin County. The County may assign this duty, through a separate agreement, to the Tri-County Regional Planning Commission or other qualified entity such as the Dauphin County Economic Development Corporation.

4.03.5. Audits.
An annual audit of all accounts and funds of the Program and Dauphin County Stormwater Account shall be completed by a qualified CPA to assure all Participants and the public that the accounts are in order. Each Participant shall be provided a true and correct copy of the annual audit upon completion thereof. The cost of this audit shall be included in the Program's budget.

4.04. Taxpayer/Ratepayer Returns.

4.04.1. Annual Report.
Dauphin County will provide, beginning in the year 2024, each Municipality an annual report that summarizes the accomplishments of the Program and an estimate of the cost savings yielded from the Program. Cost savings will be calculated for capital projects, mapping, inspection, etc. and grants or other funding support received by virtue of the Program.

4.04.2. Mandatory Returns.
Beginning in the year 2024, the Municipalities shall either (i) return a minimum of 60% of the respective reported cost savings directly to the Municipalities' taxpayers/rate payers through tax/rate reduction or (ii) certify to Dauphin County that any savings are being invested into infrastructure or water resource improvement projects that otherwise would have been funded through public funds. In no event shall a Municipality be required to show returns or investment justification in excess of 100% of its annual total stormwater management costs.

4.05. Fees and Costs.
Unless otherwise expressly stated herein, the Participants agree to bear their own fees and costs in connection with or incurred related to the matters between them, and relating to this Agreement.

ARTICLE V
Term and Termination

5.01. Effective Date.
This Agreement shall become effective as to each Participant upon execution of this Agreement. It is the intent of the Participants that their cooperative efforts, including the conduct of meetings authorized or required by this Agreement, shall commence within 60 days of the initial execution of the Agreement.

5.02. Term.
The term of this Agreement shall commence on the Effective Date and continue until terminated as set forth herein.

5.03. Term Stipulations.
If this Agreement is deemed to constitute a contractual impairment or limitation upon future governing bodies of the Parties in a legislative or governmental function, then the Parties hereby stipulate that this Agreement constitutes one of urgency and necessity, is in the public interest, and is absent of bad faith or ulterior motivation. The Parties further stipulate that stormwater management is statutorily prescribed.

5.04. Termination and Wind-Up.

5.04.1. Municipalities may elect to terminate this Agreement at the end of each regularly scheduled Pennsylvania Department of Environmental Protection General MS4 Permit period (hereinafter referred to as the "Permit Period"). Should the Permit Period be administratively extended by the Pennsylvania Department of Environmental Protection, that later date shall be deemed to be the end of the Permit Period for purposes of this section.

5.04.2. A Municipality electing to discontinue participation ("Discontinuing Municipality") in the Program shall elect to terminate its participation herein through the adoption of a resolution or ordinance not later than one hundred-eighty (180) days prior to end of a Permit Period. Termination shall be effective at 11:59 P.M. on the last day of the Permit Period with Tier Level of Service costs prorated as of such last day. The fund administrator will provide to the Discontinuing Municipality an accounting of the pro-rated costs within ninety (90) days of the date of termination including any charges against which the refund is set-off. Termination will not affect debts and costs previously incurred by the Municipality in accordance with its participation in the Program or the Discontinuing Municipality's obligation to pay thereon; however, in no event may an invoice related to such debts and costs exceed the amount that the Discontinuing Municipality duly assumed through an election to participate in the selected Tier Level of Service or Projects during its participation in the Program. Debts incurred during the participation in the Program will not be discharged as to the Discontinuing Municipality until such time as the original debts incurred by Dauphin County and accepted by the Municipality in furtherance of the Projects have been satisfied. At the request of a Municipality, Dauphin County will provide a one-time payment option, if accurately calculable, at the date of termination to cover future Program related debt and costs, as opposed to payments for the term of outstanding debt issuances.

5.04.3. In the event of termination of this Agreement as to all Municipalities for the discontinuance of the Program through mutual agreement, any funds remaining in the Dauphin County Stormwater Account, subject to any offsets necessary to retire any outstanding debt related to the Program, shall be returned to those Municipalities who remain participants in this Agreement at the time of termination based upon the contribution of the Municipality as of the date of termination. In the event funds remaining in the Dauphin County Stormwater Account are insufficient to retire any outstanding debt and cover operation and maintenance of Projects installed through the Agreement, Municipalities agree that Dauphin County may continue to charge the participating Municipalities in an amount sufficient and for as long as necessary to cover debt service on debts previously adopted by the Municipality and operation and maintenance costs of Projects installed unless alternate operation and maintenance arrangements are agreed to by the County and participating Municipalities at the Project development and

approval phase. Any funds remaining after any outstanding debt service and other costs are paid shall be disbursed to the Municipalities remaining on the date of Termination no more than one hundred twenty (120) days after the date of Termination.

ARTICLE VI

Contract Provisions

6.01. Integration.
This Agreement (and the incorporated Appendices) constitute the entire understanding and agreement between the Parties with respect to the subject matter of this Agreement and cancels, supersedes and terminates all prior agreements, contracts, understandings, negotiations, and other arrangements between the Parties whether written or oral or partly written and partly oral with respect to the subject matter of this Agreement. There are no understandings or agreements, verbal or otherwise, in relation hereto, except those expressly and specifically set forth herein.

6.02. No Reliance.
The Parties warrant that they have not relied upon any statement, projection, disclosure, report, information or any other representation or warranty except for those as may be specifically and expressly set forth in this Agreement.

6.03. No Third-Party Beneficiaries.
No provision of this Agreement shall be construed in any manner so as to create any rights in any third parties not party to this Agreement. This Agreement shall be interpreted solely to define specific duties and responsibilities between Dauphin County and the Municipalities and shall not provide any basis for claims of any other individual, partnership, corporation, organization, or municipal entity.

6.04. Other Contracts.
The Parties, at their sole expense, may undertake or award other contracts for additional or related work, and the Parties, and any subcontractors of the Parties, shall fully cooperate with the Program created hereby and carefully fit any additional or related work to the Program. The Parties shall not commit or permit any act that will interfere with the performance of work pursuant to this Agreement. This paragraph shall be included in the contracts of all contractors with whom each Party will be required to cooperate.

6.05. Amendment.
Any alterations, variations, modifications, amendments, waivers or additional provisions to this Agreement will be valid only when reduced to writing, approved by official action of each Party and duly signed by authorized representatives of all Parties, and attached hereto. No oral amendment, modification or waiver shall be effective, and this provision may not be orally amended or waived. The parties hereto further agree that any particular course of performance may not be used by any trier-of-fact to imply or infer a modification of this Agreement.

6.06. Severability.
All agreements, provisions and covenants contained in this Agreement are severable, and in the event any of them are held to be invalid by any competent court, this Agreement shall be interpreted as if the invalid agreements, provisions or covenants were not contained in this Agreement.

6.07. Applicable Law.
This Agreement shall be construed and governed pursuant to the laws of the Commonwealth of Pennsylvania. Any dispute arising from this Agreement shall be heard in the Court of Common Pleas of Dauphin County and the Parties hereby submit to the exclusive jurisdiction of that Court.

6.08. Dispute Notification.
In the event of disputes arising under this Agreement and prior to the initialization of mediation as required by Section 6.09 and thereafter legal action, the complaining Party shall reduce each and every complaint to writing and deliver same to the Dauphin County Commissioners.

6.09. Dispute Resolution.
Upon the written request of a Party, any dispute or claim in law or equity arising out of this Agreement shall be submitted to neutral, non-binding mediation prior to the commencement of litigation or any other proceeding before a trier of fact, as follows:

6.09.1. The Parties to the dispute or claim agree to act in good faith to participate in mediation and to identify a mutually acceptable mediator. If they are unable to agree upon a mediator within twenty (20) days from the date of the written request for mediation the Dauphin County Solicitor shall appoint a mediator. All Parties to the mediation shall share equally in the costs. After the selection of the mediator, the Parties shall submit to mediation for a period up to forty-five (45) days.

6.09.2. If the dispute or claim is not resolved by the forty-fifth (45^{th}) day after the selection of the mediator or if the mediation does not successfully resolve the dispute or claim, then the mediator shall provide written notice to the Parties reflecting the same and the Parties may seek alternative forms of resolution to the dispute or claim in accordance with the terms of this Agreement and other rights and remedies afforded by law.

6.09.3. If the dispute or claim is resolved through mediation, the resolution will be documented by a written agreement executed by all Parties.

ARTICLE VII
Execution

7.01. Representation by Counsel.
This Agreement has been negotiated by the Parties through their respective legal counsel and embodies terms that were arrived at through mutual negotiation and joint effort, and the Parties shall be considered to have contributed equally to the preparation of this Agreement. The Parties warrant and represent that the terms and conditions of this Agreement have been discussed and negotiated between them, and their respective counsel, and are voluntarily and knowingly accepted for the purpose of making a binding contract between the Parties. The Parties further acknowledge that they understand the facts and their respective legal rights and obligations pursuant to this Agreement.

7.02. Ordinance or Resolution.
Pursuant to 53 Pa.C.S.A. § 2305(a) the Parties shall enter into this Agreement for intergovernmental cooperation only through the passage of an ordinance or resolution by their respective governing bodies. Each Municipality shall provide Dauphin County with a copy of said ordinance or resolution prior to participation.

7.03. Notices.
All notices required by a Municipality to be given or so sent hereunder or any other official correspondence regarding this Agreement to Dauphin County shall be sent by the Municipality via United States mail, postage prepaid, addressed to the following individuals at the following addresses unless Dauphin County informs the Municipality, in a future writing, of a different address(es) for purposes of receiving notices hereunder. All notices given pursuant to this Section shall be effective as of the date said notice is mailed.

TCRPC Executive Director
112 Market Street, 2nd Floor
Harrisburg, PA 17101

Dauphin County Chief Clerk
2 S. Second Street, 4th Floor
Harrisburg, PA 17101

7.04. Counterparts.
This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. This Agreement may be electronically transmitted and electronically signed, in whole or in part, pursuant to the Pennsylvania Electronic Transactions Act, 73 P.S. § 2260.101 *et. seq.* and The Electronic Signatures in Global and National Commerce Act, 15 U.S.C.A. § 7001, *et. seq.* The effectiveness of such documents and signatures shall have the same force and legal effect as manually signed originals and shall be binding on the parties.

7.05. Signatures.
The undersigned individuals and/or representatives of each party, represent and warrant that they have the signatory authority to enter into this Agreement and legally bind the respective party hereto.

[Remainder of Page Intentionally Left Blank]

IN WITNESS WHEREOF, the parties hereto have caused this Intergovernmental Cooperation Agreement for the Implementation of the Dauphin County Regional Water Resource Enhancement Program to be executed by their authorized officers.

ATTEST:

J. Scott Burford
Chief Clerk/Chief of Staff

(SEAL)

COUNTY of DAUPHIN
COMMONWEALTH of PENNSYLVANIA

Mike Pries, Chairman
Board of Commissioners

Chad Saylor, Vice-Chairman
Board of Commissioners

George P. Hartwick, III, Secretary
Board of Commissioners

ATTEST:

_____

MUNICIPALITY: Lower Swatara Twp

Jon A. Wilt

_____

_____

_____

_____

_____

_____

_____

_____

For eligible municipalities, Project 1 Add-on Service Investment ($2/lb sediment):

*$*_____ *for* _____ *sediment*

Note: Separate Page 19 for each participating Municipality.

APPENDIX A
OF THE
INTERGOVERNMENTAL COOPERATION AGREEMENT
FOR THE
DAUPHIN COUNTY
REGIONAL WATER RESOURCE ENHANCEMENT PROGRAM

I. Project 1 Background: MS4 municipalities have a difficult time meeting their sediment reduction requirements within their boundaries by 2023 (space constraints, cost constraints). To kickoff WREP, a regional project was identified that can be started in 2022 to demonstrate that Dauphin County's role in assisting municipalities with stormwater management can result in cost savings and other co-benefits. Londonderry Township has a large-scale stream restoration BMP (Conewago Creek project) that is anticipated to result in more sediment reduction credits than the Township, and its partner Mount Joy Township, need to satisfy their MS4 requirements. Candidate MS4 municipalities who may have interest in paying into the partnership in return for sediment reduction credits that will be reportable to PADEP: Steelton Borough, Middletown Borough, Lower Swatara Township, Highspire Borough, Swatara Township, New Cumberland Borough (Cumberland County) – refer to Figure 1 for eligible municipalities in cyan watersheds.

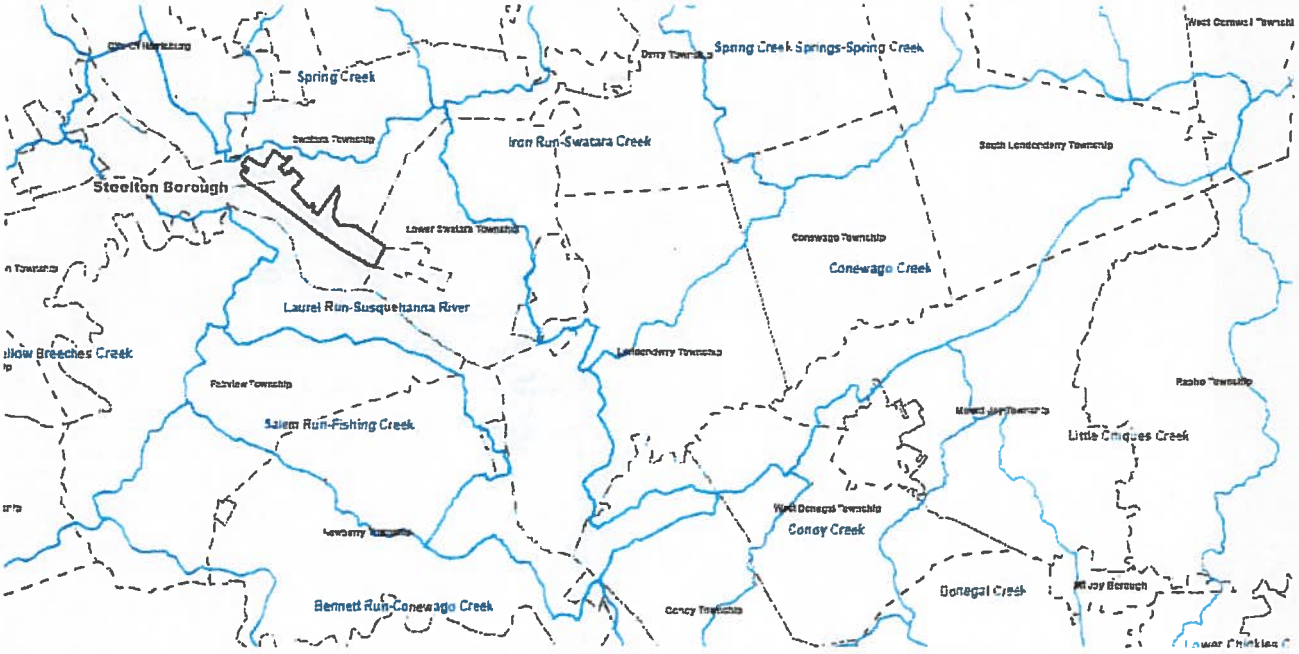
II. Conewago Creek Restoration Project construction schedule:
- A. Phase 1 – Brills Run to confluence
- B. Phase 2 – entirely in Lancaster County
- C. Phase 3 – entirely in Dauphin County
- D. Opened bids February 16, 2022, start construction May 2022
- E. Milestone 1 – Final Grading due August 25, 2022
- F. Substantial Completion – due September 22, 2022
- G. Final Completion – due October 22, 2022
- H. Phase 3 – anticipated to be built in 2023, notice to proceed will be issued upon confirmation that it is fully funded

III. Roles:
- A. TCRPC – Sediment reduction intergovernmental partnership administration (issue partnership agreements, track sediment reduction balance, coordinate partnership candidates, distribute MS4 documentation to partners for annual reports); lead on WREP advancement.
- B. DC DCED – Debt issuance and funding administration; additional roles based upon funding sources.
- C. Londonderry Township – Administer the existing local funding and construction project (Project owner for Phases 1 and 2 is certain; Owner of Phase 3 if funding sources require it); project permittee; provide MS4 documentation to TCRPC to distribute to partnering municipalities for their annual reports; take part in decision making regarding $/lb. and candidate partners.
- D. Municipal Partner – Invest an amount that contributes to project costs at a rate of $2.00 per pound of sediment. Municipal Partner will receive documentation from TCRPC regarding the sediment reduction yield of the project and the reportable amount of sediment reduction credits that the Municipal Partner should report on its Annual Report for Pollutant Reduction Plan credit.

IV. Add-on service optional signup:

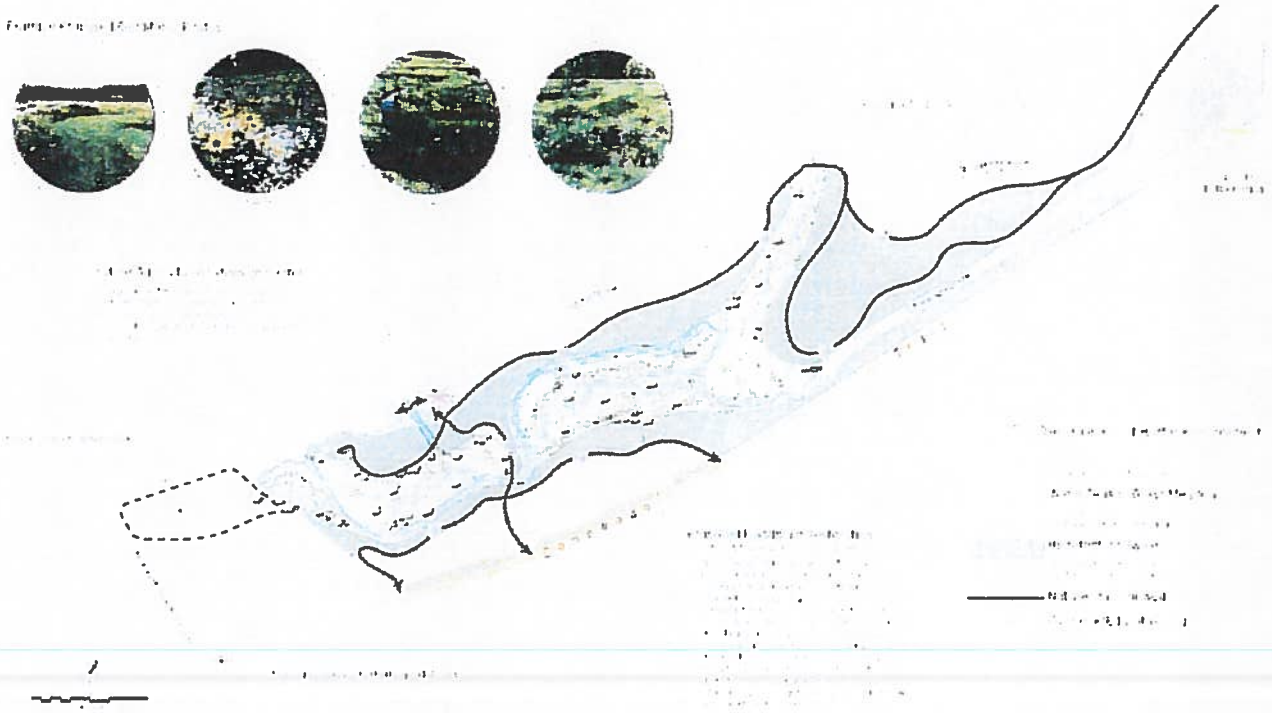
A. Eligible municipalities will designate their investment in the Conewago Creek Restoration Project by indicating the cash amount and corresponding sediment reduction credits at the rate listed under Section III.D. on the signature page of the Intergovernmental Cooperation Agreement.

FIGURE 1 - ELIGIBLE MUNICIPALITIES MAP



Excerpt from HRG Whitepaper, January 4, 2022 – Steelton Borough Joint PRP Project with Londonderry Township (Dauphin County)

FIGURE 2 – PROJECT MASTER PLAN



Project outcomes:

4877-ft stream restoration
2,988-ft stream creation
15.2-ac floodplain restored to historical conditions
125,000-cy legacy sediment removal
1,018,000-lb sediment reduction credit

FIGURE 3 – LAND ACQUISITION AREA MAP

Chesapeake Bay Watershed
Sediment Reduction Project

PA Turnpike Commission
Pollutant Reduction Plan Amendment
Rosedale Ave BMP

Lower Swatara Township
Dauphin County

Prepared For:
Pennsylvania Turnpike Commission

Prepared By:
First Pennsylvania Resource, LLC
a wholly owned subsidiary of RES, LLC
317 East Carson Street, Suite 242
Pittsburgh, PA 15219

Revised January 2023

TABLE OF CONTENTS

LIST OF TABLES

LIST OF GRAPHS

LIST OF APPENDICES

Executive Summary

First Pennsylvania Resource, LLC ("FPR"), a wholly owned subsidiary of Resource Environmental Solutions, LLC (RES) has prepared a Pollutant Reduction Plan (PRP) Amendment for the PA Turnpike Commission (PTC) for the Rosedale Ave BMP (Project, BMP, Site), as a component of the larger PennDOT facilitated Chesapeake Bay Watershed Sediment Reduction Project. The purpose of the Project is to provide sediment reduction toward the PTC to reduce sediment as required by their MS4 permit.

The Project proposes to use stream restoration with a floodplain restoration approach at the Rosedale Ave BMP in the Upper Chesapeake Bay Watershed (4-Digit HUC #0206) (Appendix A. Figures). The BMP is located just north of a mobile home park between Rosedale Avenue and Lisa Lake in Lower Swatara Township, Dauphin County. The BMP is located within the PTC Planning Area and is privately owned. RES is in the process of negotiating a land option agreement with the landowner for the areas included within the BMP footprint.

The chosen streams are unstable with incised channels due to stormwater impacts and historic and ongoing land uses. The proposed floodplain restorations are designed to be self-sustaining, highly functioning floodplain systems that will reduce pollutant loadings by stabilizing eroding streambanks and reconnecting the stream with its historic floodplain. Restoration efforts will utilize a combination of channel restoration, floodplain grading, subsurface grade control structures, and habitat structural improvements to restore the channel pattern and floodplain. The floodplain restoration approach aims to spread high flow storm events across a larger re-established floodplain area, reducing shear stresses within the channel. A combination of subsurface logs and rocks will be used to provide grade control and long-term vertical bed stability. The resulting stream complexes are designed to have low bank heights and low to very low streambank erosion rates. Where site conditions will not accommodate floodplain restoration, a natural channel design approach will be used to repair and stabilize the eroded stream channels.

This PRP and associated baseline sediment loading, reduction, and effectiveness calculations were prepared in accordance with the PA DEP MS4 Checklist Series (2020) , PA DEP guidance document 3800-PM-BCW0100k - National Pollutant Discharges Elimination Systems (NPDES) Stormwater Discharges from Small Municipal Separate Storm Sewer Systems Pollutant Reduction Plan (PRP) Instructions (3/2017), Consensus Recommendation for Improving the Application of the Prevented Sediment Protocol for Urban Stream Restoration Projects Built for Pollutant Removal Credit (02/2020), Consensus Recommendations to Improve Protocols 2 and 3 for Defining Stream Restoration Pollutant Removal Credits (10/2020), and the Credit Determination Protocols 1 and 3 of the "Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects (09/2014) (collectively referred to as the Updated Expert Panel Documents)."

The results of the investigation indicate that the proposed Rosedale Ave BMP could be employed to achieve and/or exceed the contracted sediment reduction target of 270,000 lbs/year, as well as substantially reduce nitrogen and phosphorus loading. The site-specific reduction totals for sediment, or total suspended solids (TSS), are provided. These calculations demonstrate a direct nexus between the restoration effort and improved water quality in the Chesapeake Bay Watershed.

A. Pollutants of Concern

The proposed Project consists of one BMP within the Chesapeake Bay. As a project within the Chesapeake Bay, the pollutants of concern are sediment and nutrients (Total Phosphorus [TP]

and Total Nitrogen [TN]). The PA DEP's Pollutant Aggregation Suggestions for MS4 Requirements Table (Municipal) (rev. 3/5/2018), indicates that the applicable requirements include Appendix D - Siltation/Nutrients and Appendix E – Excessive Algal Growth and Siltation. According to the PRP instructions, the assumption can be made that meeting the sediment reduction goals for the watershed will also accomplish nutrient reduction goals. For this project, sediment will be discussed as the primary pollutant of concern (POC), but TP and TN reduction estimates will also be provided.

B. MS4 Eligibility

The PTC has Pollutant Reduction Plan (PRP) obligations in the National Pollutant Discharge Elimination System (NPDES) under their individual MS4 permits with sediment reduction requirements. Information regarding the specified planning area, implementation timeframe, and method for calculating loading and load reductions is provided below in Table 1. PTC MS4 Permit Details.

Table 1: PTC MS4 Permit Detailsails

Stakeholder	Permit Issuance/ Renewal Date	Implementation Date	Planning Area	Methods used for Calculating:	
				Sediment Loading	Sediment Load Reduction
PTC	October 29, 2021	October 2026	PTC properties + 1-mile buffer	MapShed	Default Rate (115 lb/ft) or Expert Panel Protocols

Figures detailing the location of the BMP, the immediate surroundings, and visual representations of baseline data collected are provided in Appendix A: Figures. Figures include Figure 1: Vicinity Map, Figure 2: Project Location Map, Figure 3: 2011 National Land Use Map, Figure 4: Bank Erosion Hazard Index (BEHI) Ratings Map, Figure 5: Near Bank Stress (NBS) Ratings Map, Figure 6: Erosion Rate Map, and Figure 7: Erosion Pin Locations. restoration approach is shown in Appendix C: Design Plans. The BMP-specific loading and reduction values are summarized in Sections C and D below and in Appendix D: Supporting Documentation. Photographs documenting the active erosion are also included in Appendix D.

B.1 BMP

The Rosedale Ave BMP is located just north of a mobile home park between Rosedale Avenue and Lisa Lake in Lower Swatara Township. The project is located within the PTC Planning Area. RES is in the process of negotiating a land option agreement with the landowner for the areas included within the BMP footprint. Land cover within the proposed BMP limits is mostly early successional forest and shrubland between roadways and residential developments. The roughly 1,397 LF of UNTs originate from a culvert underneath Rosedale Avenue and drainages along White House Lane. The main stream reach is listed as attaining for aquatic life, and its designated use is listed as Warm Water Fisheries (2020 Integrated Report; Ch. 93 Designated Use). The stream is deeply entrenched with vertical banks up to 6 feet in areas, and minimal bank protection/vegetation. The banks are undercut along outer curves and the channel is over widening rapidly. RES proposes to utilize floodplain restoration to maximize sediment reduction potential.

B.2 MS4 Eligibility

This BMP meets the minimum eligibility criteria summarized in the "Considerations of Stream Restoration Projects in Pennsylvania for Eligibility as an MS4 Best Management Practice" Document. These minimum criteria include:

- Documented existing and active streambank erosion (Section C, Appendices A and D);
- A minimum of 100 linear feet of stream channel (Table 2, Appendices A and D);
- Impervious areas upstream of the project must be sufficiently treated to address peak flows that may exceed engineering design thresholds or compromise channel form and function;
    - The first step in the design process is an existing conditions watershed assessment which accounts for the drainage area and difference in land cover within and upstream of the project area. In the 2D modeling, steady-state peak flow are determined from the watershed assessment to design for the worst case scenario 100-year event. By nature, the floodplain designs act in such a way that peak flows are attenuated during storm events relative to the pre-design conditions. Easier access to a wide and hydraulically rough floodplain decreases flow velocity, which in turn increases residence time within the project area. This increased residence time flattens the runoff hydrograph relative to the existing conditions. Model results are also used to design grade and erosion control structures in areas that demonstrate high shear stresses to ensure that the integrity of the channel's form and function is maintained even during strong storm events (Appendix C).
- The project addresses both sides of the channel
- The project maximizes floodplain reconnection through the regrading of the floodplain and a combination of approaches to either raise the floodplain and channel elevation through valley fill or to lower them to reconnect the stream to the groundwater table (where appropriate). The restored bank heights are designed to be very low (6"-12") in order to maximize overbank flooding events into the floodplain; and,
- A minimum permanent 35' riparian buffer on all sites. The nature of the stream valleys varies across the BMP but the floodplain width varies from approximately 50' to 60'. The conservation boundaries as shown in Appendix A and C will be left intact indefinitely to provide buffer for the streams and replanting will occur within the entire restored floodplain regardless of width. Where the floodplain width may not encompass the entire 35', additional upland plantings will be included.

C. Determine Existing Loading for Pollutants of Concern

Extensive baseline site investigations were conducted at the BMP by RES staff to evaluate existing sediment loads and erosion rates, following protocols established in the Updated Expert Panel Documents, and to guide restoration design.

C.1 Baseline Data Collection

Within the study area for the BMP, the streams were walked to identify restoration potential and identify unique reaches. Reaches with full restoration potential were subdivided into unique categories based on land cover type, land use type, vegetation status, and bank erosion severity/frequency. One Bank Erosion Hazard Index (BEHI) Assessment and Near Bank Stress (NBS) Assessment was completed at a representative eroding bank in each of the assessment reaches. NBS was estimated following procedures outlined by Rosgen using

a Level II – General Prediction estimation described in Method 1: Rapid Visual Assessment. Upon the completion of the evaluations, each reach was walked again to verify the assessment results, record the average height of each study bank and determine the start and endpoints of the banks using a Trimble Geo7 Hand Held GPS Unit.

Soil bulk density samples were collected at a rate of approximately 1/500 linear feet using standard core sampling methods at a range of depths. These samples were analyzed by Geotechnical Testing Services, Inc., the results are summarized in Table 2. Baseline Data Summary and in Appendix F. Soil Bulk Density Sampling Results. The average of all of the samples was used as the bulk density value in the Protocol 1 calculations.

Although bank erosion pins can be unreliable, as they fail to accurately account for the many causes of erosion and are often washed away, they are widely used to give a "snapshot" of lateral erosion occurring at set locations within a streambank. Bank erosion pins were installed at representative locations within the main stem of the BMP. The date and bank height were noted, and measurements were taken from the end of the pin to the streambank. The measurements were collected multiple times over the course of the year. The locations of the erosion pins which have already been installed are shown in the Figure 7 (Appendix A. Figures). This data is provided in Appendix D for results collected to date, for a minimum of 12 months worth of measurements.

Acute bank slumping, or mass wasting, a substantial mechanism contributing to sediment loss from the site, was also observed. This data is very important because in portions of the BMP it accounts for the majority of erosion observed and is either not captured at snapshot locations by bank pin measurements or is misrepresenting bank pin measurements as though the bank is aggrading when it is in fact buried by material slumping on top of them. In addition, bank pin data cannot provide estimates of the sediment being lost as a result of vertical instability, in all locations, or in major storm events.

C.2 Data Analysis

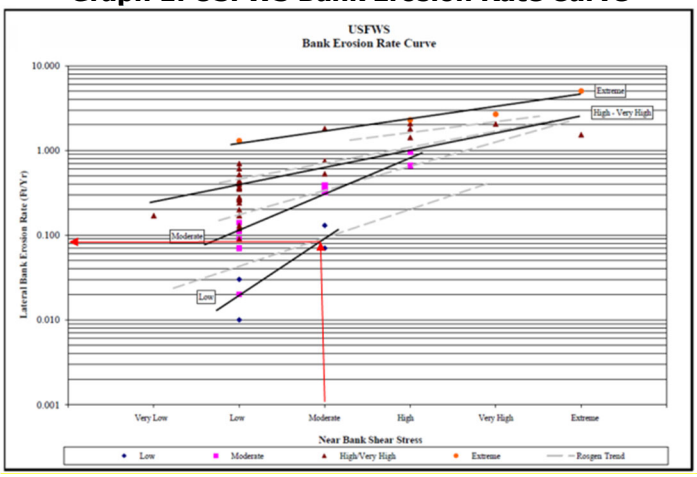
Data analysis was completed using the field assessment data and surveyed stream data in ESRI ArcGIS ArcMap and Microsoft Excel. For the BMP, a detailed attribute table was created for the entirety of the surveyed stream layer using the BEHI and NBS evaluation data gathered during the field investigation. Bank heights were adjusted using the GPS data to account for the variation in bank height throughout each assessment reach. The final attribute table included the following: Reach ID, Restoration Type, Study Bank Height, Bank Full Height, Bank Angle, Root Depth, Root Density, Surface Protection, Bank Full Width, and Stream Length.

The attribute table was then exported to Microsoft Excel to complete the analyses. BEHI data was analyzed and values were generated following procedures established in David L. Rosgen's "*A Practical Method of Computing Streambank Erosion Rate (2001).*" NBS Ratings were generated again using best fit polynomial equations extracted from scatter plots created in excel using Rosgen's established values and ratings converted to numeric values.

Bank erosion rates were then calculated following procedures outlined in Rosgen's Bank and Nonpoint Source Consequences of Sediment (BANCS) Method with the incorporation of Bank Erosion Curves created by the U.S. Fish & Wildlife Service Chesapeake Bay Field Office Coastal Program (Graph 1). For a more accurate and rapid calculation of erosion rate, values were

plotted in excel on a scatter plot where linear equations were later developed. The generated graph is provided below.

Graph 1: USFWS Bank Erosion Rate Curve



C.3 Results

The baseline data are summarized in Table 2. BEHI and NBS scores ranged from moderate to high, with an average ranging from moderate to moderate-high. All BMPs have areas with severe erosion and high bank heights. These data can be assessed visually in Figures 4-6.

Based upon these data, the annual sediment loads were calculated. The default concentrations of TP (1.05 lb TP/ton TSS) and TN (2.28 lb TN/ton TSS), as described in the Updated Expert Panel Documents, were then used to estimate existing TP and TN loading at the project site.

Table 2: Baseline Data Summary		
Variables		
Stream Length		1,397
Average	**Bank Height (ft, weighted ave)**	3.15
	BEHI	High
	NBS	Mod-High
	Erosion Rate (weighted ave)	0.81
	Soil Bulk Density	92.9 (4 Samples)

The land-river sediment delivery factors (Chesapeake Community Modeling Program's (CCMP) Phase 5.3 Data Library) were then applied to determine the rates of pollutants arriving at the Chesapeake Bay from these BMPs. These data and the calculated erosion rates indicate highly unstable streambanks at this BMP are resulting in large volumes of existing pollutant loading (Table 3: Existing Pollutant Loads at BMP).

Table 3: Existing Pollutant Loads		
Variables		
Total Annual Load (Lbs/Year)		672,570
Delivery Factor	**TSS**	0.293
	TP	0.417
	TN	0.695
Bulk Density (Lbs/CF)		92.93
Delivered TSS (Lbs/Year)		197,063

D. BMP to Achieve Reductions in Pollutant Loading

To estimate the pollutant reduction directly attributable to the proposed stream restoration BMP using the Expert Panel Protocols (Appendix C: Design Plans), the total loads (tons/yr) were converted to the unit loads (lbs/ft/yr) by dividing the total load by the linear footage of stream, which was calculated as half of total streambank lengths and multiplying by 2,000 to convert into lbs.

The Protocol 1 calculations result in the projected sediment reduction yield achieved through direct prevention of sediment loss using calculated existing loads. In accordance with the PRP Instructions for such stream restoration BMPs, the total load reductions were calculated using the applicable sediment delivery ratio. The restoration efficiency uncertainties were calculated at the interim 75% and at 90%, based upon the mathematical relationship of high existing and low proposed bank heights as observed on similar floodplain restoration projects.

Recent PA DEP guidance has indicated that restoration efficiencies up to 90% may be used with: 1) adequate documentation of a secondary method to validate the BANCS assessment, 2) pre-construction monitoring data, 3) a post-construction monitoring plan, and 4) a minimum of 1 year of post-construction monitoring data to justify the results.

As described above, pre-construction data collected for this purpose include DoD Modeling, surveyed cross sections of the existing stream condition across the sites, quantitative bank pin and mass wasting observations, and calculations of existing substrate and woody debris. (Appendix D. Supporting Data)

A simplified version of the updated Protocol 3 methodology from *Consensus Recommendations to Improve Protocols 2 and 3 for Defining Stream Restoration Pollutant Removal Credits* was used to determine the suspended sediment load reductions as a result of the Project conceptual restoration designs. The USGS Groundwater Toolbox and USGS StreamStats were used to determine each site's 50% recurrence interval baseflow and annual flow exceedance interval curve. That flow data was used to define the Floodplain Trapping Zone (FTZ) in both the existing and proposed conditions, and to determine the net percentage of flows treated in the conceptual floodplain design. The USDA Cross-Section Analyzer was used to complete the conceptual-level modeling whereas final calculations will be performed using a coupled 1D/2D HEC-RAS model. The entirety of the floodplain was assumed to be non-tidal wetland (NTW) restoration. The specific steps of Protocol 3 were then followed to determine each site's P6 Land-River Segment ID, unit sediment load delivered to the site using the Chesapeake Bay CAST tool, and final sediment load reduction in units of [lbs TSS/yr]. The summary of Protocol 3 results are included in Table 4 below and in greater detail in Appendix D.

The results sediment reduction calculations are summarized below in Table 4: Anticipated BMP Load Reductions. The total indicates potential reduction generation for the BMP in its entirety; however, actual reduction generated will be determined by the extents of the constructed BMP and through 12-month post construction validation.

Table 4. Anticipated Sediment Reduction		
TSS Loading (Lbs/Yr)		197,063
Protocol 1: Annual TSS Reduction (Lbs/Yr)	**Interim 75% Efficiency**	147,797
	90% Efficiency	177,357
Protocol 3: Additional TSS Reduction (Lbs/Yr)		302,887
Total Annual TSS Reduction (Lbs/Yr)	**Interim 75% Efficiency**	450,684
	90% Efficiency	**480,244**
	115 lb/ft Default	160,655
Total Annual TN Reduction (Lbs/Yr)		533
Total Annual TP (Lbs/Yr)		147

Notes:
1. Per PA DEP Guidance, the MMW may claim either 115 lb/ft or the Expert Panel Efficiency value. Both totals are show above.
2. It is understood that only 75% efficiency will be granted until the 1-year post-construction validation monitoring even provides data justifying the capped 90% efficiency.
4. The totals above indicate potential reduction generation for the BMP in its entirety. Actual reduction generated will be determined by the extents of the constructed BMP and through 12-month post construction validation.

E. BMP Operations and Maintenance (O & M)

With regard to the land acquisition, RES identifies potential BMPs and contacts the landowners of the potential BMP. Regardless of ownership type (private or public), RES negotiates a site protection instrument (SPI) such as a declaration of restrictive covenant for conservation (DRC), and an agreement with the landowner which provides for the execution of the SPI upon the closing of the agreement. A memorandum of this agreement is recorded at the county courthouse to give public notice of the agreement. The agreement also provides an inspection period which typically consists of an initial 12-month term with two 6-month extensions for a total of 24 months until closing must be initiated, or the contract expires. During the inspection period, RES conducts due diligence on the property and confirms title to the subject property, acquires title insurance and addresses concerns with the title, such as pre-existing easements, or liens. During this time, RES also conducts physical inspections surveys and RES completes the engineering and permitting of the project. Finally, necessary 'Secondary Agreements' for situations such as spoil stockpiles, access, staging, etc. are negotiated with the landowner during the inspection period. Upon closing, the landowner executes the DRC and the Secondary Agreements

As described above, the SPI will be placed on the property parcels in advance of the proposed restoration activities, thereby ensuring the long-term protection of the site. The SPI restricts activities that are incompatible with the objectives of the project site. The SPI will be recorded within 60 days at the county courthouse after receipt of all required permits, clearances, approvals and authorizations, and prior to project implementation. Recording the SPI after all necessary permits are approved avoids creating irreversible encumbrances on the land title until there is

minimal risk of project modification. An example copy of an SPI that would be filed upon project authorization is included as Appendix B: Site Protection Instrument. The final SPI may be subject to review and approval by all parties.

Following construction, RES will perform the maintenance and monitoring (M&M) responsibilities for a period of five years, as required by the Chapter 105 permit conditions. RES will inspect the BMPs annually to perform monitoring and all necessary maintenance needed for the continued viability of the project for the M&M period. The need to perform maintenance will be assessed during annual visits, and if deemed necessary, appropriate remedial action will be performed to repair deficient areas. This includes fixing damage to the stream banks due to flood events. RES will also perform inspections after major flood events that have the potential to damage the stream system.

Following construction at each BMP, RES will complete an as-built survey of the relocated stream to include a full longitudinal profile illustrating the channel restoration. One permanent monitoring location will be installed for every thousand feet of stream as a reference at each site to illustrate post-construction conditions. For projects claiming Protocol 3 credits, HOBO water gauge data loggers will be installed at this location within the stream and floodplain to gather hydrologic data. The as-built reports will be submitted to PA DEP and USACE following construction and planting completion.

During the five-year maintenance and monitoring period, annual monitoring reports will be submitted to PA DEP and USACE by December 31 each year monitoring occurs. At a minimum, monitoring reports will include:

- Visual observations of stream banks and channel/floodplain geometric stability
- Description of the general condition of restored wetland and upland areas
- Photos taken from ground level at each permanent photo monitoring location
- Assessment of vegetative cover in reestablished wetland corridor (if Protocol 3 credits are claimed)
- BEHI and NBS assessments for the restored stream channel to validate nutrient reduction efficiency
- Hydrologic data from the stream channel and wetlands to record real time water surface elevations throughout the growing season and validate the reconnection of the stream to the floodplain (if Protocol 3 credits are claimed)
- Discussion of the maintenance and monitoring activities conducted, and
- Proposed maintenance schedule for the following year based upon the results of the annual monitoring.

A summary of the proposed performance standards for the sites is summarized in Table 5.

Table 5: Performance Standards Summary				
Resource Type	**Performance Standard Type**	**Evaluation**	**Performance Standard Value**	**Unit**
Streams	Bank Stability	BEHI Score	<Low	---
	Geomorphic Stability	Visual Observation	No observed vertical or horizontal instability	---
	Large Woody Debris	Cubic meter per Acre	>25% increase	%
	Stream Hydrology	Channel/Floodplain Connectivity	≥1 Bankfull event per year	# (Count)
	Substrate	Pebble Count	D50 particle size remains in the same size class or larger as noted in As-Built	
Wetlands	Vegetation	Plot Assessment	Prevalence index value <3.0	---
	Groundwater Hydrology	Soil Saturation	Saturation within the upper 1' for ≥12.5% of the growing season	%

F. Summary and Conclusions

According to the results generated, this proposed BMP will meet (or exceed) the 270,000 lb/yr goal for PTC (Rosedale Ave BMP). The actual size of the project and resulting sediment reductions will be based

Based on anticipated post-construction stream conditions, including low bank heights and low-very low erosion rates resulting from the floodplain restoration approach to stream restoration, a preliminary calculation of delivered nutrient loading from the BMP would estimate a delivered TSS loading of greater than or equal to than 90%. In accordance with agency coordination and PA DEP recommendations, RES has been directed to assume only a 50% efficiency initially and then validate the actual post-restoration condition, which RES has calculated on similar projects to be above 96% (PA DEP caps at 90%). These calculations demonstrate a direct nexus between the potential Chesapeake Bay Watershed BMP and improved water quality improvements in the downstream Chesapeake Watershed. They also confirm that, amongst the various studied BMPs, RES can provide a viable and feasible mechanism to provide PTC with the contracted sediment reduction.

APPENDIX A
FIGURES

res

CORPORATE:
6575 WEST LOOP SOUTH, SUITE 300, BELLAIRE, TX 77401
P: 713.520.5400

Figure 1: Project Location

Rosedale Ave BMP

Lower Swatara Township
Dauphin County

Map Key

- Contours (2ft)
- Project Streams (±1,397 ft)
- Non-Project Streams
- Roads
- Conservation Area (±4.66 AC)
- Parcel Of Interest

1 inch equals 225 feet

0 50 100 150 200 250
US Feet

References

1. Boundaries are illustrated here for assessment purposes only and do not constitute survey-quality information.

2. Contours were generated from 1m-resolution LiDAR-derived DEMs (USGS 3DEP; 2016 acquisition).

3. The background orthomosaic basemap is from PEMA (2018).

4. Map data are projected onto the NAD83 State Plane PA South (ft) planar reference system.

Date: 9/12/2022	Drawn by: JGC
Job Number: 105247	Checked by: HK

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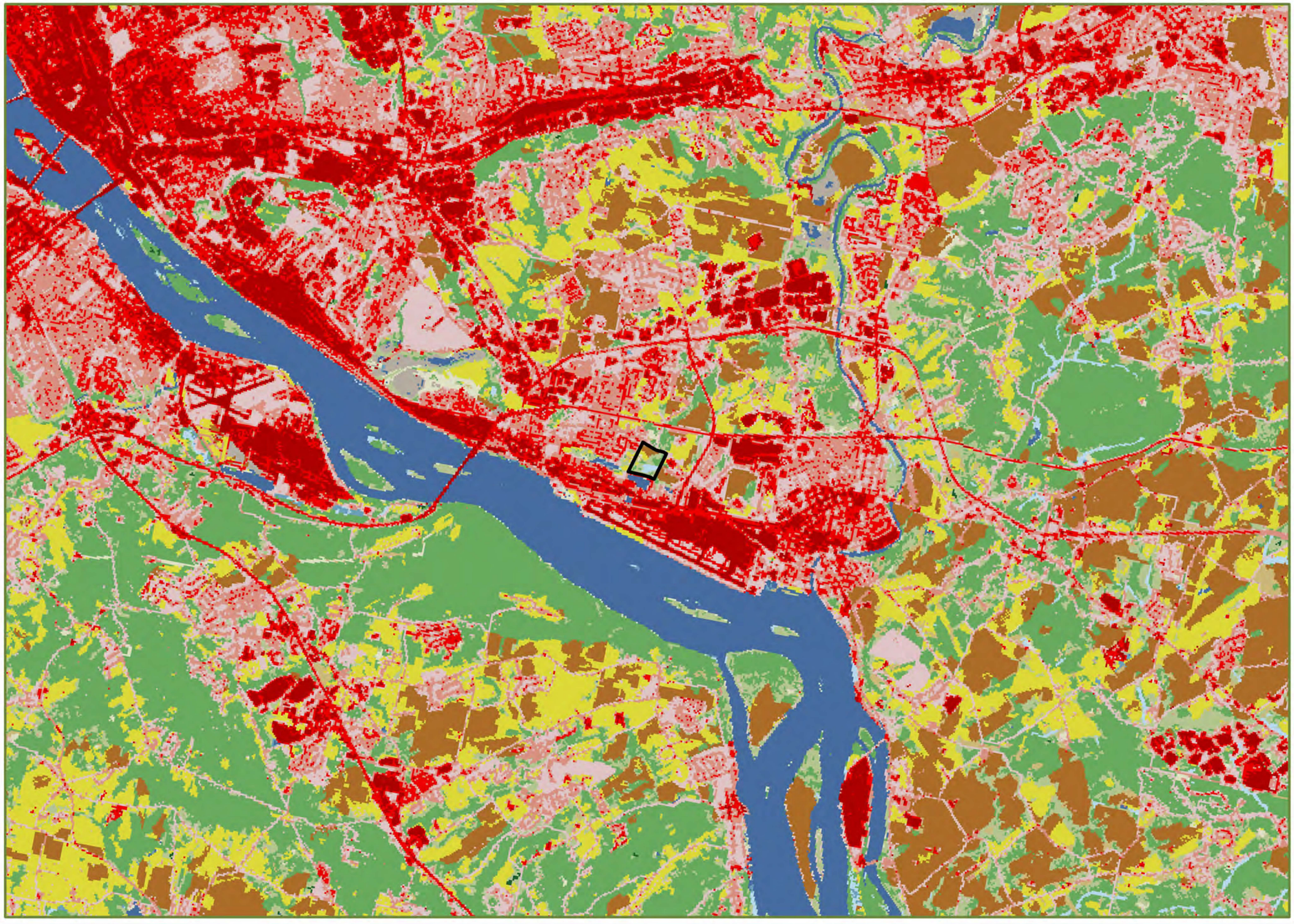

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P: 713.520.5400

Figure 2:
2019 Land Cover

Rosedale Ave BMP

Lower Swatara Township
Dauphin County

Map Key

- Parcel of Interest

2019 NLCD

- Open Water
- Perennial Snow/Ice
- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, High Intensity
- Barren Land
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Shrub/Scrub
- Herbaceous
- Hay/Pasture
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Wetlands

1 inch equals 5,280 feet

0 1
Miles

References
1. Map data are projected onto the NAD83 State Plane PA South (ft) planar reference system.

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Job Number: 105247	Checked by: HK

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res

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P: 713.520.5400

Figure 3:
BEHI Rating

Rosedale Ave BMP

Lower Swatara Township
Dauphin County

Map Key

Conservation Area (±4.66 AC)

BEHI Rating

- Very Low
- Low
- Moderate
- High
- Very High

1 inch equals 125 feet

0 25 50 75 100 125
US Feet

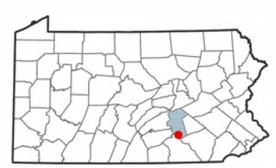
References

1. Boundaries are illustrated here for assessment purposes only and do not constitute survey-quality information.

2. Bank lines are offset from their true spatial position by 2pt to improve cartographic interpretation and readability.

3. The background orthomosaic basemap is from PEMA (2016).

4. Map data are projected onto the NAD83 State Plane PA South (ft) planar reference system.



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Job Number: 105247	Checked by: HK

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P: 713.520.5400

Figure 4:
NBS Rating

Rosedale Ave BMP

Lower Swatara Township
Dauphin County

Map Key

Conservation Area (±4.66 AC)

NBS Rating

- Very Low
- Low
- Moderate
- High
- Very High
- Extreme

1 inch equals 125 feet

0 25 50 75 100 125

US Feet

References

1. Boundaries are illustrated here for assessment purposes only and do not constitute survey-quality information.

2. Bank lines are offset from their true spatial position by 2pt to improve cartographic interpretation and readability.

3. The background orthomosaic basemap is from PEMA (2016).

4. Map data are projected onto the NAD83 State Plane PA South (ft) planar reference system.

Date: 9/12/2022	Drawn by: JGC
Job Number: 105247	Checked by: HK

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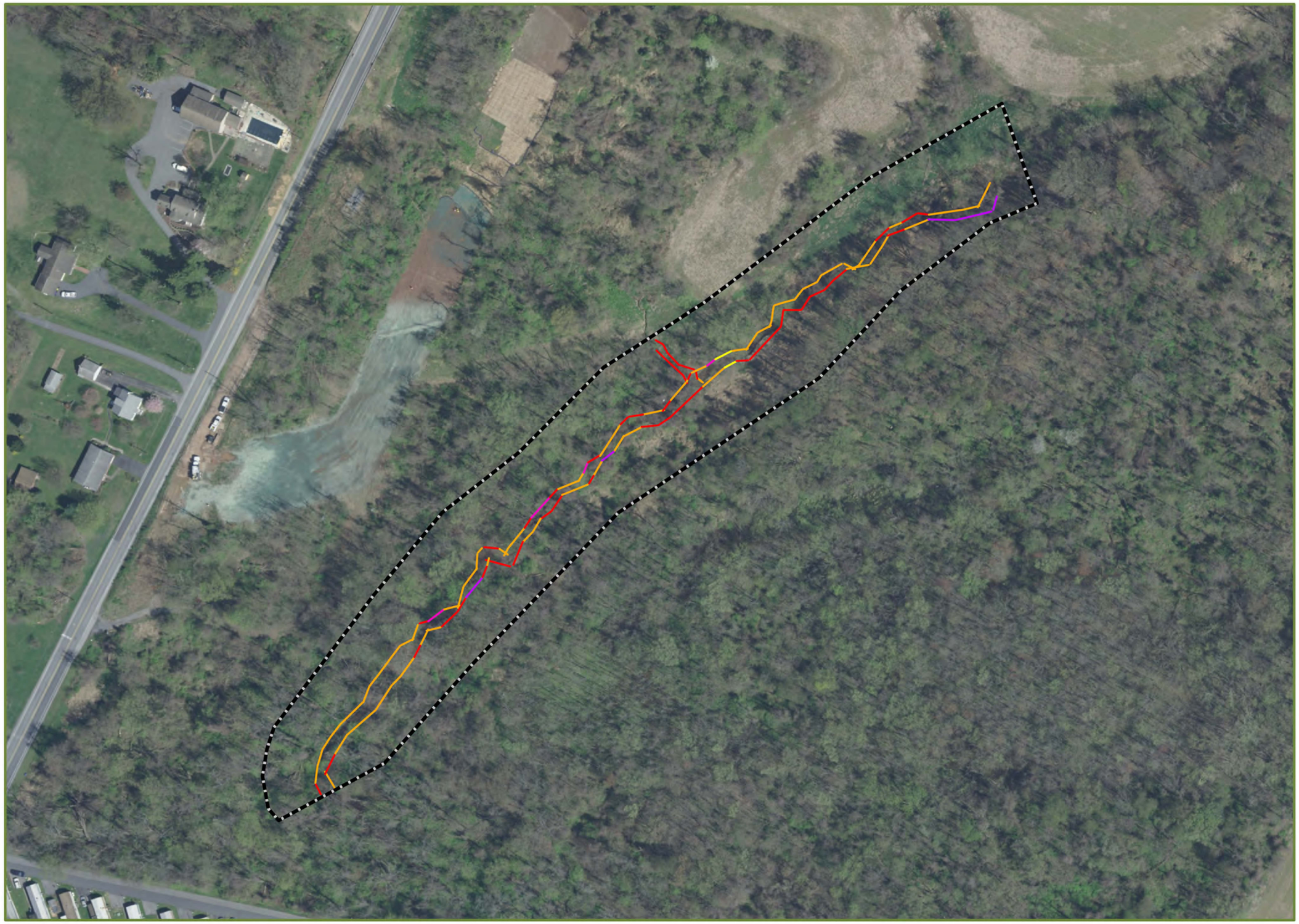

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P: 713.520.5400

Figure 5:
Erosion Rate

Rosedale Ave BMP

Lower Swatara Township
Dauphin County

Map Key

Conservation Area (±4.66 AC)

Erosion Rate (ft/yr)

- < 0.10 (Low)
- 0.10 - 1.00 (Moderate)
- 1.00 - 1.10 (High-Very High)
- > 1.10 (Extreme)

1 inch equals 125 feet

0 25 50 75 100 125
US Feet

References

1. Boundaries are illustrated here for assessment purposes only and do not constitute survey-quality information.

2. Bank lines are offset from their true spatial position by 2pt to improve cartographic interpretation and readability.

3. The background orthomosaic basemap is from PEMA (2016).

4. Map data are projected onto the NAD83 State Plane PA South (ft) planar reference system.

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Job Number: 105247	Checked by: HK

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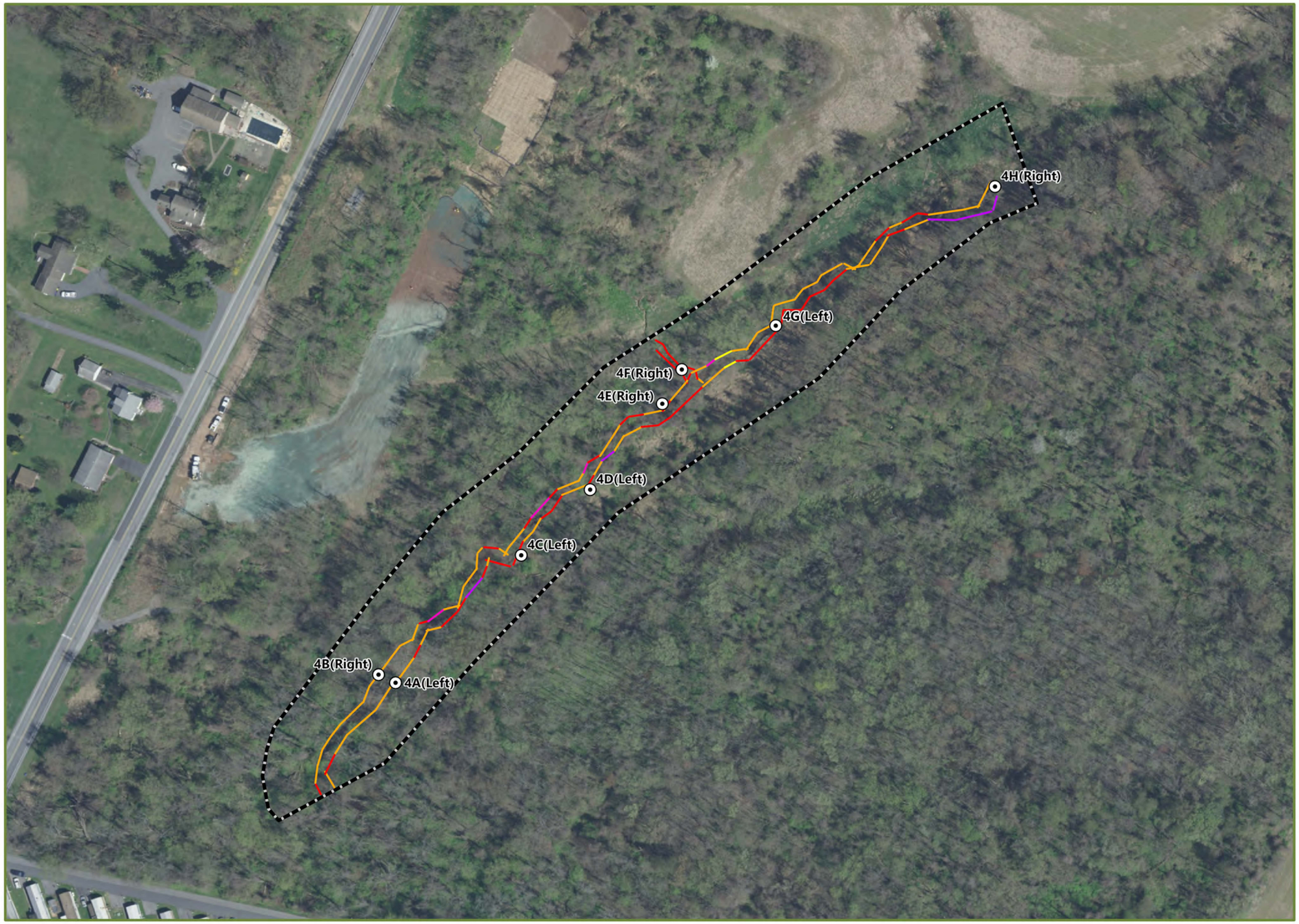

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CORPORATE:
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P: 713.520.5400

Figure 6: Erosion Pin Locations

Rosedale Ave BMP

Lower Swatara Township
Dauphin County

Map Key

- Conservation Area (±4.66 AC)
- Erosion Pins

Erosion Rate (ft/yr)

- < 0.10 (Low)
- 0.10 - 1.00 (Moderate)
- 1.00 - 1.10 (High-Very High)
- > 1.10 (Extreme)

1 inch equals 125 feet

0 25 50 75 100 125
US Feet

References

1. Boundaries are illustrated here for assessment purposes only and do not constitute survey-quality information.

2. Bank lines are offset from their true spatial position by 2pt to improve cartographic interpretation and readability.

3. The background orthomosaic basemap is from PEMA (2016).

4. Map data are projected onto the NAD83 State Plane PA South (ft) planar reference system.

Date: 9/12/2022	Drawn by: JGC
Job Number: 105247	Checked by: HK

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APPENDIX B
Example Site Protection Instrument

APPENDIX C
Design Plans

CHESAPEAKE BAY MS4 SEDIMENT REDUCTION PROJECT
CONCEPTUAL BMP DESIGN PLAN

LOWER SWATARA TOWNSHIP, DAUPHIN COUNTY, PENNSYLVANIA

1. PROJECT DESCRIPTION:

   FIRST PENNSYLVANIA RESOURCE, LLC (FPR), IS PROPOSING STREAM AND WETLAND RESTORATION FOR A COMBINATION OF SITES ASSOCIATED WITH THE CHESAPEAKE BAY WATERSHED SEDIMENT REDUCTION PROJECT (PROJECT) IN CHESTER, DAUPHIN, YORK, FRANKLIN, AND LANCASTER COUNTIES, PA. THE PROJECT PROPOSES TO USE STREAM RESTORATION AS A SEDIMENT AND NUTRIENT LOAD REDUCTION (COLLECTIVELY, LOAD REDUCTION) BEST MANAGEMENT PRACTICE (BMP) WITH A FLOODPLAIN RESTORATION APPROACH TO RESTORE STREAM AND FLOODPLAIN AREAS WITHIN THE CHESAPEAKE BAY WATERSHED.

   THIS CONCEPT LEVEL BMP DESIGN PLAN PRESENTS SIX POTENTIAL BMPS WITH VARYING LEVELS OF DEGRADATION, AS WELL AS LAND AND ENGINEERING RESTRAINTS. THE BMPS ARE ALL LOCATED WITHIN THE URBANIZED AREA, OR THE 1-MILE BUFFER OF THE URBANIZED AREA. THEY ARE PREDOMINANTLY STORMWATER-FED AND THE RESULTING STREAMS ARE UNSTABLE AND INCISED WITH MINIMAL CONNECTION TO THEIR HISTORIC FLOODPLAINS. RESTORATION EFFORTS WILL UTILIZE A COMBINATION OF CHANNEL RELOCATION, CHANNEL FILLING, FLOODPLAIN GRADING, SUBSURFACE GRADE CONTROL STRUCTURES, AND HABITAT STRUCTURAL IMPROVEMENTS TO RESTORE THE CHANNEL PATTERN AND FLOODPLAIN. THE FLOODPLAIN RESTORATION APPROACH WILL SPREAD HIGH FLOW STORM EVENTS ACROSS THE LARGER RE-ESTABLISHED FLOODPLAINS, REDUCING SHEAR STRESSES WITHIN THE CHANNEL. A COMBINATION OF SUBSURFACE LOG AND ROCK WILL BE USED TO PROVIDE GRADE CONTROL AND ADD LONG-TERM VERTICAL BED STABILITY.

2. SITE ADDRESS: VARIOUS

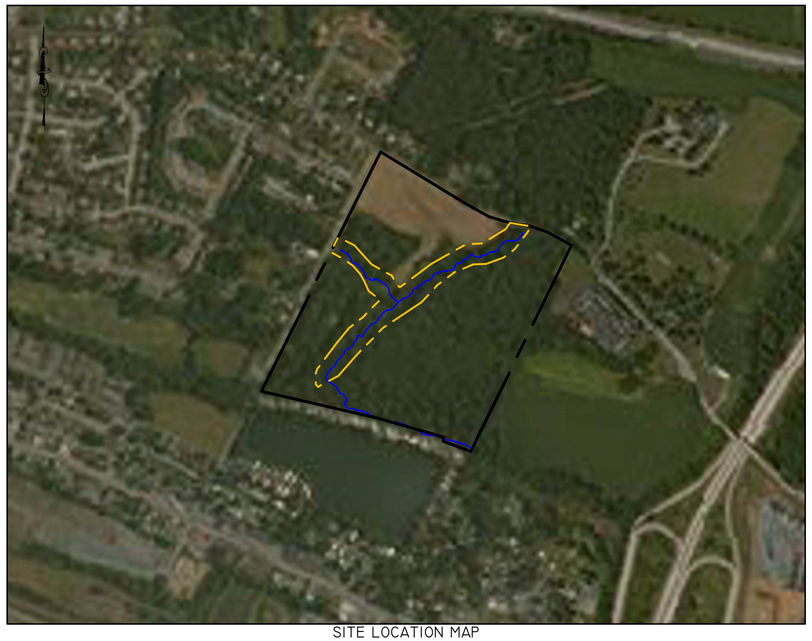
3. SPONSOR: FIRST PENNSYLVANIA RESOURCES, LLC.
   317 EAST CARSON ST, SUITE 242
   PITTSBURGH, PA 15219

4. LANDOWNERS AND SITE COORDINATES:

   4.1 BMP 4
   - 4.3.1 DHK LOT 2, LLC, PARCEL 36-021-014
   - 4.3.2 LATITUDE: 40° 12' 22.44"N (40.206233)
   - 4.3.3 LONGITUDE: 76° 45' 58.63"W (-76.766211)

5. SURVEY INFORMATION:

   EXISTING SURFACE CONTOUR DATA AND PARCEL DATA ACQUIRED FROM PASDA IMAGERY NAVIGATOR, WWW.PASDA.PSU.EDU.



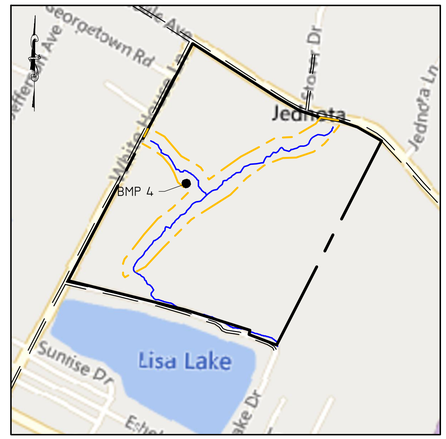
SITE LOCATION MAP

0 3000 6000 12000 Feet

SCALE: 1" = 500'

MAP LEGEND

PROPERTY BOUNDARY	
SITE PROTECTION BOUNDARY	
EXISTING THALWEG	



PROJECT LOCATION MAP

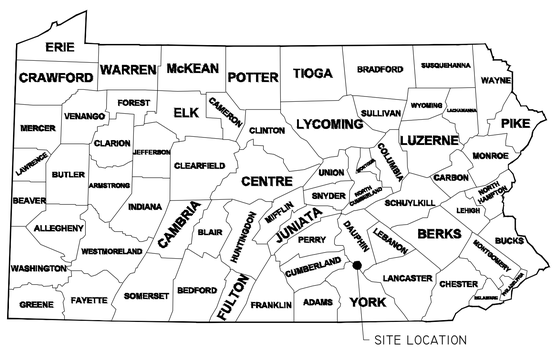
0 5000 10000 20000 Feet

SCALE: 1" = 5000'

SHEET INDEX	
SHEET #	SHEET TITLE
C000	TITLE SHEET
C100	BMP 4 EXISTING CONDITIONS
C300	BMP 4 PROPOSED GRADING AREA STREAM L & L-1
C800	CONSTRUCTION DETAILS
C900	BMP 4 SITE RESTORATION PLAN STREAM L & L-1
C901	RESTORATION PLAN DETAILS

FIRST PENNSYLVANIA RESOURCE, LLC.

ATTN: HANNAH KALK
317 EAST CARSON ST, SUITE 242
PITTSBURGH, PA 15219
EMAIL: HKALK@RES.US
PHONE: (412) 249-2435



ONE CALL SERIAL NO.: 20213092840

CALL BEFORE YOU DIG!
PENNSYLVANIA LAW REQUIRES 3 WORKING DAYS NOTICE FOR CONSTRUCTION PHASE AND 10 WORKING DAYS IN DESIGN STAGE-STOP
CALL PENNSYLVANIA ONE CALL SYSTEM, INC. 1-800-242-1776

PENNSYLVANIA ACT 38 (1991) REQUIRES NO LESS THAN 3 WORKING DAYS NOTICE NOR MORE THAN 10 WORKING DAYS NOTICE FROM EXCAVATORS WHO ARE ABOUT TO: DIG, DRILL, BLAST, AUGER, BORE, GRADE, TRENCH, OR DEMOLISH WHEN IN THE CONSTRUCTION PHASE. FOR LOCATION REQUESTS IN THE STATE OF PENNSYLVANIA, CALL TOLL FREE 1-800-242-1776. UNDERGROUND UTILITIES HAVE BEEN PLOTTED FROM AVAILABLE INFORMATION AND THE LOCATION MUST BE CONSIDERED APPROXIMATE. OTHER UNDERGROUND UTILITIES MAY EXIST WHICH ARE NOT SHOWN. IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO ASCERTAIN ALL PHYSICAL LOCATIONS OF UTILITY LINES PRIOR TO THE TIME OF CONSTRUCTION. IN NO WAY SHALL THE CONTRACTOR HOLD THE SURVEYOR RESPONSIBLE FOR ANY UTILITY LOCATION SHOWN ON THIS PLAN.

REVISIONS

NO.	DESCRIPTION	DATE	BY

CHESAPEAKE BAY MS4 SEDIMENT REDUCTION
PROJECT CONCEPTUAL BMP DESIGN PLAN

DRAWN BY: WP
CHECKED BY: NH
APPROVED BY: HK
DATE: November 11, 2021

PENNSYLVANIA
DAUPHIN COUNTY
LMC15434 3KD 7

PROJECT NO.
19524.7

SHEET C000

res

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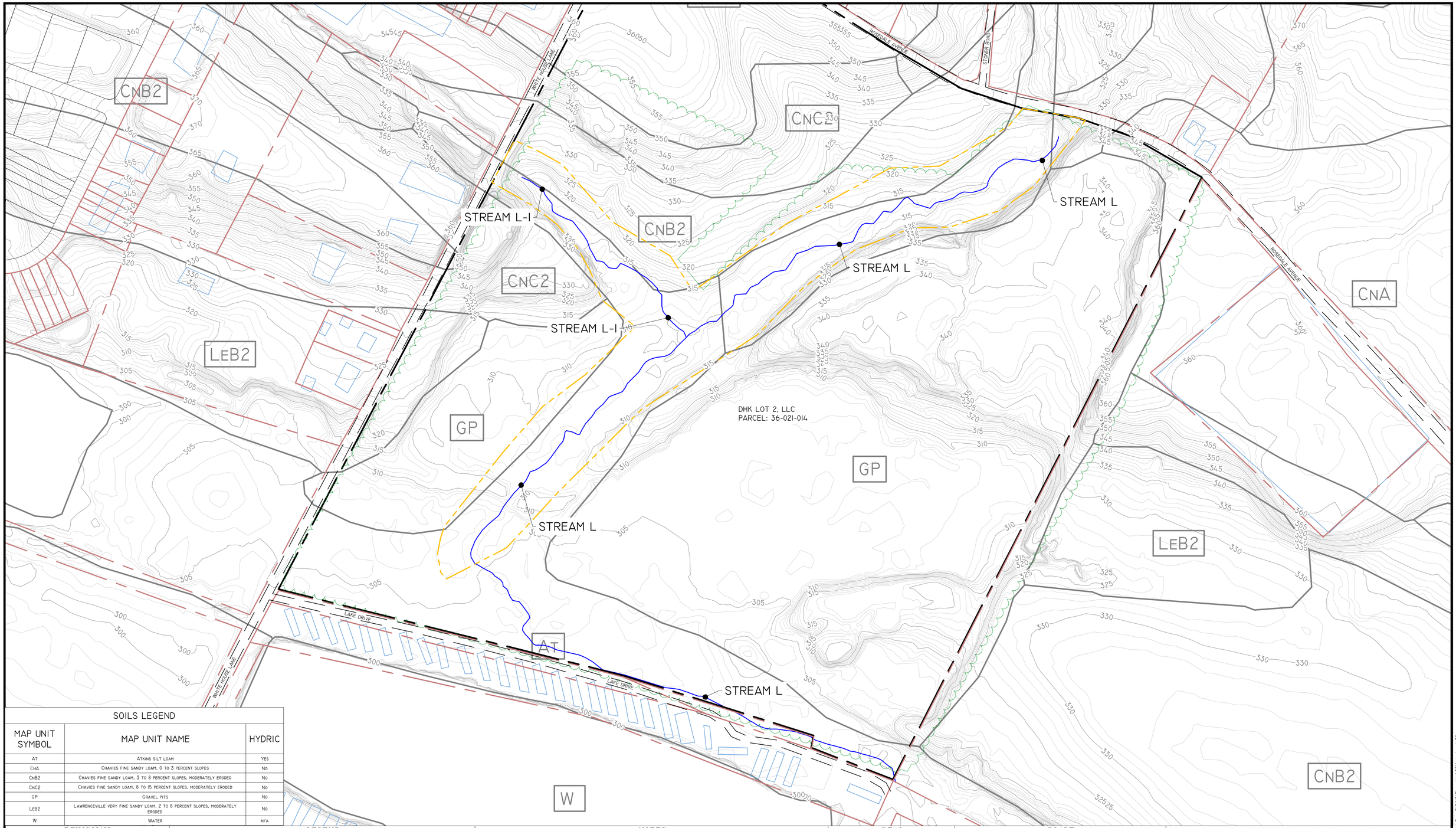

SOILS LEGEND		
MAP UNIT SYMBOL	MAP UNIT NAME	HYDRIC
At	Atkins silt loam	Yes
CnA	Chavies fine sandy loam, 0 to 3 percent slopes	No
CnB2	Chavies fine sandy loam, 3 to 8 percent slopes, moderately eroded	No
CnC2	Chavies fine sandy loam, 8 to 15 percent slopes, moderately eroded	No
GP	Gravel pits	No
LeB2	Lawrenceville very fine sandy loam, 2 to 8 percent slopes, moderately eroded	No
W	Water	N/A

REVISIONS

NO.	DESCRIPTION	DATE	BY

LEGEND

- PROPERTY BOUNDARY
- ADJACENT PROPERTY BOUNDARY
- SITE PROTECTION BOUNDARY
- EXISTING THALWEG
- EXISTING WETLANDS
- EXISTING STRUCTURES
- ROAD
- TREE LINE
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- SOIL TYPE BOUNDARY

NOTES

SEAL

SCALE

0 100 200 400 Feet

SCALE: 1" = 100'

RESOURCE ENVIRONMENTAL SOLUTIONS
317 East Carson St, Suite 242
Pittsburgh PA 15219
www.res.us
Telephone: (412) 249-2435
Email: hkalk@res.us

res

CHESAPEAKE BAY MS4 SEDIMENT REDUCTION
PROJECT CONCEPTUAL BMP DESIGN PLAN

BMP 4 EXISTING CONDITIONS

DRAWN BY:	WP	PENNSYLVANIA	
CHECKED BY:	NH	DAUPHIN COUNTY	LOWER SWATARA TOWNSHIP
APPROVED BY:	HK	SHEET: C100	PROJECT NO: 105247
DATE:	NOVEMBER 10, 2021		

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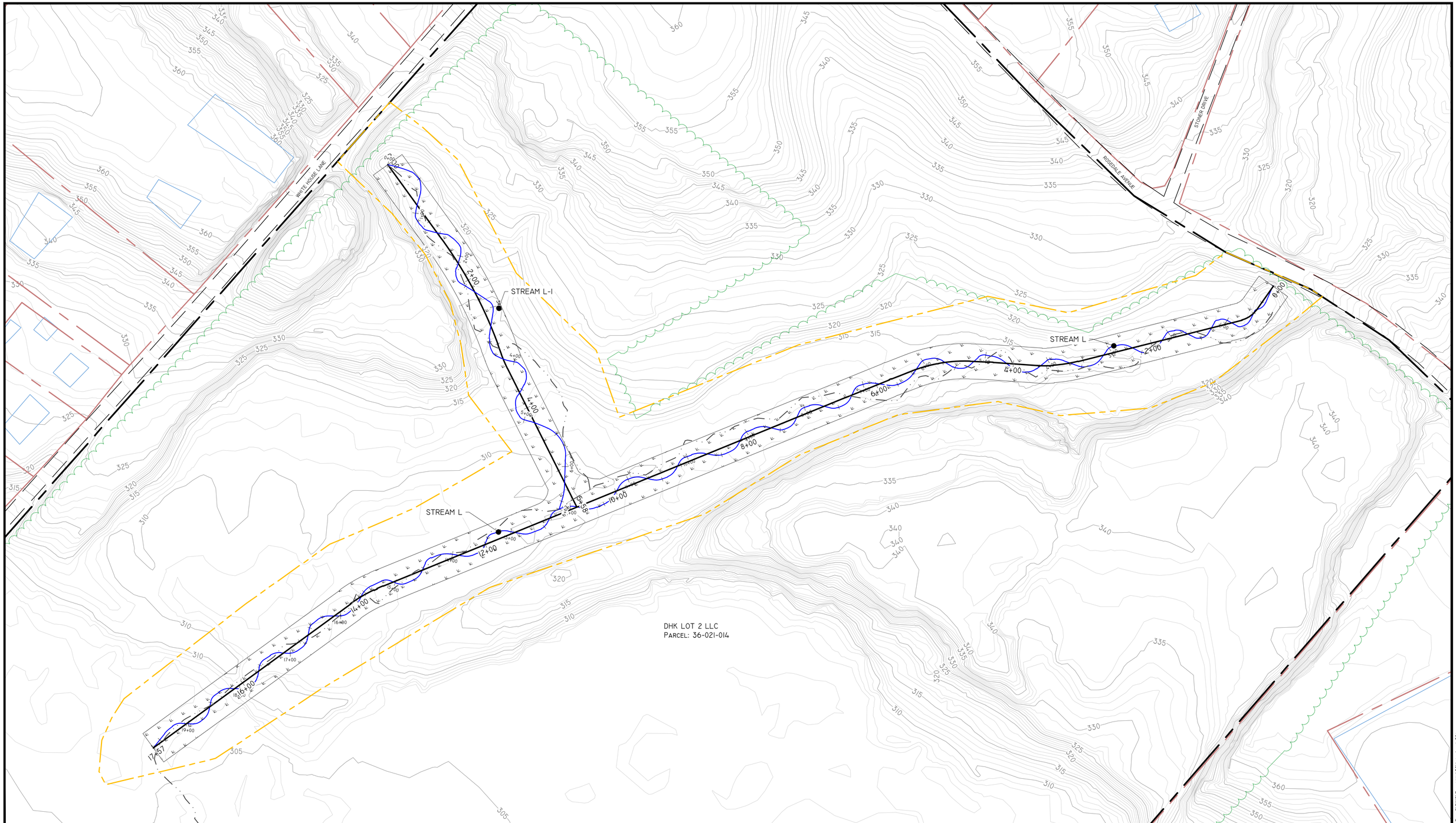

REVISIONS

NO.	DESCRIPTION	DATE	BY

LEGEND

- PROPERTY BOUNDARY
- ADJACENT PROPERTY BOUNDARY
- SITE PROTECTION BOUNDARY
- EXISTING THALWEG
- EXISTING WETLANDS
- EXISTING STRUCTURES
- EXISTING ROAD
- EXISTING TREE LINE
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- PROPOSED FLOODPLAIN GRADING
- PROPOSED THALWEG
- PROPOSED VALLEY BASELINE

NOTES

SEAL

SCALE

0 60 120 240 Feet

SCALE: 1" = 60'

RESOURCE ENVIRONMENTAL SOLUTIONS
317 EAST CARSON ST, SUITE 242
PITTSBURGH PA 15219
WWW.RES.US
TELEPHONE: (412) 249-2435 EMAIL: HKALK@RES.US

CHESAPEAKE BAY MS4 SEDIMENT REDUCTION PROJECT CONCEPTUAL BMP DESIGN PLAN

BMP 4 PROPOSED GRADING AREA

DRAWN BY:	WP	PENNSYLVANIA	
CHECKED BY:	NH	DAUPHIN COUNTY	LOWER SWARTARA TOWNSHIP
APPROVED BY:	HK	SHEET: C300	PROJECT NO: 105247
DATE:	NOVEMBER 10, 2021		

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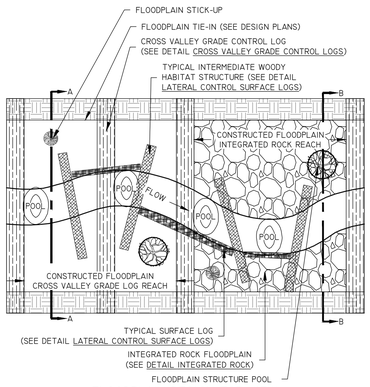
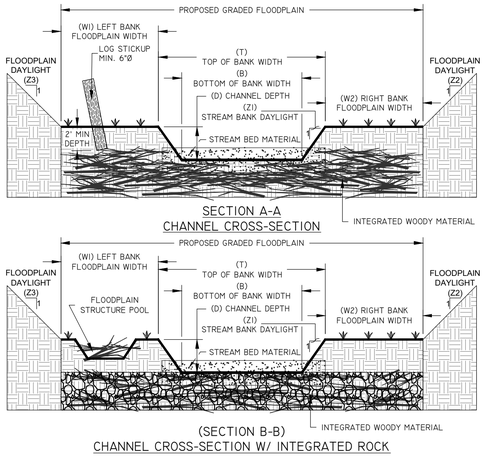


FLOODPLAIN DESIGN TOP VIEW

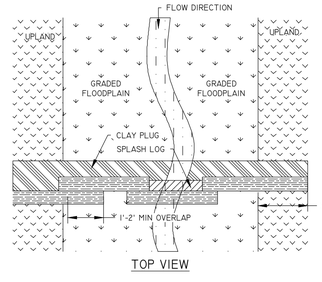


SECTION A-A
CHANNEL CROSS-SECTION

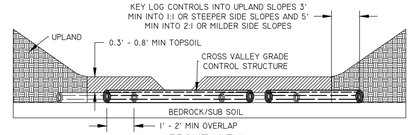
(SECTION B-B)
CHANNEL CROSS-SECTION W/ INTEGRATED ROCK

NOTES:
1. ALL PROPOSED DESIGN ELEVATIONS WILL BE HELD TO A 0.3' DEVIATION FROM DESIGN DURING CONSTRUCTION.
2. EXISTING STREAMBED MATERIAL WILL STOCKPILED AND RE-UTILIZED INTO PROPOSED CHANNEL CONSTRUCTION.
3. WHEN PARENT STREAMBED MATERIAL IS NOT EXISTING ONSITE IT WILL BE IMPORTED AND UTILIZED IN PROPOSED CHANNEL CONSTRUCTION.
4. INTEGRATE WOODY MATERIAL WILL BE HARVESTED ONSITE A UTILIZED INTO CHANNEL AND FLOODPLAIN CONSTRUCTION. WHEN EXISTING WOODY MATERIAL ONSITE IS LIMITED ONLY INTEGRATE THE WOODY. MATERIAL WITHIN A 6' BUFFER AROUND THE PROPOSED CHANNEL.
5. INTEGRATED ROCK SECTIONS WILL ALSO UTILIZE INTEGRATED WOODY MATERIAL WHERE POSSIBLE.
6. EXCESS WOODY MATERIAL WILL BE UTILIZED FOR STICKUPS AND FLOODPLAIN STRUCTURE POOLS AT THE DISCRETION OF THE CONSTRUCTION MANAGER OR CONTRACTOR.
7. FLOODPLAIN STICKUPS AND STRUCTURE POOL LOCATIONS WILL BE DETERMINED BY THE CONSTRUCTION MANAGER OR CONTRACTOR.
8. FLOODPLAIN MUST HAVE A MIN 1' OF CLEAN FILL ON TOP OF ALL OTHER MATERIALS.
9. SEE DESIGN PLANS FOR STREAM POOL LOCATIONS.

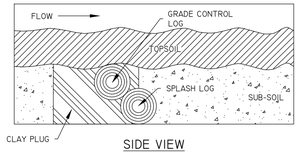
C-1 / C800 — FLOODPLAIN DESIGN (TYP)
NOT TO SCALE



TOP VIEW



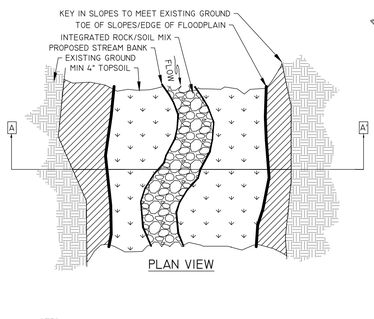
FRONT VIEW



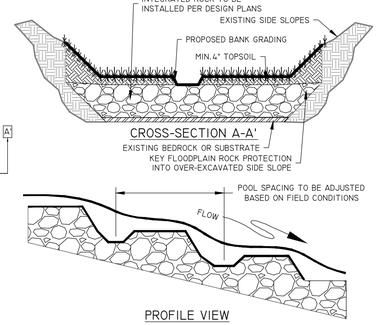
SIDE VIEW

NOTES:
1. ALL MATERIAL IS TO BE APPROVED BY THE DESIGN ENGINEER OR CONSTRUCTION MANAGER PRIOR TO INSTALLATION ON-SITE
2. WOODY MATERIAL IS TO BE BETWEEN 12"-16" AND RELATIVELY STRAIGHT; HIGHLY VARIABLE OR CURVED TRUNKS ARE NOT TO BE USE
3. ALL STRUCTURES ARE TO BE PLACED ON BEDROCK OR SIMILAR NON-EROSIVE BASE SUCH AS A DENSE CLAY. IF BEDROCK OR A NON-EROSIVE FOUNDATION IS NOT AVAILABLE A SPLASH LOG MUST BE INSTALLED DOWNSTREAM OF THE GRADE CONTROL LOGS AS SHOWN ON THE DESIGN PLANS
4. LOGS WITHIN THE FLOODPLAIN ARE TO BE OVERLAPPED BY A MINIMUM OF 1.5 ', WHERE THE LOGS ARE TOED INTO THE VALLEY SIDE SLOPES, ARE TO BE TOED IN A MINIMUM OF 3 – 5'. IF INSUFFICIENT MATERIAL IS AVAILABLE TO TOE IN THE WOODY MATERIAL IT IS TO BE ANCHORED IN PLACE USING MINING LAG BOLTS DRILLED INTO THE BEDROCK OR LOGS WILL BE KEYED INTO THE BEDROCK A MINIMUM OF 3 INCHES.
5. MATERIAL WITH A HEAVY CLAY OR CLAYEY SILT CONTENT SHALL BE USED TO CONSTRUCT A CLAY PLUG ON THE UPSTREAM SIDE OF THE LOG SILL. THE CLAY PLUG SHALL BE TIED INTO BEDROCK OR OTHER NON-PERMEABLE MATERIAL AT THE BASE OF THE STRUCTURE AND SHALL EXTEND UPWARDS TO WITHIN 2 INCHES OF THE TOP OF THE STRUCTURE. THE CLAY PLUG SHALL HAVE A WIDTH OF 3 FEET UPSTREAM OF THE LOG SILL AND EXTEND ACROSS THE ENTIRE VALLEY BOTTOM IN ORDER TO PREVENT WATER-PIPING THROUGH THE STRUCTURE. MATERIAL EXCAVATED FOR THE LOG SILLS MAY BE USED AT THE DISCRETION OF THE ENGINEER OR CONSTRUCTION MANAGER TO CONSTRUCT THE CLAY PLUG.
6. FINAL STRUCTURE ALIGNMENT AND LOCATION MAY BE ADJUSTED BY DESIGN ENGINEER OR CONSTRUCTION MANAGER IN THE FIELD AS NEEDED

C-2 / C800 — CROSS VALLEY GRADE CONTROL LOGS
NOT TO SCALE



PLAN VIEW

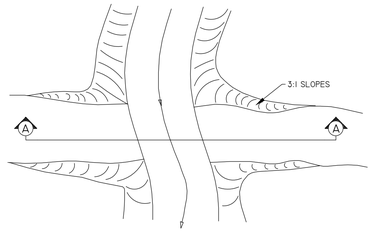


CROSS-SECTION A-A'

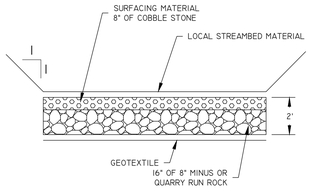
PROFILE VIEW

NOTES:
1. NATIVE BACKFILL MATERIAL AND FILL TO BE COMBINED WITH RIPRAP FOR THE INTEGRATED ROCK COMPACTED LAYER SHALL BE FREE OF RUBBISH; STONES GREATER THAN 6", FROZEN MATERIAL, OR OTHER OBJECTIONABLE MATERIALS. FILL MATERIAL MUST BE APPROVED BY THE CONSTRUCTION MANAGER PRIOR TO PLACEMENT AND SHALL CONFORM TO UNIFIED SOIL CLASSIFICATION GC, SC, CH, OR CL AND MUST HAVE AT LEAST 30% PASSING THE #200 SIEVE.
2. COMPACTION - THE MOVEMENT OF THE HAULING AND SPREADING EQUIPMENT OVER THE FILL SHALL BE CONTROLLED SO THAT THE ENTIRE SURFACE OF EACH LIFT SHALL BE TRAVERSED BY NOT LESS THAN ONE TREAD TRACK OF HEAVY EQUIPMENT OR COMPACTION SHALL BE ACHIEVED BY A MINIMUM OF FOUR COMPLETE PASSES OF A SHEEPSFOOT ROLLER, RUBBER TIRED ROLLER, VIBRATORY ROLLER, OR EARTHMOVING EQUIPMENT CAPABLE OF APPLYING SUFFICIENT GROUND PRESSURE. FILL MATERIAL SHALL CONTAIN SUFFICIENT MOISTURE SUCH THAT THE REQUIRED DEGREE OF COMPACTION WILL BE OBTAINED WITH THE EQUIPMENT USED. THE FILL MATERIAL SHALL CONTAIN SUFFICIENT MOISTURE SO THAT IF FORMED INTO A BALL IT WILL NOT CRUMBLE, YET NOT BE SO WET THAT WATER CAN BE SQUEEZED OUT. WHEN REQUIRED BY THE REVIEWING AGENCY THE MINIMUM REQUIRED DENSITY SHALL NOT BE LESS THAN 95% OF MAXIMUM DRY DENSITY WITH A MOISTURE CONTENT WITHIN +/-2% OF THE OPTIMUM. EACH LAYER OF FILL SHALL BE COMPACTED AS NECESSARY TO OBTAIN THAT DENSITY, AND IS TO BE CERTIFIED BY THE CONSTRUCTION MANAGER AT THE TIME OF CONSTRUCTION. ALL COMPACTION IS TO BE DETERMINED BY AASHTO METHOD T-99 (STANDARD PROCTOR).

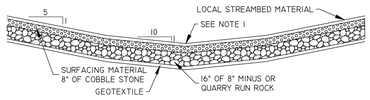
C-3 / C800 — INTEGRATED ROCK DETAIL
NOT TO SCALE



TOP VIEW



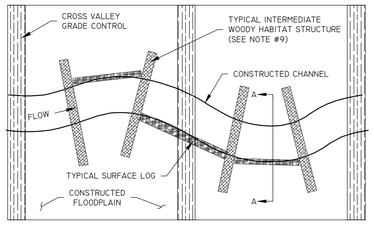
SECTION VIEW



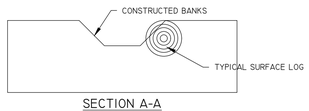
SECTION A-A

NOTES:
1) THIS STANDARD DRAWING REQUIRES SUPPORTING TECHNICAL DOCUMENTATION PRIOR TO USE AND MUST BE ADAPTED TO THE SPECIFIC SITE.

C-4 / C900 — FORD CROSSING
NOT TO SCALE



TOP VIEW



SECTION A-A

NOTES:
1. THE SIZE, LOCATION, AND ORIENTATION OF PROPOSED SURFACE LOGS WILL BE DETERMINED BY THE ENGINEER OF CONSTRUCTION MANAGER BASED ON SITE CONDITIONS DURING CONSTRUCTION.
2. SURFACE LOS SHALL BE CONSTRUCTED OF LOGS STORED ON-SITE. LOGS MAY BE HARVESTED ON-SITE IF NECESSARY WITHIN THE LIMITS OF DISTURBANCE.
3. 12" (MIN) LOGS WILL BE USED FOR SURFACE LOGS

C-5 / C800 — LATERAL CONTROL SURFACE LOGS
NOT TO SCALE

PENNDOT PUBLICATION 584

TABLE 8.11 ALLOWABLE SHEAR STRESSES FOR VARIOUS LININGS

LINING CATEGORY	LINING TYPE	ALLOWABLE INIT SHEAR STRESS	
		PA	LB/SQ.FT.
UNLINED - EASILY ERODID SOILS (1)	SILTS, FINE-MEDIUM SANDS	1.4	0.03
	COARSE SANDS	1.9	0.04
	VERY COARSE SANDS	2.4	0.05
	FINE GRAVEL	4.8	0.1
UNLINED - EROSION RESISTANT SLILS (2)	CLAY LOAM	12	0.25
	SILTY CLAY LOAM	8.6	0.18
	SANDY CLAY LOAM	4.8	0.1
	LOAM	3.4	0.07
	SILT LOAM	5.7	0.12
	SANDY LOAM	1	0.02
	GRAVELY, STONY, CHANNERY LOAM	2.4	0.05
	STONY OR CHANNERY SILT LOAM	3.4	0.07
NON-REINFORCED VEGETATION	CLASS A	177.2	3.7
	CLASS B	100.6	2.1
	CLASS C	47.9	1
	CLASS D	28.7	0.6
	CLASS E	16.8	0.35
TEMPORARY RECP'S (3/4)	MULCH CONTROL NETTING (3)	SEE TABLE 8.15	
	NETLESS ROLLED EROSION CONTROL BLANKET (5)		
	OPEN WEAVE TEXTILE		
	SINGLE-NET EROSION CONTROL BLANKET		
	DOUBLE-NET EROSION CONTROL BLANKET		
PERMANENT RECP'S (3/4)	TURF REINFORCMENT MAT - TYPE 5.A	288	6
	TURF REINFORCMENT MAT - TYPE 5.B	384	8
	TURF REINFORCMENT MAT - TYPE 5.C	480	10
RIPRAP LINIG	R-3	48	1
	R-4	96	2
	R-5	144	3
	R-6	192	4
	R-7	240	5
	R-8	384	8
	GABION - 305 mm (12 in)	225	4.7
	GABION - 457 mm (18 in)	249	5.2
	GABION - 914 mm (36 in)	397	8.3
	RENO MATTRESS - 152 mm (6 in)	206	4.3
	RENO MATTRESS - 229 mm (9 in)	220	4.6

1 SOILS HAVING AN ERODIBILITY K FACTOR GREATER THAN 0.37

2 SOILS HACING AN ERODIBILITY K FACTOR LESS THAN OR EQUAL TO 0.37

CATERGORIES ARE BASED ON FHWA CLASSIFICATION SYSTEM FOR RECP'S

4 THE DIFFERENCE BETWEEN THE THREE TYPES OF TRM'S IS THE MINIMUM TENSILE STRENGTH

5 FEW, IF ANY, OF THESE ARE APPROVED FOR PENNDOT USE

ROCK SIZING MODIFIED FROM PENNDOT PUBLICATION 408

CLASS, SIZE NO. (NCSA)	R-8**	R7**	R6	R6	R5	R4
PERCENT PASSING (SQUARE OPENINGS)						
ROCK SIZE, INCHES						
42	100*					
30		100*				
24	15-50		100*	100*		
18		15-50			100*	
15	0-15		15-50			
12		0-15		15-50		100*
9					15-50	
6				0-15		15-50
4					0-15	
3						0-15
2						
NOMINAL PLACEMENT THICKNESS, INCHES	36	27	23	18	14	12

REVISIONS

NO.	DESCRIPTION	DATE	BY

LEGEND

NOTES

SEAL

SCALE

RESOURCE ENVIRONMENTAL SOLUTIONS
317 East Carson St, Suite 242
Pittsburgh PA 15219
Telephone: (412) 249-2440
www.res.us
Email: msachs@res.us

CHESAPEAKE BAY MS4 SEDIMENT REDUCTION PROJECT

CONSTRUCTION DETAILS

DRAWN BY:	WP	PENNSYLVANIA	
CHECKED BY:	NH	CHESTER COUNTY	MULTIPLE TOWNSHIPS
APPROVED BY:	MS	SHEET: C800	PROJECT NO: 105247
DATE:	NOVEMBER 5, 2021		

R:\RESC-DATA\PROJECTS\105247-PENNDOT MS4 - CHESAPEAKE BAY 2\DWG\PLANSETS\351USA LAKE 305
6:16 PM NOVEMBER 21

STREAM L-I

STREAM L

STREAM L

DHK LOT 2 LLC
PARCEL: 36-021-014

REVISIONS

NO.	DESCRIPTION	DATE	BY

LEGEND

- PROPERTY BOUNDARY
- SITE PROTECTION BOUNDARY
- MAJOR CONTOUR
- MINOR CONTOUR
- WETLAND RESTORATION PLANTING
- WETLAND RESTORATION SEEDING
- LIVE STAKING
- UPLAND RESTORATION SEEDING

NOTES

SEAL

SCALE

0 60 120 240 Feet

1" = 60'

RESOURCE ENVIRONMENTAL SOLUTIONS
33 TERMINAL WAY, SUITE W445A
PITTSBURGH PA 15219
WWW.RES.US
TELEPHONE: (412) 249-2435
EMAIL: HKALK@RES.US

res

CHESAPEAKE BAY MS4 SEDIMENT REDUCTION PROJECT

BMP 4 SITE RESTORATION PLAN STREAM L & L-I

DRAWN BY:	WP	PENNSYLVANIA	
CHECKED BY:	NH	DAUPHIN COUNTY	LOWER SWARTARA TOWNSHIP
APPROVED BY:	HK	SHEET: C900	PROJECT NO: 105247
DATE:	NOVEMBER 10, 2021		

R:\RES.COM\PROJECTS\105247-PENNDOT MS4 - CHESAPEAKE BAY 2\DWG\PLANSETS\30\LISA LAKE 305
4:45 PM NOVEMBER 21

PLANTING DETAIL NOTES:

A. GENERAL:

1. PLANT DETAILS ARE INCORPORATED INTO THIS SPECIFICATION BY REFERENCE.

2. QUALITY ASSURANCE
   2.1. SUPPLIER CERTIFICATION: THE SUPPLIER OF ALL SEEDS AND/OR VEGETATION SHALL CERTIFY THAT ORIGIN OF THE SEEDS FROM WHICH THE PLANTS OR SEEDS WERE PRODUCED IS FROM THE EASTERN OR CENTRAL PORTIONS OF THE U.S. PRIOR TO PLANTING.
   2.2. INSTALLER QUALIFICATIONS: ENGAGE AN EXPERIENCED INSTALLER, WHO HAS SUCCESSFULLY COMPLETED RESTORATION PLANTING PROJECTS SIMILAR IN SIZE AND COMPLEXITY TO THIS PROJECT.
   2.3. INSTALLER'S FIELD SUPERVISION: INSTALLER TO MAINTAIN AN EXPERIENCED FULL-TIME SUPERVISOR ON THE PROJECT SITE WHEN PLANTING IS IN PROGRESS.

3. PLANT MATERIALS
   3.1. PROVIDE PLANT MATERIALS OF QUANTITY, SIZE, GENUS AND SPECIES INDICATED ON THE CONSTRUCTION DRAWINGS.

4. ALL PLANT MATERIALS AND WORK SHALL COMPLY WITH RECOMMENDATIONS AND REQUIREMENTS OF ANSI Z60.1 2004 AMERICAN STANDARD FOR NURSERY STOCK. ALL SEEDS MUST MEET APPLICABLE STATE AND FEDERAL REGULATIONS AND MUST INCLUDE LABELING INDICATING SUPPLIER, FORMULATION, GERMINATION RATES AND SEED DATE. LABELS FROM ALL SEED INSTALLED ARE TO BE KEPT AND SUPPLIED TO OWNER AT COMPLETION OF PROJECT.

DO NOT MAKE SUBSTITUTIONS UNLESS APPROVED BY THE PROJECT MANAGER. REQUESTS FOR SUBSTITUTIONS MUST BE MADE IN WRITING TO THE PROJECT MANAGER AND APPROVED TO INSTALLATION. INCLUDE REASONS WHY THE SUBSTITUTIONS ATE BEING REQUESTED.

6. PROJECT ENGINEER MAY INSPECT PLANT MATERIALS EITHER AT PLACE OF GROWTH OR ON SITE DURING PLANTING ACTIVITIES, FOR COMPLIANCE WITH REQUIREMENTS FOR GENUS, SPECIES, VARIETY, SIZE, AND QUALITY. MATERIAL FOUND TO BE UNACCEPTABLE WILL BE REJECTED AND THE CONTRACTOR WILL BE REQUIRED TO SUPPLY REPLACEMENT MATERIAL WITHIN TIME FRAME (I.E., 1 WEEK). REJECTED MATERIAL SHALL BE IMMEDIATELY REMOVED FROM PROJECT SITE. UNACCEPTABLE MATERIAL IS DEFINED AS THE FOLLOWING:
   6.1. PLANTS WITH BENT TRUNKS OR MULTIPLE LEADERS, UNLESS CHARACTERISTIC FOR THE SPECIES;
   6.2. PLANTS WITH DISEASED TRUNKS, STEMS, OR LEAVES;
   6.3. PLANTS WITH PEST-INFESTED TRUNKS, STEMS, OR LEAVES;
   6.4. PLANTS OF INSUFFICIENT SIZE;
   6.5. PLANTS WITH WRONG SPECIES/SUB-SPECIES; AND
   6.6. PLANTS HAVING ROOT GIRDLING IN THE CONTAINER.

7. DELIVERY, STORAGE, AND HANDLING
   7.1. PROTECT BARK, BRANCHES, AND ROOT SYSTEMS FROM SUN SCALD, DRYING, SWEATING, WHIPPING, AND OTHER HANDLING AND TYING DAMAGE. DO NOT BEND OR BIND-TIE TREES OR SHRUBS IN SUCH A MANNER AS TO DESTROY THEIR NATURAL SHAPE. PROVIDE PROTECTIVE COVERING OF PLANTS DURING DELIVERY. DO NOT DROP PLANTS DURING DELIVERY.
   7.2. DELIVER PLANT MATERIALS AFTER PREPARATIONS FOR PLANTING HAVE BEEN COMPLETED AND PLANT IMMEDIATELY. IF PLANTING IS DELAYED MORE THAN 6 HOURS AFTER DELIVERY, FOLLOW STORAGE INSTRUCTIONS AS SHOWN IN TUBELING TREE PLANTING DETAIL.
   7.3. DO NOT REMOVE CONTAINER-GROWN STOCK FROM CONTAINERS UNTIL PLANTING TIME.
   7.4. SEED: SEED SHOULD BE CLEAN AND DRY. DO NOT USE SEED THAT HAS BECOME MOIST DURING DELIVERY OR STORAGE. IF SEED NEEDS TO BE TEMPORALLY STORED IT SHOULD BE STORED IN A COOL, DRY PLACE.

8. PROJECT CONDITIONS
   8.1. EXAMINE THE SUB-GRADE AND TOPSOIL, AND VERIFY THE ELEVATIONS PRIOR TO INSTALLING PLANT ON SEED MATERIAL. ALL SOIL AMENDMENTS AND CONDITIONING SHALL BE COMPLETED PRIOR TO SEEDING AND PLANT MATERIAL INSTALLATION. DO NOT PROCEED WITH THE WORK UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED IN A MANNER ACCEPTABLE TO THE INSTALLER.
   8.2. CALL PENNSYLVANIA ONE CALL SYSTEM AT 1-800-242-1776, 72 HOURS PRIOR TO ANY EXCAVATION. DETERMINE LOCATION OF UNDERGROUND UTILITIES AND PERFORM WORK IN A MANNER WHICH WILL AVOID POSSIBLE DAMAGE. HAND EXCAVATE AS REQUIRED.

9. PLANTING AND SEEDING RESTRICTIONS
   9.1. PLANTS SHALL BE PLANTED DURING UNFROZEN SOIL CONDITIONS SEPTEMBER 15TH - MAY 15TH. PLANT INSTALLATION OUTSIDE OF THIS TIME PERIOD SHALL NOT OCCUR UNLESS APPROVED BY THE PROJECT CONSTRUCTION MANAGER AND MAY REQUIRE ADDITIONS TO THE SCOPE OF WORK, SUCH AS WATERING REGIMES, AND ADDITIONAL PLANT QUANTITIES.
   9.2. SEEDING SHALL BE COMPLETED DURING SEPTEMBER 15-MAY 15 TO THE GREATEST EXTENT POSSIBLE. DORMANT WINTER SEEDING SHALL NOT BE CONDUCTED WITH MORE THAN 2" OF SNOW ON THE GROUND AT THE TIME OF SEEDING. DUE TO THE SCHEDULE OF THE PROJECT, SOME PERMANENT SEEDING OUTSIDE THIS TIME PERIOD WILL BE NECESSARY. THE CONTRACTOR WILL BE RESPONSIBLE FOR REMEDIAL SEEDING IN UNDER-PERFORMING AREAS DUE TO SEEDING OUTSIDE OF THIS TIME PERIOD. A COVER CROP SHALL BE SOWN AT THE TIME OF PERMANENT SEEDING TO PROVIDE QUICKER GERMINATION AND STABILIZATION PER THE PLAN SHEETS.
   9.3. THESE LIMITS MAY NOT BE MODIFIED UNLESS APPROVED BY THE PROJECT ENGINEER IN ADVANCE, WITH THE RISK OF SURVIVAL BORNE SOLELY BY THE CONTRACTOR.

10. WARRANTY
   10.1. WARRANTY PERIOD IS FOR ONE (1) YEAR AFTER DATE OF FINAL ACCEPTANCE AND COVERS DEFECTS INCLUDING DEATH AND UNSATISFACTORY GROWTH, EXCEPT FOR DEFECTS RESULTING FROM NEGLECT BY OWNER, ABUSE OR DAMAGE BY OTHERS, OR UNUSUAL PHENOMENA OR INCIDENTS WHICH ARE BEYOND CONTRACTOR'S CONTROL.
   10.2. CONTRACTOR SHALL GUARANTEE A MINIMUM SURVIVAL RATE FOR THE WARRANTY PERIOD OF 85% FOR BALLED AND BURLAPPED, CONTAINER GROWN, AND TUBELINGS, AND 75% FOR BARE ROOT AND LIVE STAKES.
   10.3. IF SURVIVAL RATES ARE LESS THAN THE ABOVE WARRANTY RATES, THE CONTRACTOR SHALL REPLACE THE QUANTITY OF DEFECTIVE OR DEAD PLANTS UP TO THE ORIGINAL CONSTRUCTION DRAWING SPECIFIED PLANT QUANTITY. WARRANTY PLANTINGS SHALL OCCUR WITHIN THE NEXT PLANTING WINDOW (SEPTEMBER 15TH –JUNE 15TH, EXCLUDING FROZEN SOIL CONDITIONS) FOLLOWING THE END OF THE APPLICABLE WARRANTY PERIOD.
   10.4. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY DURING THE WARRANTY PERIOD TO PROVIDE WRITTEN NOTICE OF ANY MAINTENANCE PRACTICE TO THE OWNER, WHICH IN THEIR OPINION WILL AFFECT THE GUARANTEE IF NOT REMEDIED PROMPTLY. THE PROJECT ENGINEER WILL RENDER AN OPINION OF ANY CONFLICT IF NECESSARY.

11. MAINTENANCE
   11.1. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL PLANT MATERIAL THROUGH FINAL ACCEPTANCE AND WARRANTY PERIOD.

B. EXECUTION:

INSTALL PLANT MATERIALS IN ACCORDANCE WITH THE SPECIFICATIONS AND DETAILS OF THE CONSTRUCTION DRAWINGS FOLLOWING THE ADDITION OF SOIL AMENDMENTS, SEEDING, AND INSTALLATION OF APPLICABLE EROSION CONTROL FABRIC.

1. CONTAINER GROWTH MATERIAL
   1.1. PLANTING OF CONTAINER GROWN MATERIAL SHALL OCCUR IN ACCORDANCE WITH LOCATIONS AND/OR PATTERNS SPECIFIC TO THE CONSTRUCTION DRAWINGS.
   1.2. PLANTING HOLES SHALL BE AT LEAST TWICE THE DIAMETER AND DUG TO THE SAME DEPTH AS THE CONTAINER IN WHICH THEY ARE GROWN. DO NOT REMOVE PLANT MATERIAL FROM CONTAINER UNTIL IMMEDIATELY BEFORE INSTALLATION. EXAMINE THE ROOTS TO SEE IF THEY ARE POT BOUND. CAREFULLY SEPARATE ANY POT BOUND OR CRAMPED ROOTS AND SPREAD THEM OUT WHEN PLACING THE PLANT WITHIN THE HOLE SO THAT THE ROOTS CAN GROW WITHOUT FURTHER CONSTRICTION OF THE ROOT BALL.
   1.3. SET PLANT MATERIALS PLUMB AND CENTERED WITHIN HOLE, ENSURING THAT THE TOP OF THE ROOT BALL IS SLIGHTLY ELEVATED ABOVE THE SURROUNDING SOIL ELEVATIONS. BACKFILL AROUND ROOT BALL WITH SUITABLE NATIVE SOIL, MAINTAINING PLUMB, AND GENTLY TAMPING BACKFILL LAYERS TO ELIMINATE VOIDS. WATER IS BACKFILL LAYERS TO THE POINT OF SOIL SATURATION.
   1.4. FOLLOWING THE BACKFILLING, ADD EXISTING SOIL TO BRING THE FINAL GRADE IN THE PLANTING HOLE TO THE SURROUNDING SOIL SURFACE. RAKE THE UNUSED EXISTING SOIL OUTSIDE THE PLANTING HOUSE, TAKING CARE NOT TO MOUND THE SOIL OR TO SIGNIFICANTLY ALTER THE EXISTING GRADES.

2. BAREROOT AND TUBELING MATERIAL
   2.1. IT SHOULD BE ANTICIPATED THAT THE SOIL MAY BE COMPACTED MORE THAN OPTIMAL FOR PLANTING AND IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO RIP SOIL TO ASSURE OPTIMAL PLANTING CONDITION. SOIL SHALL BE RIPPED TO A DEPTH OF 9-12".
   2.2. BAREROOT MATERIAL SHALL BE TREATED WITH ROOT DIP ACCORDING TO THE MANUFACTURERS RECOMMENDATION PRIOR TO PLANTING. MATERIALS SHALL BE PLANTED IMMEDIATELY OR OTHERWISE STORED PER THE MANUFACTURER'S RECOMMENDATIONS.

3. LIVE STAKE MATERIAL
   3.1. LIVE STAKE MATERIAL SHALL BE KEPT MOIST ACCORDING TO MANUFACTURES RECOMMENDATIONS. DO NOT ALLOW THE LIVE STAKES TO DRY OUT PRIOR TO INSTALLATION.
   3.2. MATERIAL SHALL BE PLANTED ACCORDING TO THE DETAIL PROVIDED. THE USE OF A PUNCH/PLANTING BAR, AUGER, REBAR, OR WATER-JET MAY BE USED TO PRE-DRILL HOLE IF NECESSARY.TAMP SOIL AROUND STAKE FOLLOWING INSTALL.

4. SEEDING
   4.1. SEEDING SHALL OCCUR AS SHOWN ON THE PLANTING PLAN. IN ACCORDANCE WITH THE CURRENT VERSION OF THE PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION EROSION AND SEDIMENT POLLUTION CONTROL PROGRAM MANUAL SEED SHALL BE APPLIED PRIOR TO INSTALLATION OF ANY EROSION CONTROL FABRIC. AREAS APPLIED WITH HERBICIDE MAY BE SEEDED 7 DAYS AFTER APPLICATION.
   4.2. SOW SEED WITH A SPREADER OR A HYDROSEED MACHINE WITH MANUFACTURER RECOMMENDED BINDING AGENT. IN AREAS WITH DENSE EXISTING VEGETATION, INSTALL SEED WITH A NATIVE NO-TILL DRILL SEEDER. DO NOT BROADCAST DROP SEED WHEN WIND VELOCITY EXCEEDS 5 MPH. EVENLY DISTRIBUTE SEED BY SOWING EQUAL QUANTITIES IN TWO DIRECTIONS AT RIGHT ANGLES TO EACH OTHER.
   4.3. DO NOT USE WET SEED OR SEED THAT IS MOLDY OR OTHERWISE DAMAGED IN TRANSIT OR STORAGE.
   4.4. SOW SEED PRIOR TO INSTALLATION OF EROSION CONTROL FABRIC WHERE APPLICABLE.
   4.5. IF BROADCAST, ROLL SEEDED AREAS LIGHTLY, AND WATER WITH A FINE SPRAY.
   4.6. PROTECT SEEDED AREAS AGAINST EROSION BY SPREADING STRAW MULCH IMMEDIATELY FOLLOWING COMPLETION OF SEEING OPERATIONS IF OTHER EROSION CONTROL MEASURES ARE NOT OTHERWISE SPECIFIED. SPREAD UNIFORMLY AT A RATE OF 2 TONS PER ACRE (90 LB. PER1,000 S.F.) TO FORM A CONTINUOUS BLANKET OVER SEEDED AREAS. SPREAD BY HAND, BLOWER, OR OTHER SUITABLE EQUIPMENT. ANCHOR STRAW MULCH BY CRIMPING INTO TOPSOIL BY SUITABLE MECHANICAL EQUIPMENT.
   4.7 STRAW EROSION CONTROL BLANKET IS A SUITABLE ALTERNATIVE TO BE USED INSTEAD OF BLOWN OR CRIMPED STRAW.

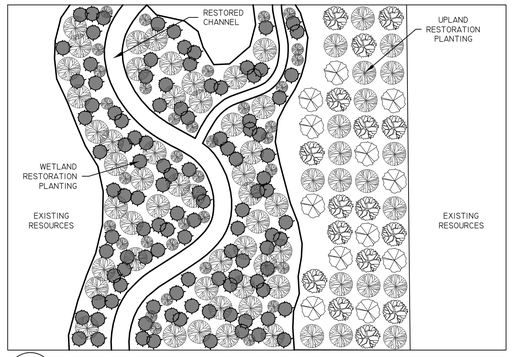
5. LOCATION
   5.1. ALL PLANT MATERIAL IS TO BE INSTALLED AS SHOWN ON THE PLANTING PLANS FOR THE PROTOTYPE.
   5.2. UPLAND TREE PLANTINGS ARE TO BE INSTALLED IN A 9X9 GRID PATTERN.
   5.3. FLOODPLAIN PLANTINGS ARE TO BE INSTALLED IN A CLUMPED FASHION WITH A MINIMUM OF 3' SPACING BETWEEN PLANTS. PLANTS ARE TO BE INSTALLED BASED UPON THE HYDROLOGIC TOLERANCES AND SITE CONDITIONS AFTER CONSTRUCTION IS COMPLETED.
   5.4. ALL LIVE STAKES ARE TO BE INSTALLED ALONG STREAM BANKS, POOLS, AND FLOODPLAIN POOLS BASED UPON SPACING INDICATED IN THE PLANTING PLAN SPECIES LIST.

CARE OF SEEDLING UNTIL PLANTED

SEEDLINGS SHOULD BE PLANTED IMMEDIATELY. IF IT IS NECESSARY TO STORE MOSS-PACKED SEEDLINGS FOR MORE THAN 2 WEEKS, ONE PINT OF WATER PER PKG. SHOULD BE ADDED. IF CLAY-TREATED, DO NOT ADD WATER TO PKG. PACKAGES MUST BE SEPARATED TO PROVIDE VENTILATION TO PREVENT 'HEATING'. SEPARATING PACKAGES WITH WOOD STRIPS AND STORE OUT OF THE WIND IN A SHADED, COOL, (NOT FREEZING) LOCATION.

CARE OF SEEDLING DURING PLANTING

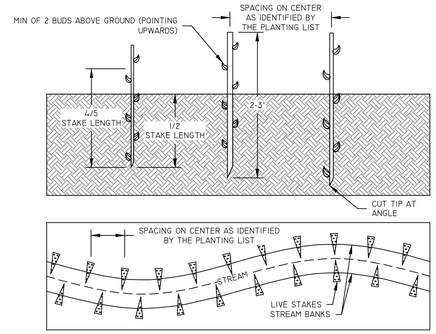
WHEN PLANTING, ROOTS MUST BE KEPT MOIST UNTIL TREES ARE IN THE GROUND. DO NOT CARRY SEEDLINGS IN YOUR HAND EXPOSED TO THE AIR AND SUN. KEEP MOSS-PACKED SEEDLINGS IN A CONTAINER PACKED WITH WET MOSS OR FILLED WITH THICK MUDDY WATER. COVER CLAY-TREATED SEEDLINGS WITH WET BURLAP ONLY.



PL-1 C900

RESTORATION PLANTING DETAIL

NOT TO SCALE

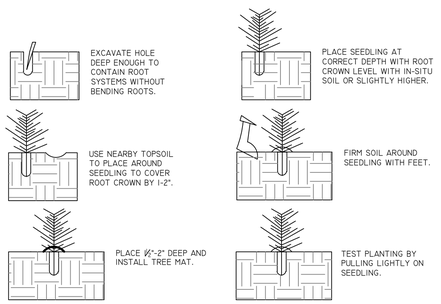


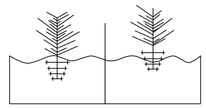
NOTES:
1. LIVE STAKES MUST BE BETWEEN ¾" TO 2" IN DIAMETER AND MUST BE 2' TO 3' LONG.
2. CUT THE STAKES WITH AN ANGLE ON THE BOTTOM AND SQUARE ON THE TOP, WITH THE BUDS POINTING UPWARD.
3. TRIM ALL SIDE BRANCHES CLEANLY SO THE CUTTING IS ONE STEM.
4. STAKES MUST BE STORED IN A COOL AND MOIST PLACE TO KEEP THEM ALIVE AND DORMANT.
5. DRIVE STAKES PERPENDICULAR TO THE GROUND WITH RUBBER HAMMER AT LEAST ⅔ TO ¾ OF THE TOTAL STAKE LENGTH. KEEP AT LEAST 2 BUDS ABOVE GROUND SURFACE.
6. DO NOT USE SPLIT STAKES.

PL-2 C900

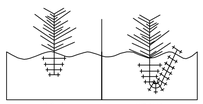
LIVE STAKES

NOT TO SCALE

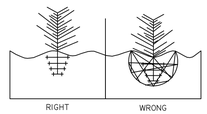




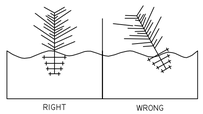
DON'T EXPOSE ROOTS TO AIR DURING FREEZE. IF PLANT IN FROZEN GROUND ROOT COLLAR SHALL BE 1" - 2" BELOW SOIL.



DO NOT BEND ROOTS SO THAT THEY GROW UPWARDS OUT OF THE GROUND. TRIM ROOTS IF NECESSARY SO THEY FIT IN PLANTING HOLE. DO NOT TRIM MORE THAN 25% OF EXISTING ROOT SYSTEM.



ALWAYS PLANT IN SOIL - NEVER LOOSE LEAVES OR DEBRIS. PACK SOIL TIGHTLY.

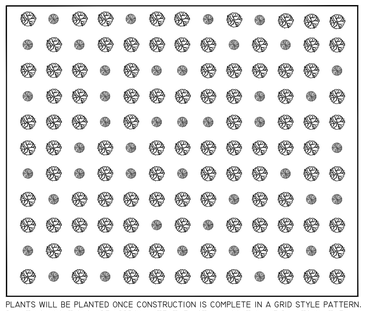


PLANT SEEDLINGS UPRIGHT - NOT AT AN ANGLE.

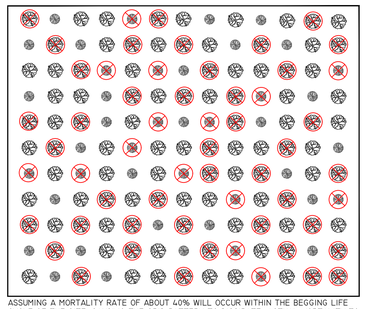
PL-3 C900

CONTAINER & TUBELING PLANTING DETAIL

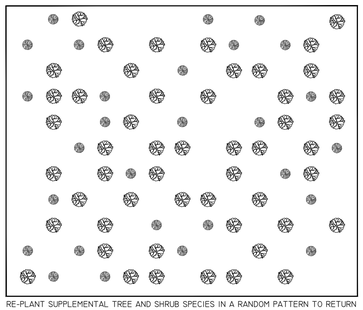
NOT TO SCALE



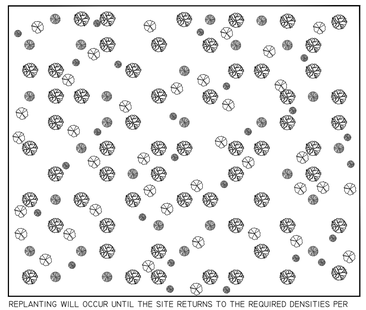
PLANTS WILL BE PLANTED ONCE CONSTRUCTION IS COMPLETE IN A GRID STYLE PATTERN. PLANTING LOCATIONS ARE APPROXIMATE. THE ACTUAL LOCATION OF PLANTS ON THE SITE WILL BE SUBJECT TO SITE CONDITIONS AT THE TIME OF PLANTING.



ASSUMING A MORTALITY RATE OF ABOUT 40% WILL OCCUR WITHIN THE BEGGING LIFE CYCLE OF THE SITE, CAUSING THE GRID PATTERN TO DISSIPATE. ACTUAL MORTALITY TO BE VERIFIED DURING MONITORING.



RE-PLANT SUPPLEMENTAL TREE AND SHRUB SPECIES IN A RANDOM PATTERN TO RETURN THE SITE TO THE REQUIRED DENSITIES PER ACRE.



REPLANTING WILL OCCUR UNTIL THE SITE RETURNS TO THE REQUIRED DENSITIES PER ACRE AND THE SITE HAS BEEN CLOSED OUT

PL-4 C900

MATRIX PLANTING PLAN DETAIL

NOT TO SCALE

REVISIONS

NO.	DESCRIPTION	DATE	BY

LEGEND

TUBELING

SHRUB

REPLANTED TUBELING

REPLANTED SHRUB

NOTES

SEAL

SCALE

RESOURCE ENVIRONMENTAL SOLUTIONS
33 TERMINAL WAY, SUITE W445A
PITTSBURGH PA 15219
WWW.RES.US
TELEPHONE: (412) 249-2435
EMAIL: HKALK@RES.US

CHESAPEAKE BAY MS4 SEDIMENT REDUCTION PROJECT

SITE RESTORATION DETAILS

DRAWN BY:	WP	PENNSYLVANIA	
CHECKED BY:	NH	CHESTER COUNTY	MULTIPLE TOWNSHIPS
APPROVED BY:	HK	SHEET: C901	PROJECT NO: 105247
DATE:	NOVEMBER 10, 2021		

R:\RESCAD\PROJECTS\105247-PENNDOT MS4 - CHESAPEAKE BAY 2\DWG\PLANETS\35\LISA LAKE 30S
4:45 PM NOVEMBER 21

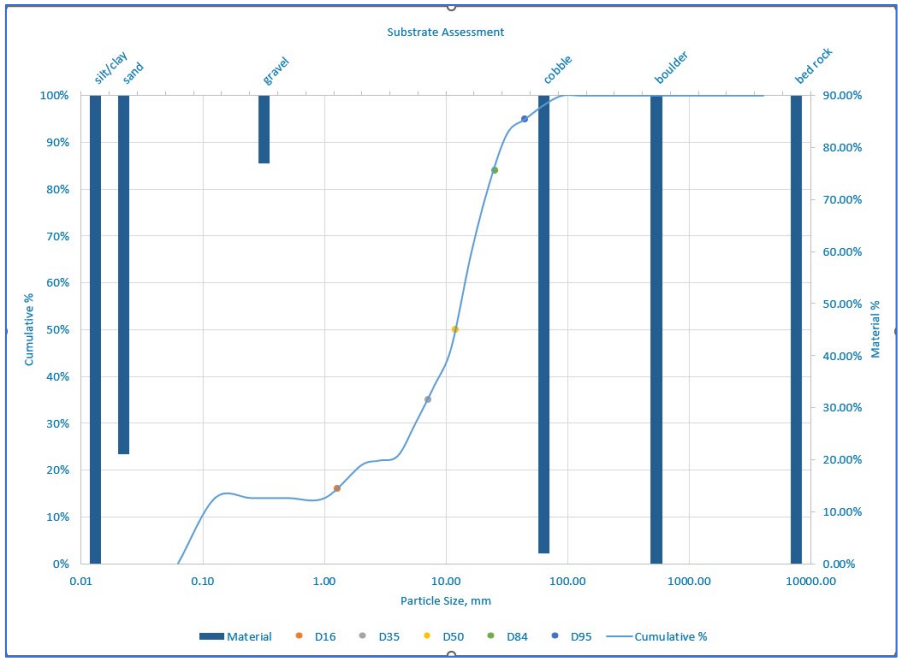
APPENDIX D
Supporting Data

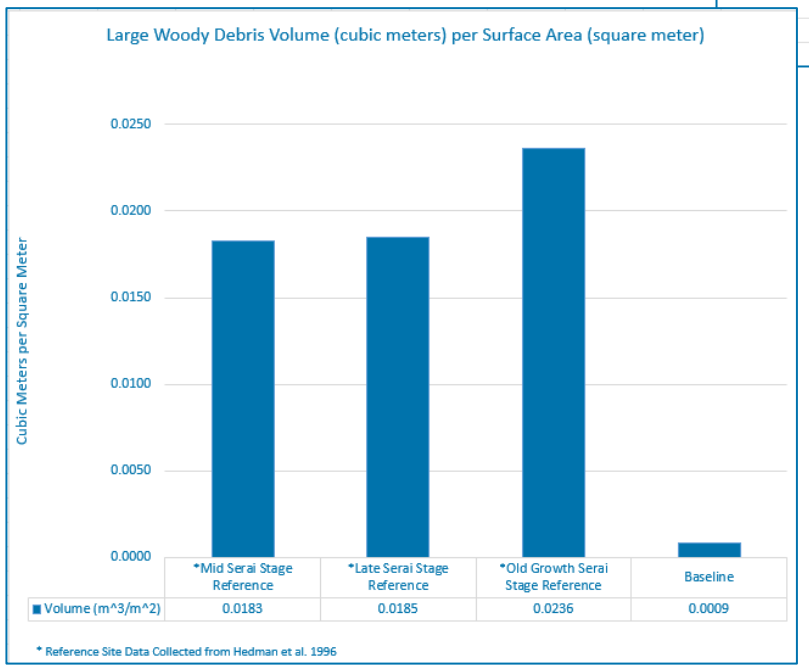
Rosedale BMP – Cross-section 1 Baseline Data

		Metric					
	Enter Values Here!	BankHt/ BankfullHt	Root Depth/ BankHt	Root Density	Bank Angle	Surface Protection	
Bank Height (ft)	4.60	4.18	0.35	10.00	80.00	5.00	Value
Bankfull Height (ft)	1.10	10.00	5.42	8.44	5.90	10.00	Index
Root Depth (ft)	1.60						
Root Density (%)	10						
Bank Angle (degree)	80						
Surface Protection (%)	5						
Section 1 Score:	39.8						
Bank Material	Silt Clay						
	0						
Stratification	0						
*Add 5-10 points depending on position							
Total	39.8 VERY HIGH						

Bank Material Guide	
Bedrock	Low
Boulders	Low
Cobble	(- 10)
Gravel	(+5-10)
Sand	(+10)
Silt Clay	(+0)

VERY LOW	5-9.5
LOW	10-19.5
MODERATE	20-29.5
HIGH	30-39.5
VERY HIGH	40-45
EXTREME	46-50



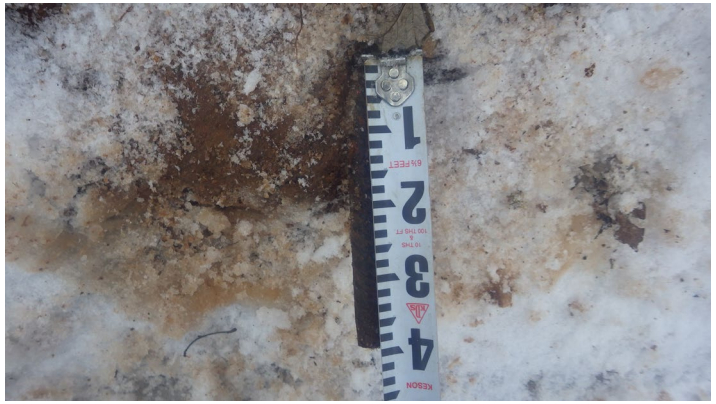


Water Quality Summary Table		
Date		1/27/2022
Time		13:00
Chemical Measurment	Temperature (°C)	0.20
	Specific Conductance (µS/cm)	636.00
	DO %	99.20
	DO (mg/L)	14.41
	pH	6.91

Rosedale Ave BMP Supporting Erosion Data

Rosedale Ave Bank Pin Change Summary											
Name	Bank	Bank Height (Feet)	Length START (Inches)	Date	Length NEXT 1	Date	Length 2	Date	Length 3	Date	Change Observed in 12 months (Inches)
4A	Left	3	5.41	12/16/2021 HK	4.81	1/28/2022 JT/KK	7.55	4/22/2022	8.50	12.20.22 ES	3.09
4B	Right	3	5.53		3.97		6.75		6.62		1.09
4C	Left	3	5.41		4.69		15.75		15.81		10.40
4D	Left	3	3.25		1.69		7.01		6.75		3.50
4E	Right	3	4.31		3.38		5.25		5.50		1.19
4F	Right	2.23					4.55		4.96		4.96
4G	Right	5.13					5.45		No access		0.32
4H	Right	4.82					4.75				-0.07

Rosedale Ave BMP – Photographs Supporting Erosion Data



Protocol 1 Results Summary

Project:	Chesapeake Bay MS4 - Rosedale Ave Reduced	**Checked By: PGHK**
Calculated By:	HKES	
Date:	3/23/2022	

RES Project No: 105247
Client: PennDOT
MS4/TMDL: MS4

Project Description

Basin Location Information

HUC-12 Code	020503051011
HUC-12 Name	Laurel Run-Susquehanna River

Project Reach Information

Reach Length	1,397.24	LF
Corridor Width	Variable	

Protocol 1 Summary - Credit for Prevented Sediment During Storm Flow

Stream Length	1397	LF
Eroding Banks	2794	LF
Weighted Average Bank Height	3.15	FT
Weighted Average Erosion Rate	0.81	FT/Year
Total Reach Erosion Tons	336.28	Tons/Year, TSS
Total Reach Erosion LBS	672,570	LBS/Year, TSS
SDR for TSS	0.29	
Delivered Load Tons	98.53	Tons/Year, TSS
Delivered Load LBS	197063	Lbs/Year, TSS
Reach Erosion by Foot	141	Lbs/Year/Foot
TN Delivered	532.88	LBs/Year

Protocol 3 Summary - Credit for Floodplain Reconnection Volume

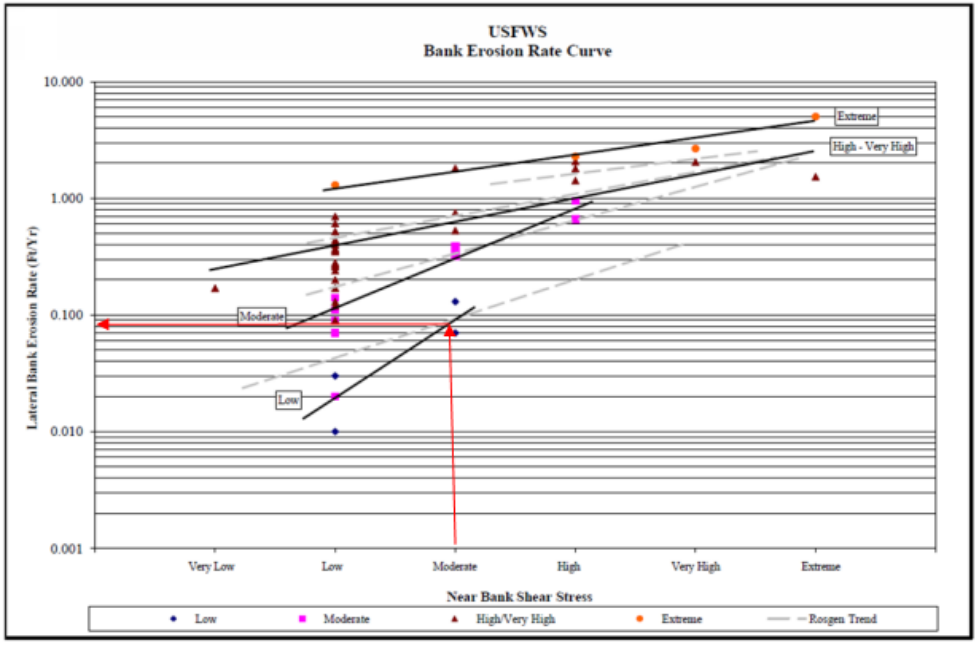
Total Sediment Reduced	302,887	Lbs/Year

Post-Construction Sediment Load Reduction & Efficiency Summary		
	Baseline Conditions	Post-restoration Condition
Stream Length (ft)	1,397	
Stream Banks (ft)	2,794	
Bank Height (ft, weighted ave)	3.15	
Erosion Rate (ft/yr)	0.81	
Total Reach Erosion (lbs/yr)	672,570	
SDR for TSS	0.29	
Delivered Load (lbs/yr)	197,063	
Protocol 1: Annual TSS Reduction (lbs/yr)	177,357	
Estimated Reduction Efficiency	90%	
Protocol 3: Additional TSS Reduction (lbs/yr)	302,887	
Total Annual TSS Reduction (lbs/yr) Anticipated	480,244	

		Calculated by: HKPGRB	Checked by:	Date: 09/2/2022									
FID	Side	Study Bank Height (ft)	Associated BEHI	BEHI Rating	NBS Score	Numeric NBS	Length (ft)	Erosion Rate	Bank Area	CF/Year	Tons/Year	Tons/FT/Year	LBS/FT/YR
	Right	2	C	moderate	Moderate	3	28.40	0.311	56.808	17.657	0.820	0.029	57.77
	Right	2	D	high	High	4	31.23	1.044	62.455	65.206	3.030	0.097	194.05
	Right	1.8	C	moderate	Moderate	3	29.89	0.311	53.802	16.723	0.777	0.026	51.99
	Right	1.8	D	high	Moderate	3	90.44	0.641	162.790	104.393	4.851	0.054	107.27
	Right	6	E	very high	Moderate	3	16.71	0.641	100.279	64.306	2.988	0.179	357.56
	Right	2	D	high	Moderate	3	24.08	0.641	48.168	30.889	1.435	0.060	119.19
	Right	3.6	E	very high	High	4	29.13	1.044	104.850	109.469	5.086	0.175	349.28
	Right	2.3	D	high	High	4	21.94	1.044	50.466	52.689	2.448	0.112	223.15
	Right	2.7	E	very high	Very High	5	33.71	1.700	91.020	154.714	7.189	0.213	426.50
	Right	2.7	D	high	High	4	16.85	1.044	45.497	47.501	2.207	0.131	261.96
	Right	2.3	E	very high	High	4	33.71	1.044	77.525	80.939	3.761	0.112	223.15
	Right	2	D	high	Moderate	3	19.83	0.641	39.659	25.432	1.182	0.060	119.19
	Right	3	E	very high	High	4	18.14	1.044	54.432	56.829	2.641	0.15	291.07
	Right	3	D	high	High	4	27.53	1.044	82.578	86.216	4.006	0.146	291.07
	Right	4	E	very high	Moderate	3	37.11	0.641	148.458	95.203	4.424	0.119	238.37
	Right	4	D	high	Low	2	24.41	0.394	97.635	38.457	1.787	0.073	146.41
	Right	3.3	E	very high	Moderate	3	23.94	0.641	79.000	50.661	2.354	0.098	196.66
	Right	3	D	high	Low	2	29.62	0.394	88.857	34.999	1.626	0.055	109.81
	Right	3	E	very high	High	4	99.68	1.044	299.044	312.215	14.507	0.146	291.07
	Right	5.5	D	high	Low	2	30.67	0.394	168.707	66.451	3.088	0.101	201.32
	Right	2.8	E	very high	Moderate	3	19.22	0.641	53.822	34.514	1.604	0.083	166.86
	Right	2.7	D	high	Moderate	3	9.75	0.641	26.323	16.880	0.784	0.080	160.90
	Right	3	D	high	Moderate	3	19.93	0.641	59.779	38.335	1.781	0.089	178.78
	Right	3.3	E	very high	Extreme	6	19.83	2.767	65.423	181.049	8.412	0.424	848.67
	Right	3.5	E	very high	Moderate	3	32.32	0.641	113.121	72.541	3.371	0.104	208.58
	Right	5.5	D	high	High	4	17.57	1.044	96.648	100.905	4.689	0.267	533.63
	Right	2.3	D	high	High	4	33.63	1.044	77.345	80.752	3.752	0.112	223.15
	Right	4	E	very high	High	4	12.05	1.044	48.187	50.309	2.338	0.194	388.09
	Right	3.5	E	very high	Moderate	3	10.92	0.641	38.205	24.500	1.138	0.104	208.58
	Right	3	E	very high	High	4	10.11	1.044	30.324	31.659	1.471	0.146	291.07
	Right	3.3	E	very high	High	4	22.61	1.044	74.609	77.895	3.619	0.160	320.18
	Right	3.5	D	high	Moderate	3	7.06	0.641	24.697	15.838	0.736	0.104	208.58
	Right	3.5	A	very low	High	4	19.40	0.000	67.915	0.000	0.000	0.000	0.00
	Right	4	E	very high	High	4	193.20	1.044	772.787	806.824	37.489	0.194	388.09
	Right	2	E	very high	High	4	22.69	1.044	45.376	47.375	2.201	0.097	194.05
	Right	2.5	E	very high	High	4	22.95	1.044	57.380	59.908	2.784	0.121	242.56
	Right	3.5	E	very high	High	4	15.85	1.044	55.463	57.906	2.691	0.170	339.58
	Right	3	E	very high	Moderate	3	29.92	0.641	89.756	57.558	2.674	0.089	178.78
	Right	3	D	high	Low	2	18.51	0.394	55.528	21.872	1.016	0.055	109.81
	Right	3	E	very high	High	4	24.75	1.044	74.253	77.523	3.602	0.146	291.07
	Right	3	D	high	Low	2	35.05	0.394	105.141	41.413	1.924	0.055	109.81
	Right	3.4	E	very high	Moderate	3	27.84	0.641	94.667	60.707	2.821	0.101	202.62
	Right	3.2	E	very high	Very High	5	48.90	1.700	156.465	265.958	12.358	0.253	505.48
	Right	2.8	D	high	Very High	5	18.47	1.700	51.720	87.912	4.085	0.221	442.29
	Right	4.5	E	very high	Very High	5	35.84	1.700	161.294	274.166	12.739	0.355	710.83
	Left	3.20	E	very high	Moderate	3	8.00	0.641	25.591	16.411	0.763	0.095	190.70
	Left	2.70	D	high	High	4	15.06	1.044	40.670	42.461	1.973	0.131	261.96
	Left	2.70	D	high	Moderate	3	24.06	0.641	64.967	41.661	1.936	0.080	160.90
	Left	2.70	D	high	Moderate	3	20.95	0.641	56.570	36.277	1.686	0.080	160.90
	Left	2.70	D	high	Moderate	3	18.91	0.641	51.060	32.743	1.521	0.080	160.90
	Left	2.70	D	high	Moderate	3	21.23	0.641	57.325	36.761	1.708	0.080	160.90
	Left	2.20	D	high	Moderate	3	44.10	0.641	97.023	62.219	2.891	0.066	131.11
	Left	2.20	D	high	Low	2	22.33	0.394	49.120	19.348	0.899	0.040	80.53
	Left	2.20	D	high	Low	2	13.62	0.394	29.953	11.798	0.548	0.040	80.53
	Left	2.80	D	high	Low	2	19.65	0.394	55.013	21.669	1.007	0.051	102.49
	Left	2.80	D	high	Moderate	3	21.71	0.641	60.785	38.980	1.811	0.083	166.86
	Left	3.00	D	high	High	4	13.26	1.044	39.777	41.529	1.930	0.146	291.07
	Left	3.00	D	high	Very High	5	25.05	1.700	75.147	127.733	5.935	0.237	473.88
	Left	2.50	D	high	Low	2	21.06	0.394	52.655	20.740	0.964	0.046	91.51
	Left	3.00	D	high	Low	2	29.93	0.394	89.787	35.366	1.643	0.055	109.81
	Left	3.20	D	high	High	4	18.99	1.044	60.767	63.444	2.948	0.155	310.47
	Left	3.20	D	high	Moderate	3	13.49	0.641	43.154	27.674	1.286	0.095	190.70
	Left	2.30	D	high	Low	2	11.31	0.394	26.016	10.247	0.476	0.042	84.19
	Left	3.10	D	high	Low	2	14.10	0.394	43.718	17.220	0.800	0.057	113.47
	Left	3.10	D	high	Very High	5	12.84	1.700	39.815	67.678	3.145	0.245	489.68
	Left	3.10	D	high	High	4	19.57	1.044	60.658	63.330	2.943	0.150	300.77
	Left	2.50	D	high	Moderate	3	29.15	0.641	72.883	46.738	2.172	0.074	148.98
	Left	6.00	E	very high	Moderate	3	34.85	0.641	209.073	134.073	6.230	0.179	357.56
	Left	6.00	E	very high	Moderate	3	18.23	0.641	109.401	70.156	3.260	0.179	357.56
	Left	3.20	E	very high	Moderate	3	34.48	0.641	110.347	70.763	3.288	0.095	190.70
	Left	3.20	E	very high	High	4	16.02	1.044	51.271	53.530	2.487	0.155	310.47
	Left	3.20	E	very high	Very High	5	36.67	1.700	117.336	199.446	9.267	0.253	505.48
	Left	3.60	E	very high	High	4	14.92	1.044	53.702	56.068	2.605	0.175	349.28
	Left	3.60	E	very high	Moderate	3	30.72	0.641	110.582	70.914	3.295	0.107	214.54
	Left	3.60	E	very high	Moderate	3	16.61	0.641	59.812	38.356	1.782	0.107	214.54
	Left	2.60	D	high	Low	2	32.98	0.394	85.745	33.774	1.569	0.048	95.17
	Left	3.60	E	very high	High	4	17.86	1.044	64.303	67.135	3.119	0.175	349.28
	Left	3.60	E	very high	High	4	18.95	1.044	68.235	71.241	3.310	0.175	349.28
	Left	3.60	E	very high	Moderate	3	33.02	0.641	118.875	76.231	3.542	0.107	214.54
	Left	3.30	E	very high	High	4	10.08	1.044	33.257	34.722	1.613	0.160	320.18
	Left	3.50	E	very high	Moderate	3	23.49	0.641	82.214	52.722	2.450	0.104	208.58
	Left	4.40	E	very high	Very High	5	13.20	1.700	58.066	98.700	4.586	0.348	695.03
	Left	3.30	E	very high	High	4	12.70	1.044	41.898	43.744	2.033	0.160	320.18
	Left	3.50	E	very high	High	4	30.59	1.044	107.052	111.767	5.193	0.170	339.58
	Left	3.60	E	very high	Moderate	3	1.94	0.641	6.999	4.488	0.209	0.107	214.54
	Left	3.20	E	very high	Moderate	3	20.73	0.641	66.332	42.537	1.976	0.095	190.70
	Left	3.30	E	very high	Moderate	3	28.69	0.641	94.670	60.709	2.821	0.098	196.66
	Left	3.30	D	high	High	4	13.54	1.044	44.682	46.650	2.168	0.160	320.18
	Left	3.90	D	high	Moderate	3	21.78	0.641	84.940	54.470	2.531	0.116	232.42
	Left	2.90	D	high	Moderate	3	27.35	0.641	79.310	50.860	2.363	0.086	172.82
	Left	2.40	D	high	Moderate	3	19.10	0.641	45.835	29.393	1.366	0.072	143.02
	Left	2.50	E	very high	High	4	18.44	1.044	46.111	48.142	2.237	0.121	242.56
	Left	3.40	D	high	Low	2	136.69	0.394	464.732	183.051	8.505	0.062	124.45
	Left	3.60	B	low	Moderate	3	23.60	0.070	84.972	5.937	0.276	0.012	23.38
	Left	2.70	D	high	Moderate	3	16.37	0.641	44.204	28.347	1.317	0.080	160.90
	Left	2.70	D	high	Low	2	11.52	0.394	31.114	12.255	0.569	0.049	98.83
	Left	3.40	D	high	Low	2	19.29	0.394	65.600	25.839	1.201	0.062	124.45
	Left	3.60	D	high	High	4	22.17	1.044	79.800	83.315	3.871	0.175	349.28
	Left	3.60	D	high	High	4	15.23	1.044	54.846	57.261	2.661	0.175	349.28
	Left	1.30	D	high	Low	2	46.27	0.394	60.148	23.691	1.101	0.024	47.58
	Left	3.20	D	high	Low	2	22.79	0.394	72.944	28.731	1.335	0.059	117.13
	Left	2.00	D	high	Low	2	15.37	0.394	30.746	12.110	0.563	0.037	73.21
	Left	2.50	D	high	Moderate	3	21.17	0.641	52.929	33.942	1.577	0.074	148.98
	Left	3.30	E	very high	Low	2	39.80	0.394	131.324	51.726	2.403	0.060	120.79
	Left	3.80	E	very high	High	4	23.52	1.044	89.370	93.307	4.335	0.184	368.69
	Totals						**2794.479**		**8813.488**	**7237.378**	**336.285**	**12.592**	**25183.015**
		3.15				3.32	1397.24	0.81				0.12	239.84

BEHI	NBS		BEHI/NBS	
Very Low	Very Low	0.005	Very LowVery Low	0.005
	Low	0.010	Very LowLow	0.010
	Moderate	0.020	Very LowModerate	0.020
	High	0.035	Very LowHigh	0.035
	Very High	0.065	Very LowVery High	0.065
	Extreme	0.150	Very LowExtreme	0.150
Low	Very Low	0.015	LowVery Low	0.015
	Low	0.030	LowLow	0.030
	Moderate	0.070	LowModerate	0.070
	High	0.150	LowHigh	0.150
	Very High	0.350	LowVery High	0.350
	Extreme	0.800	LowExtreme	0.800
Moderate	Very Low	0.090	ModerateVery Low	0.090
	Low	0.125	ModerateLow	0.125
	Moderate	0.300	ModerateModerate	0.300
	High	0.800	ModerateHigh	0.800
	Very High	1.000	ModerateVery High	1.000
	Extreme	1.200	ModerateExtreme	1.200
High	Very Low	0.250	HighVery Low	0.250
	Low	0.400	HighLow	0.400
	Moderate	0.640	HighModerate	0.640
	High	1.000	HighHigh	1.000
	Very High	1.750	HighVery High	1.750
	Extreme	2.500	HighExtreme	2.500
Very High	Very Low	0.250	Very HighVery Low	0.250
	Low	0.400	Very HighLow	0.400
	Moderate	0.640	Very HighModerate	0.640
	High	1.000	Very HighHigh	1.000
	Very High	1.750	Very HighVery High	1.750
	Extreme	2.500	Very HighExtreme	2.500
Extreme	Very Low	0.150	ExtremeVery Low	0.150
	Low	1.300	ExtremeLow	1.300
	Moderate	1.750	ExtremeModerate	1.750
	High	2.500	ExtremeHigh	2.500
	Very High	3.500	ExtremeVery High	3.500
	Extreme	4.500	ExtremeExtreme	4.500

Non-highlighted rates from USFWS Bank Erosion Rate Curve
Yellow Highlighted rates from Rosgen Colorado Bank



Protocol 3 Results Summary

APPENDIX E
Soil Bulk Density Lab Results

Laboratory Determination of Density (Unit Weight) of Soil Specimens
D7263-09 (2018)e2 - Method B

Client	Resource Environmental Solutions
Project	CHK MS4
Project No.	44696

Lisa Lake(Rosedale Ave BMP)

Boring Number	LL-TxSA	LL-TxSB	LL-BxSA	LL-BxSB						
Depth	0.5'	2.6'	0.5'	2.5'						
Sample	NA	NA	NA	NA						
Lab Sample No.	44696001	44696002	44696003	44696004						
Water Contents										
Tare Number	Q88	Q34	Q98	Q89						
Wt. Tare & WS, gm	226.06	243.45	230.25	250.95						
Wt. Tare & DS, gm	192.82	209.05	201.06	212.85						
Wt. Tare, gm	74.71	71.22	74.01	73.52						
Water Content, %	**28.1%**	**25.0%**	**23.0%**	**27.3%**						
Direct Measurement Data										
Wt. Of Wet Soil + tube., gm	247.1	267.88	253.65	272.92						
Wt of empty tube, gm	95.52	95.21	97.19	95.21						
Wt. of Wet Soil, gm	151.58	172.67	156.46	177.71						
Length 1, in	1.997	2.001	1.997	1.998						
Length 2, in	1.998	2.003	1.997	1.997						
Length 3, in	1.996	1.999	1.998	2.002						
Top Diameter, in	1.852	1.846	1.857	1.857						
Middle Diameter, in	1.853	1.846	1.852	1.851						
Bottom Diameter, in	1.837	1.856	1.829	1.840						
Sample Volume, cc	87.71	88.08	87.60	87.99						
Water Content ,%	28.1%	25.0%	23.0%	27.3%						
Unit Wet Wt., gm/cc	1.73	1.96	1.79	2.02						
Unit Wet Wt., pcf	107.8	122.3	111.5	126.0						
Unit Dry Wt., pcf	**84.2**	**97.9**	**90.6**	**99.0**						
Unit Dry Wt., gm/cc	1.35	1.57	1.45	1.59						
Specific Gravity, Assumed	2.7	2.7	2.7	2.7						
Void Ratio,e	1.00	0.72	0.86	0.70						
Porosity, n	0.50	0.42	0.46	0.41						
Saturation, %	75.8%	93.5%	72.2%	105.1%						

**Samples 001-004 contained organics (roots).*

Performed By: JSJ Input Validation: JSJ Reviewed By: ALO Date: 11/1/2021

ORIGINAL PRP

LOWER SWATARA TOWNSHIP

Dauphin County, Pennsylvania

Chesapeake Bay Pollutant Reduction Plan

September 2017

Updated: May 2018

HRG Project No. R000257.0439

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

Chesapeake Bay Pollutant Reduction Plan

LOWER SWATARA TOWNSHIP

DAUPHIN COUNTY, PENNSYLVANIA

TABLE OF CONTENTS

INTRODUCTION

Lower Swatara Township (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].

General Information	
Permittee Name: Lower Swatara Township	**NPDES Permit No.:** PAG133543
Mailing Address: 1499 Spring Garden Drive	**Effective Date:** March 18, 2013
City, State, Zip: Middletown, PA 17057	**Expiration Date:** March 15, 2018
MS4 Contact Person: Ann Hursh	**Renewal Due Date:** September 16, 2017
Title: Planning & Zoning Coordinator	**Municipality:** Lower Swatara Township
Phone: (717) 939-9377	**County:** Dauphin
Email:	**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

Lower Swatara Township is a small MS4 community that will be starting its second permit term in March 2018. According to the United States Census Bureau's 2010 census, 100% of the Township (7,943.2 acres) is classified as urbanized area (UA).

The municipal UA is split between the Swatara Creek-Susquehanna River and Laurel Run-Susquehanna River HUC-12 Watersheds. The Laurel Run-Susquehanna River has been classified as impaired by PADEP. The Pollution Reduction Plan (PRP) requirements for this impaired watershed are included as part of this CBPRP.

[1] PADEP, MS4 Requirements Table (Municipal) (rev. 5/9/2017)
[2] PADEP 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 Lower Swatara 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. One public comment was received during this time. The public comment and response is included in Appendix A. The information contained in this report was presented to the public during the regularly scheduled Lower Swatara Township Board of Supervisors workshop meeting held on August 2, 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 Lower Swatara 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). In addition to the MS4 infrastructure (inlets, pipes, outfalls, existing BMPs, etc.), the Planning Area Map also shows the CBPRP planning area, UA boundary, watershed boundaries, existing BMP locations, and proposed BMP locations.

The Township's Land Use Map was developed using the most recent National Land Cover Database[3]. Much of the northern part of the municipality is farmland or low density residential areas. Medium to High density developed areas are concentrated in the southwest portion of the municipality along Eisenhower Boulevard, in the southeast along the Turnpike, and in the central portion of the Township along Fulling Mill Road.

Per the request of PADEP the map was updated accordingly in May of 2018 and is attached to this report.

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

SECTION C: POLLUTANTS OF CONCERN

The pollutants of concern for Lower Swatara 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)
Laurel Run	Unnamed Tributaries to Susquehanna River, Unnamed Tributaries to Sherman Creek	Appendix E - 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 Lower Swatara 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/PA Turnpike** – The impervious area attributed to state roadways (PennDOT) and the portion of the PA 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 systems.
- **Private Properties** – Portions of the Susquehanna Regional Airport and Penn State University (Harrisburg campus) are located within the Township. As these facilities are operated and maintained under their own NPDES permits, they were removed from the Township planning areas. Additionally, the PA Turnpike Commission has two office buildings located adjacent to the Turnpike that were removed from the Township planning areas.
- **General Permit for Stormwater Associated with Industrial Activity (PAG-03)** – The Township contains four facilities currently covered by NPDES PAG-03 permits. The property areas regulated by the existing PAG-03s were removed from the planning area.
- **Direct Discharge Areas** – Direct discharge areas are areas in which stormwater runoff does not enter the MS4. The majority of the Township MS4 is located in the central and southern portions of the Township. Much of the UA along the outer boundaries of the Township is drained by tributaries to the Swatara Creek and Susquehanna River and does not enter the MS4. Therefore, 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 and 2B. 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	7,943
Parsed Area (PennDOT/PA Turnpike)	- 274
Parsed Area (Private Properties)	- 892
Parsed Area (PAG-03)	- 116
Parsed Area (Direct Discharge)	- 2,902
Adjusted Planning Area	**3,759**

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

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

Planning Area	Urbanized Area (acres)
Laurel Run PRP	4,647
Parsed Area (PennDOT Roadways)	- 200
Parsed Area (Private Properties)	- 892
Parsed Area (PAG-03)	- 53
Parsed Area (Direct Discharge)	- 1,089
Adjusted Planning Area	**2,413**

D.2 Existing Pollutant Load Calculation

The existing pollutant loads were calculated using the Simplified Method[6]. In accordance with this method, the adjusted UA from Tables 2A and 2B were multiplied by the percent pervious and impervious land use values for Lower Swatara 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 Dauphin 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 the Laurel Run 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 Lower Swatara Township

Planning Area	Urbanized Area (acres)	Regulated Pollutant Load TSS (lbs/yr)
Laurel Run PRP	2,413	1,681,152
Lower Swatara Township CBPRP	3,759	2,619,554

As the Laurel Run PRP planning area is located within the overall CBPRP planning area, the pollutant loads associated with this 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 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)

D.3 Existing Pollutant Loading Adjustment for Previously Implemented BMPs

Lower Swatara Township contains multiple existing BMPs that are being used as credit towards reducing the Township baseline load. Additional information for these BMPs is included in Appendix D. 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]. Only those BMPs installed within the non-parsed portions of the UA area being counted as credit towards reducing the existing baseline.

Originally, this was calculated using DEP's "Statewide MS4 Land Cover Estimate" document. This method is acceptable for larger areas, but there can be errors when calculating for smaller areas. Based on this information, PADEP asked that the calculations be done using a different method that would provide more accuracy. Therefore, new calculations were completed using WikiWatershed "Model my Watershed" tool to determine the land use included within the BMP drainage area. The impervious and pervious areas were determined using the percentage information provided in each land use definition.

The recalculations resulted in an increased load reduction for the total baseline reduction the existing BMPs provided.

Table 4A: Adjusted Baseline Load Summary – CBPRP Planning Area

Planning Area	UA (acres)	Regulated Pollutant Load TSS (lbs/yr)	Existing BMP Load Reduction TSS (lbs/yr)	Adjusted Pollutant Load TSS (lbs/yr)
CBPRP	3,759	2,619,554	217,460	2,402,094

Table 4B: Adjusted Baseline Load Summary – Laurel Run Planning Area

Planning Area	UA (acres)	Regulated Pollutant Load TSS (lbs/yr)	Existing BMP Load Reduction TSS (lbs/yr)	Adjusted Pollutant Load TSS (lbs/yr)
Laurel Run PRP	2,413	1,681,152	132,885	1,548,267

[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

Lower Swatara 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	3,759	242,238

In addition to meeting the PAG-13 General Permit, Appendix D requirements listed in Table 5, the Laurel Run watershed has four streams (three unnamed tributaries to Susquehanna River and one unnamed tributary to Sherman Creek) with 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 Laurel Run, Appendix E watershed is 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 – Laurel Run PRP Planning Area

Planning Area	UA (acres)	Required Load Reduction TSS (lbs/yr)
Laurel Run PRP	2,413	152,857

As stated previously, the load reduction requirements for the Laurel Run planning area is 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 (242,238 lbs/yr), 63-percent (152,857 lbs/yr) is to be achieved within the Laurel Run watershed.

[11] PADEP - PRP Instructions, 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 the public works employees and municipal staff, in-field site assessments, and public outreach meetings.

The proposed strategy (Table 7) includes multiple BMP types including bioretention (rain gardens), stream restoration, and riparian buffer plantings. 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.

Table 7: BMP Strategy Summary

Site	BMP ID	BMP Type	Planning Area	Drainage Area (acres)	Length (ft)	Load Reduction TSS (lbs/yr)
Shireman Parcel	BMP-1	Bioretention	CBPRP	1.08	n/a	357
	BMP-2	Buffer Planting		1.61	700	322
Old Reliance Park	BMP-3	Bioretention	CBPRP	1.11	n/a	621
Shope Gardens Park	BMP-4	Bioretention	CBPRP/Laurel Run PRP	1.33	n/a	1,458
Middletown Area High School	BMP-5	Stream Restoration	CBPRP/Laurel Run PRP	n/a	1,600	71,808
Greenfield Park	BMP-6	Basin Retrofit	CBPRP/Laurel Run PRP	8.65	n/a	4,452
		Stream Restoration		n/a	1,600	71,808
Hershey Creamery	BMP-7	Stream Restoration	CBPRP	n/a	1,800	89,760
Total						**240,586**

Table 7 has been updated per PADEP's request as of May, 2018. New calculations were completed using WikiWatershed "Model my Watershed" tool to determine the land use included within the BMP drainage area. The impervious and pervious areas were determined using the percentage information provided in each land use definition.

The combination of proposed projects listed in Table 7 meet both the pollutant load reduction requirements for the Chesapeake Bay (CBPRP planning area) as well as the pollutant load reductions for the local impaired waters (Laurel Run PRP planning area).

Table 8: Proposed BMP Load Reductions by Planning Area

Planning Area	Load Reduction from Proposed BMPs TSS (lbs/yr)	Required Load Reduction TSS (lbs/yr)	Percent of Goal Achieved
Laurel Run PRP	156,296	152,857	102%
CBPRP	245,829	242,238	101%

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

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. 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.

Shireman Parcel Park Development – The Shireman parcel is a property slated to be acquired for future development as a community park. Though not yet master planned, the park project will likely incorporate a small rain garden located next to a future parking lot and riparian buffer plantings for the approximately 700-ft of unnamed tributary to the Swatara Creek located along the southern property line. The rain garden will be designed as an excavated shallow surface depression with amended soil media (a mixture of sand, soil, and organic material) and planted with specially selected native vegetation to treat and capture runoff from the parking area.

The unnamed tributary to the Swatara Creek that flows along the southern property line is in relatively good condition. No major stream restoration is planned for this stream, however the condition of the riparian buffer is in need of improvements. The existing buffer is of minimal width and choked with invasive species. The proposed riparian buffer enhancement will expand the buffer to a minimum width of 35 feet. The buffer will provide wildlife habitat, enhance park aesthetics, and provide vegetative stabilization for the stream. 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 lawn areas in order to reduce the amount of nutrients and sediment reaching the creek.

Minimal Existing Riparian Buffer

Old Reliance & Shope Gardens Park Bioretention – Both Old Reliance Park and Shope Gardens Park have received recent upgrades in park facilities. New play structures and swing sets have been installed at each park. A small bioretention basin is planned to be installed at each park next to the playground areas to manage runoff from the play structure and swing set area. The rain garden 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. The bioretention basin design will also include educational signage.

Middletown High School Stream Restoration – An unnamed tributary is located on the school district property between the Middletown high school and middle school. The stream flows from Blue Raider Lane south towards the Pennsylvania Turnpike. The stream enters a culvert under the Turnpike and is conveyed south along the Penn State Harrisburg campus before ultimately discharging to the Susquehanna River.

Streambank Scour

A site investigation of this stream showed multiple areas of scour and significant erosion as well as debris and other obstructions in the stream channel. This proposed project will implement streambank stabilization measures along approximately 1,600 feet of the unnamed tributary. 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.

Stream stabilization and restoration will 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. The root structures of the riparian plantings will provide vegetative stabilization for the newly-stabilized streambanks, and promote plant uptake of potentially pollutant-laden runoff from neighboring lawn and turf field areas. The Township anticipates that this project will be a partnership opportunity with the neighboring schools and provide educational opportunities for middle and high school students to learn about local water quality and environmental issues.

Obstructions to Stream Channel
(Invasives / Vegetative Debris

Greenfield Park Basin Retrofit and Stream Restoration – Greenfield Park is a municipally-owned community park located in the central portion of the Township. The 25-acre park contains several soccer fields and three small parking areas. A siltation-impaired unnamed tributary is located in a wooded area along the northern part of the park. A site visit conducted to determine the condition of the stream found multiple eroded areas of streambank and sediment-laden runoff in the stream.

Eroded Streambank

The proposed project will implement streambank stabilization measures along approximately 1,600 feet of the stream. This will include the repair of existing eroded areas and regrading the slope of incised streambanks to reconnect the stream to the surrounding floodplain in order to 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.

Stream stabilization and restoration will also include improvements to the vegetated buffer surrounding the stream. The stream currently has an existing vegetated buffer, but it is in need of improvements. The riparian buffer enhancement will include removal of invasive species, brush, and debris as well as the installation of additional native plantings. The root structures of the riparian plantings will provide vegetative stabilization for the newly-stabilized streambanks, and promote plant uptake of potentially pollutant-laden runoff from the school's athletic fields.

The existing stormwater basin adjacent to the parking lot was originally designed as a bioretention basin but it was installed as a detention basin. As currently constructed, the detention basin receives, temporarily holds, and discharges stormwater at a controlled rate. While this can provide rate and volume control, the basin offers only a limited water quality benefit. The only water quality benefit is realized through minimal infiltration. This project proposes to retrofit the existing basin with bioretention features to transform the basin from a simple catch, store, and release pond into a BMP 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 basin with native and/or wetland plant species.

The extent and nature of the retrofit will rely on the results of future engineering investigations, however 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.

Hershey Creamery Stream Restoration – Hershey Creamery is located just north of the turnpike in the high-intensity development portion of the Township. This project proposes to restore approximately 1,800 feet of an unnamed tributary to the Swarata Creek located along the northern Hershey Creamery property line.

Eroded Streambanks

A site investigation of this stream revealed that although this is a relatively small stream, its stream banks are highly-eroded which is causing a significant amount of sediment to be conveyed from this tributary to the Swatara Creek. During high-intensity rain fall events, stormwater quickly concentrates into the stream channel instead of spreading out across the floodplain. This project proposes to regrade the streambanks and connect the streambank to the surrounding floodplain. This will reduce the quantity and velocity of flow in the channel and thereby reduce the amount of streambank erosion.

The existing vegetated buffer appears to be in overall good condition. However, additional native plantings may be added to supplement and expand the existing buffer.

Table 9: BMP Implementation Schedule

Site	BMP ID	BMP Type	Permitting & Engineering Design (Permit Year)	Construction/ Reporting (Permit Year)
Shireman Parcel	BMP-1	Bioretention	1	2/3
	BMP-2	Buffer Planting		
Old Reliance Park	BMP-3	Bioretention	1	1
Shope Gardens Park	BMP-4	Bioretention	1	1
Middletown Area High School	BMP-5	Stream Restoration	2	3
Greenfield Park	BMP-6	Basin Retrofit	3	4
		Stream Restoration		
Hershey Creamery	BMP-7	Stream Restoration	4	5

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.

Bioretention Areas/Basin 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

Notice of Public Participation & Public Meeting Notice Published on Township Website
(http://lowerswatara.org/stormwater.php)

Lower Swatara Township

Home | About Us | History | Directory | Calendar | Voting Districts | Newsletter | Utilities | MS4 (STORMWATER) | Links

- Board
- Manager's Office
- Finance
- Emergency Services
- Emergency Management
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- Code Enforcement
- Public Works
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Middletown
77°F
SSE 5 MPH
Click for forecast
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MS4 (STORMWATER)

MS4 municipal separate storm sewer system

Citizens observing illicit discharge during normal office hours should contact Dan Wagner, Public Works Superintendent, at the Township immediately at (717) 939-9377. Observances after hours should be reported immediately by phoning (717) 558-6900.

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

Lower Swatara 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 public is invited to review this document and provide written comments to the Planning and Zoning Coordinator.
1499 Spring Garden Drive, Middletown, PA 17057
Ann Hursh, ahursh@lowerswatara.org

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 2, 2017 starting at 7PM, at the municipal building.

2017.07.27 Lower Swatara CBPRP - FOR REVIEW

UPCOMING EVENTS

August 16
7 PM
Board of Commissioners Legislative Mtg.

August 23
7 PM
Municipal Authority Mtg.

August 24
7 PM
Plannning Commissio Mtg.

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

5066432

PA MEDIA GROUP

Order Confirmation

Ad Order Number 0008285861

Customer	Payor Customer	
LOWER SWATARA TOWNSHIP	**LOWER SWATARA TOWNSHIP**	
*Account:*67130	*Account:* 67130	*PO Number*
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Materials		*Amount Due*	$144.03
Invoice Text			

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Pick Up #		*Ad Attributes*	
External Ad #		*Color*	<NONE>
Production Method	AdBooker	*Production Notes*	

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

Lower Swatara 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://lowerswatara.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 2, 2017 starting at 7PM, at the municipal building.

MINUTES

NON-LEGISLATIVE MEETING – AUGUST 2, 2017

The August 2, 2017 Non-Legislative Meeting of the Lower Swatara Township Board of Commissioners was called to order at 7:00 P.M. by President Jon G. Wilt. The following officials were in attendance:

- Jon G. Wilt, President
- Laddie J. Springer, Vice President
- Michael J. Davies, Assistant Secretary
- Todd F. Truntz, Commissioner
- Benjamin C. Hall, Commissioner
- Jean R. Arroyo, Secretary
- Peter R. Henninger, Solicitor
- Erin G. Letavic, HRG, Engineer
- Ann Hursh, Planning and Zoning Coordinator
- Daniel L. Wagner, Public Works Director
- Scott Young, Officer in Charge

Residents and visitors in attendance: (PLEASE SEE ATTACHED SIGN-IN SHEET)

President Wilt welcomed everyone to the meeting and opened the floor for public comments.

PUBLIC COMMENTS:

Lee Dickerson, 1880 North Union Street, expressed concerns with the sewerage issues and problems at the end of North Union Street and with the lack of action on the comprehensive plan. Mr. Dickerson stated that he was told over two years ago by his personal attorney that this is how the script would play out on the development of his property: it would be a slow process, would make it through the Planning Commission, and then be stale mated by the Commissioners before it was even presented. He was told that if he went for a variance, the variance would not be approved. Solicitor Henninger explained that Mr. Dickerson had originally filed an application for a zoning change. He then withdrew that application and decided to ask for a variance. The variance was denied, so Mr. Dickerson took an appeal to the Court of Common Pleas. Briefs have been filed, and the court's decision is being awaited. Since this is a pending

legal matter, he advised the Board not to discuss this further. As far as the comprehensive plan is concerned, the Board will take action when it feels it is appropriate, which could be tonight

Dave Klingaman, 241 Keystone Drive, referenced Mr. Dickerson's comments and asked why, when residents bring concerns to the Board, the Commissioners can just table them and never discuss them. He asked why they can't set a time limit to give a decision. Solicitor Henninger explained that in regards to the Dickerson matter, the issue is in litigation. The Zoning Hearing Board did make a ruling, and that ruling was challenged and is now in court. Timeframes on many other matters are not controlled by this Board, but are set by the state legislature through rules and regulations under the first class township code.

Marjie Hartz, North Union Street, referenced page 66 of the draft comprehensive plan, which indicates that the Dauphin County Comprehensive Plan was last updated in 2008. She noted that it was just updated, and asked if this will be adjusted in the Township's plan. Solicitor Henninger agreed it should be. Ms. Hartz also questioned page 33, which says Area 1 North Union Street north of Fulling Mill Road should retain its current zoning designation of Mineral Recovery. However, the attached map shows the current zoning as Industrial (Mineral Recovery). Ms. Letavic recalled that the context of this was related to particular areas that the committee was looking at as far as alternate uses/rezoning. Ultimately, it was decided to retain the Mineral Recovery zoning, but she believes that the map and chart may simply document the discussion that occurred. Ms. Hartz stated this is very confusing. She also noted that the Concerned Citizens' Group in regards to the UPS project is actively involved and attending meetings and would like the Board to know that is strongly opposed to the project. She suggested that politics seem to be playing a huge role in the UPS process. As elected officials, the Commissioners must remember that it is people above politics.

Bill Leonard, 1401 Heritage Square, stated that he spent about fourteen years on the Board of Commissioners, two on the Planning Commission, and also served as Fire Chief for about six to eight years. He recalled that he rarely saw any big issues that had 100% agreement one way or the other. The UPS project is no different, and there are many concerns that need addressed. However, Mr. Leonard stated that he feels there may be people who have not spoken up yet that do support that kind of development in that part of the community. There are pictures on social media expressing concerns about truck traffic on Fulling Mill Road. He explained that Fulling Mill Road was designed from North Union Street to the Fire Department to be a collector

road to get as much traffic out of Old Reliance, Shopes Gardens, and Route 230 and into that part of the Township as much as possible. Also, the North Union Street interchange was expanded to further help with getting truck and business traffic out of the central part of the Township and over to the northeast part. Mr. Leonard noted that he does not favor development on the west side of North Union Street, but does see value in continuing to build out business and commercial opportunities on the east side. Using the approximately one mile of roadway involved and comparing it to the about 40 miles of road in the Township, it sounds like what will be seen through incremental truck traffic is an impact of 2 1/2 % of Township roads.
Mr. Leonard referenced the Pennsy Supply quarry, and stated he does not know if they own it or are leasing it. He stated that he understands they may be paying some royalties, but is not sure if that information is accurate. He asked if the Township gets any tax revenue from the holes in the ground at the Pennsy quarry. Solicitor Henninger explained that the Township only receives real estate taxes. Mr. Leonard added that concerns are being expressed about farmland being taken away, yet the two quarries on North Union Street already took farmland away and do not provide any revenue. Those two quarries combined are almost twice the size of the site UPS is interested in. Truck traffic also results from the quarry. He surmised that the $12,000 - $15,000 expenditure recently approved by the Township for resurfacing a portion of North Union Street is needed as a result of the traffic that is already there. UPS has indicated that if its plan is approved, it will be willing to make some of these improvements for the Township. Mr. Leonard stated that he feels UPS is a very good company, and he would hate to see them relocate on the east side of the Swatara Creek and pay tax revenue to either Derry Township or Londonderry Township rather than Lower Swatara Township and the Middletown Area School District, while hypothetically still driving through Lower Swatara Township to get off at the Vine Street interchange. He agreed there will be sacrifices involved, but suggested everyone also consider the overall benefits of the project.

Ms. Hartz stated that the area is zoned Mineral Recovery for a reason; the quarry has been there for a long, long time and there is stone there to recover.

NANCY AVOLESE AND RUTH SHIREMAN: HISTORIC PRESERVATION SOCIETY OF LOWER SWATARA TOWNSHIP:

Nancy Avolese, 1451 North Union Street and Ruth Shireman, 790 Longview Drive, referenced a concept paper they had provided the Board about establishing a Historic Preservation Society of Lower Swatara Township. The mission is to educate, promote interest in, and advocate for the preservation of historic buildings, cemeteries, and landscapes in Lower Swatara Township. The group would provide advisory information to the Board of Commissioners on needed preservation efforts. There would be no cost to the taxpayers; Ms. Avolese and Ms. Shireman would be doing this on their own, and would also provide a digital library of historical landmarks, historical properties, etc. and would give out plaques to those who apply (the applicant would pay for the plaque). Ms. Avolese added that if the Board approves, one of the things the group will do is be caretakers of the small cemetery on Route 230. She noted that she has two masons that are willing to do some of the work for free. No decision is needed tonight. This is just something that the Board is being asked to consider. Ms. Avolese stated that they feel history is important, and anyone that doesn't think so is awfully shortsighted.

APPROVAL OF MINUTES:

A motion was made by Vice President Springer, seconded by Commissioner Hall, to approve the Minutes of the July 5, 2017 Workshop Meeting. The motion was unanimously approved.

PLANNING AND ZONING REPORT:

Ann Hursh, Planning and Zoning Coordinator, reported that the Planning Commission met on July 27 for the review and discussion of the Petition to Amend the Zoning Ordinance and Zoning Map Amendment for BT-NEWYO, LLC as submitted by McNees, Wallace & Nurick LLC for a proposed regional hub facility for UPS. It took action to table the application until the August 24 meeting. This was done to allow residents to submit any additional information or concerns that they may have and to give the Planning Commission members time to review any new information. The Zoning Hearing Board met on July 6 as rescheduled due to the lack of a quorum at the June 27 meeting. The hearing was for Docket No. 2017-03 – MRPI Fulling Mill

Road, 140 Fulling Mill Road, requesting a variance from Zoning Ordinance §Maximum Fence Height, for a 9' high security fence. The decision was to approve the variance. The hearing also addressed Docket No. 2017-04 – Phoenix Contact, 586 Fulling Mill Road, requesting a variance from Zoning Ordinance §27-2402 Off-Street Parking, Required Parking Spaces. The decision was to approve the variance.

Staff completed the Organizational Analysis for the Codification Project Update and returned it to General Code as required. Storm damage complaints concerning erosion and debris were investigated, documented and resolved. Ms. Hursh reported that she attended a day long training seminar titled "Selling Stormwater" on July 17. The Chesapeake Bay Pollution Reduction Plan (CBPRP) has been submitted for staff review; Ms. Letavic will present it later this evening. The Land Development Plans for Soccer Shots and AV Flight are ready to be recorded. A resident from Evergreen Drive attended the last Board meeting to discuss a concern regarding a detention basin issue. Ms. Hursh explained that the president of the Woodridge Homeowners Association has been asked to provide her with a list of the names and addresses of the other homeowners involved. Meetings will be set up in the near future, even if they need to be one-on-one due to scheduling conflicts. In response to a question from Commissioner Hall, Ms. Hursh confirmed that the department is busier this year than the previous year.

PUBLIC WORKS REPORT:

Mr. Wagner reported that the Department has been very busy. Recently completed projects include placing a border around the playset areas at both Shopes and Old Reliance Parks, applying the remaining grub control at the parks, applying soil amendments again to the playing surfaces of both soccer and baseball fields, completing the annual leak detection test with the fueling system, setting up and cleaning up from the movie night at Shopes Gardens and Vacation Bible School week at both Georgetown and Market St. Playgrounds, completing vehicle inspections for the month, watering the soccer fields regularly as needed, and replacing signs that were not meeting specs or were hit during vehicle crashes.

Current projects include weekly mowing of the parks, mowing of the hazard mitigation lots, mowing around the tree plantings at the Fulling Mill Road property, addressing cleanup and repair issues from the rain event on July 23, making repairs to North Union St. for the paving at the end of September, and removal of the fallen tree at Old Reliance Park. The Department also hopes to get

back to the Shope Gardens and Old Reliance playground projects to get the remaining border, wood carpet, and drainage installed. Mr. Wagner added that he was contacted by Suez today. They anticipate coming in tomorrow to repair the cross bore on Swatara Drive. Mr. Wagner also updated the Board on the situation with PPL and the cross bore at the Market Street and Hanover Street area. He anticipated this will be taken care of in the upcoming months.

Mr. Wagner again noted that there are an overwhelming number of one calls for the Public Works and Municipal Authority, routinely 40 – 50 month. This is very time consuming.

The Board discussed the PennDOT 2017-2018 Winter Maintenance Agreement. Mr. Wagner explained that after the last winter storm (March 13 – 14, 2017), the Public Works Department took a pretty good "whooping" about its response, and there was staff discussion with Terry Kauffman (previous Interim Manager) and Mr. Williamson about continued plowing of certain PennDOT roads. Concerns of when Township roadways or developments were plowed factored into this. It was suggested that PA Route 230 no longer be taken care of by the Township. President Wilt asked if this has been discussed with PennDOT since he believes the Township is in year three of a five-year agreement. Mr. Wagner stated it has not, but changes can be made at any time. President Wilt commented that he is concerned this could be a safety hazard if PennDOT does not address 230 in a timely manner. Commissioner Truntz agreed this could be looked into, but added that there were tempers flaring during the storm and no one meant to be derogatory. He suggested this be discussed further. Commissioner Davies asked if the Township is equipped to handle plowing 230. Mr. Wagner explained that the Township has been able to maintain it pretty well, although a snow blower for the front of the loader would be useful. The Board agreed to table any action on this item until further discussions are held with PennDOT.

Mr. Wagner stated that before the Board tonight is a memo relative to the sale of items on Municibid which were previously approved via resolution. A motion was made by Commissioner Truntz, seconded by Commissioner Hall, to approve the sale of the following equipment to the high bidders upon receipt of a certified check, money order, or cash:

1.)	2006 Crown Victoria	Sale Price of $1,178.00 sold to Glenda Washington of Pittsburg, PA
2.)	2009 Dodge Charger SE	Sale Price of $1,450.00 sold to Kevin Kline of Bernville PA
3.)	2008 Dodge Charger SE	Sale Price of $5,000.00 sold to David Huff of Saint Marys PA
4.)	Stihl Demolition Saw	Sale Price of $ 410.00 sold to Hayden Crick of Harrisburg PA
5.)	Accu-Turn 5402 Tire Machine	Sale Price of $ 701.00 sold to Dale Hess of Mount Joy, PA

The motion was unanimously approved.

A motion was made by Vice President Springer, seconded by Commissioner Hall, to approve authorization for Lester Lanman, Municipal Authority Manager/Assistant Superintendent of Public Works, to sign title transfers on behalf of Lower Swatara Township. The motion was unanimously approved.

Mr. Wagner recognized Seth Myers, who recently resigned from the Department, and stated that he was a great worker and will be missed. He wished him well. Mr. Wagner reported that the Department is in need of help. It is now down a total of four employees – two full time and two part time. In 1990, the Department had four employees, which was expanded to five. In 2002, it was expanded to six employees. That is currently where the Department stands, and there are additional requirements such as extra roads, MS4 regulations, and parks. He stated that the Department needs expanded; he has been looking for part-time help since March. President Wilt stated these are personnel issues which should not be addressed at a public meeting. Commissioner Truntz added that the Township has advertised for help, and interviews will be scheduled.

Mr. Wagner reminded residents that the dumpster will be available on August 5 from 8:00 A.M. to noon.

Commissioner Truntz commented that he understands the pressure the Department is under, and expressed his appreciation for the efforts of the crew during the recent storm. He also inquired if there is an estimated time for re-opening of the two parks. Mr. Wagner explained that he hopes they can be completed by the end of next week. In response to a question from Commissioner Truntz, Mr. Wagner confirmed that the old playground equipment was removed last fall because of safety issues.

Commissioner Hall stated that he would like to discuss the PA One Call issue with Mr. Wagner. He also asked Mr. Wagner to remind Suez about the issue with Anglesey Circle. Mr. Wagner confirmed that they are aware of this and it will be addressed.

The Board discussed a letter from the County offering gypsy moth spraying. Solicitor Henninger recalled that in the past, the Township did not participate because of ineligibility or lack of interest. Unless interest has been expressed, he recommended the Township advise the County that it is not interested in participating this year. A motion was made by Commissioner Truntz, seconded by Commissioner Davies, to decline participation in the gypsy moth spraying. The motion was unanimously approved.

MANAGER'S REPORT:

A motion was made by Commissioner Hall, seconded by Commissioner Davies, to approve Resolution No. 2017-R-15 appointing Jean R. Arroyo, Township Secretary, as the Right To Know Officer for the Township and Scott A. Young, Officer in Charge, as the Right to Know Officer for the Police Department until their successors are appointed. The motion was unanimously approved.

The Board discussed modifications to the Fire Company Lease to allow for Life Lion EMS to be housed at the Lower Swatara Township Volunteer Fire Company building on Fulling Mill Road. The Township owns that property, and it has a long-term lease with the Fire Department; Article 10.1 of that lease states that the tenant may not assign or transfer this lease or sublease the whole or any part of the leased premises. A motion was made by Commissioner Truntz, seconded by Vice President Springer, to waive the provisions of Article 10.1 of the lease in order to allow the Life Lion EMS to sublease the property. The motion was unanimously approved.

Commissioner Truntz remarked that hearing the public outcry, he feels it is time for move forward with approval of the draft comprehensive plan. A motion was made by Commissioner Truntz, seconded by Commissioner Hall, to direct the consultant for the comprehensive plan to revise the draft plan to delete the recommended rezoning to Commercial of the property on the southeast quadrant of the North Union Street interchange with PA Route 283 leaving it residential, and further directing the preparation of a resolution to adopt the proposed plan as revised. The motion was unanimously approved. Solicitor Henninger added that the plan should also be revised as per Ms. Hartz' comment to change the 2008 reference of the Dauphin County Comprehensive plan to 2017. He explained that the comprehensive plan needs to be adopted by resolution, so he will prepare this for action at the August legislative meeting. Solicitor Henninger summarized the comprehensive plan process to-date. The steering committee for the plan met for a period of about two years, and came up with a recommendation. The plan then went to the Planning Commission,

which recommended three changes, one of which was the southeast quadrant of North Union Street (the Dickerson property) which was not recommended for any change by the comp plan committee but was recommended for change by the Planning Commission. The Board's motion is to go with the steering committee's recommendation on that quadrant. Kathy Gotshall, Oberlin Road, explained that she was a member of that steering committee, and it had actually suggested to the Planning Commission that it be changed from Residential to Commercial. Chris DeHart, who was a member of the Planning Commission at that time, explained that the parcel was not done in this comp plan, but was done prior to the comp plan process. The only changes suggested pertained to the Williams' farm.

Solicitor Henninger reported that if the Board is comfortable with what was negotiated, it can approve the hiring of Francis P. Lynch as the interim Township Manager on a month-to-month basis at a salary of $6,000 per month. A motion was made by Commissioner Truntz, seconded by Commissioner Davies, to approve the hiring of Francis "Frank" P. Lynch under the terms and conditions of the employment letter/agreement, effective August 7, 2017 as drafted and negotiated by the solicitor. The Board and public congratulated Mr. Lynch. Mr. Lynch thanked the Board for the opportunity, and gave some background on his employment history, which included Comcast, the Patriot-News, and Labor and Industry. He has also served on the Board for Susquehanna Township for the last fifteen years. Mr. Lynch stated that he is pleased to work with the team and to try to fulfill the Commissioners wishes of being a truly first-class Township.

SOLICTIOR'S REPORT:

Solicitor Henninger noted that a Public Hearing was held earlier this evening on proposed Ordinance No. 570, which would amend the Zoning Ordinance pertinent to the location, placement, construction, and maintenance of Wireless Telecommunications Towers and Wireless Telecommunications Antennas. A motion was made by Commissioner Davies, seconded by Commissioner Hall, to approve Ordinance No. 570. A roll call vote was taken with the following ballot tabulation: Commissioner Hall – aye, Commissioner Truntz – aye, Commissioner Davies – aye, Vice President Springer -- aye, and President Wilt – aye. Ordinance No. 570 was approved by a 5 – 0 margin.

Solicitor Henninger reported on the Phillips Real Estate Investment Partnership versus Dauphin County Board of Assessment Appeals. Several years ago, Phillips had appealed the County's assessment of its fair market value of $3,157,800; the Township had participated proportionately in hiring an appraiser to appraise the property, and that figure came in at $3,100,000. The property owner is willing to accept this appraisal, and all parties are in agreement. A motion was made by Vice President Springer, seconded by Commissioner Truntz, to approve the settlement agreement for a fair market value of 3.1 million dollars for the Phillips property. The motion was unanimously approved.

Solicitor Henninger noted that there is a pension amendment being proposed to the Non-Uniformed Pension Plan with regards to the retirement age for participants hired on or after August 2, 2017. Specifically, it would require anyone who is retiring at 62 to have at least 12 years of service in order to be vested in the pension. This change would need to be done by ordinance. A motion was made by Commissioner Truntz, seconded by Commissioner Davies, to approve advertisement of an ordinance amending the Non-Uniformed Pension Plan with regards to this change. The motion was unanimously approved.

ENGINEER'S REPORT:

Ms. Letavic presented the Board with a memo relative to field views performed by HRG to assist staff with an evaluation of the Township's infrastructure after the storm of July 23. She noted there is a separate report in the Board packet documenting some of the things that were looked at. The majority of the work that needs to be done would require an emergency permit from DEP.

HRG has drafted a project manual for the portions of the Old Reliance and Shope Gardens park project projects to be publicly bid (stormwater BMP installation) The bid documents have been sent to DCNR for concurrence prior to advertisement. Periodic site inspections continue in an effort to facilitate the completion of the project.

Ms. Letavic updated the Board on the Capital Improvement Plan -- PENNVEST funding for stormwater projects. Due to the July 23 storms, and in order to update staff on the utility conflict information that has been obtained for the stormwater designs at Rosedale and Georgetown, Township staff, Municipal Authority staff, and HRG met on July 26. Priorities for the project were re-evaluated and it was determined to add the Hanover Street storm sewer system to the Rosedale project. Though the Georgetown neighborhood will benefit from drainage improvements in the

future, staff's recommendation it to put the project on hold for design and accelerate the schedule for the expanded Rosedale project. HRG is reviewing the engineering scope for an adjustment to the contract for the additional survey and design that is necessary; however, the Township will see short-term cost savings by putting the other project on hold.

Ms. Letavic presented a Power Point on the Chesapeake Bay Pollutant Reduction Plan (see attached). The Township has a new MS4 permit cycle coming up, and part of that is updating the Chesapeake Bay Pollutant Reduction Plan. The Swatara Creek – Susquehanna River Watershed has no local impairments. The Lauren Run – Susquehanna River Watershed and the Chesapeake Bay Watershed do. She explained some of the proposed BMPs (Best Management Practices). The next step is the public comment period (August 1 – 31). The plan is on the Township's website and is also available at the Township Building. Additional steps include the revision of the report (Sept. 1 – 14), and then submission of the report (Sept. 15). Implementation is to start in 2018 when the permit is approved, with completion in five years – 2023. Ms. Letavic noted that while no specific cost estimates have been done on the Township plan, a preliminary cost estimate is $1.2 million.

FINAL COMMENTS:

Commissioner Truntz thanked Sergeant Scott Young for coordinating the effort to participate in Middletown's National Night Out, and thanked Detective Ryan Gartland for participating. He also thanked everyone for attending tonight's meeting.

Commissioner Hall also thanked Sergeant Young for his efforts. He noted that he appreciates the comments from the public tonight, and how they were kept professional. This is democracy at its best. Commissioner Hall stated that he is also excited about what Ms. Avolese and Ms. Shireman hope to achieve with the historical society.

Vice President Springer thanked Sergeant Young, Detective Gartland, and Fire Chief Weikle and the Fire Department volunteers for assuring that Lower Swatara Township was well represented at National Night Out.

Commissioner Davies thanked the Public Works employees and the engineer for responding to the recent stormwater issues. He also gave a "hats off" to Sergeant Young and the Police Department for participation in Middletown's National Night Out. Commissioner Davies thanked the public for its comments on the proposed development plans. While the Board has not seen any

filed plans yet, it is good to know what people are thinking. He also welcomed Mr. Lynch on board.

President Wilt thanked those who came out this evening, and again thanked Sergeant Young and Detective Gartland for their efforts at National Night Out. He also welcomed Mr. Lynch on board.

President Wilt requested an executive session immediately upon conclusion of tonight's meeting in order to discuss personnel issues.

ADJOURN AND CONVENE INTO EXECUTIVE SESSION:

Hearing no other business, a motion was made by Commissioner Truntz, seconded by Vice President Springer, to adjourn the meeting and convene into executive session. The motion was unanimously approved, and the meeting adjourned at 8:50.

ATTEST:

Jean R. Arroyo
Township Secretary

PLEASE PRINT NAME CLEARLY

AUGUST 2, 2017

PUBLIC HEARING ON WIRELESS FACILITIES ORDINANCE – 6:45 PM

BOARD OF COMMISSIONERS WORKSHOP – 7:00 PM

Name/Organization	Address/Contact Information
BILL LEONARD	1461 HERITAGE SQUARE
Ruth Shuemaker	Longview Dr.
Carolyn Lutz	Woodridge Drive
Tom Williams	Fulling Mill
Ron Paul	Richard Ave.
[illegible]	3812 Hilcrest Rd.
Sheryl Cyphert	Candlewycke Dr.
Chris [illegible]	2CD Rehm Rd
Staci & Chris Hartz	N. Union St.
Bruce & Joanne Harter	1134 Shute Rd.
Sharry Scanlon	Union St.
Nancy Avolese	145 N. Union St.
RA BOBBHOLDER	
Laura Ribic	N. Union St
[illegible]	[illegible]
Wagner	Longview Drive
Frye	
John Weikle	LSFD
Brianna Clark	Longview Drive
[illegible]	Old Reliance
Robert [illegible]	S. Stwp
Marie Hartz	Union St

PLEASE PRINT NAME CLEARLY

AUGUST 2, 2017

PUBLIC HEARING ON WIRELESS FACILITIES ORDINANCE – 6:45 PM

BOARD OF COMMISSIONERS WORKSHOP – 7:00 PM

Name/Organization	Address/Contact Information
JANE MCCARTY	1781 LAMPLIGHT CIR MDN
K. Gotthall	HEARTHSTONE
N. Pendergrass	BRIARCREEK
David Klingaman	241 Keystone Drive
Linda Mehoffe	921 Ebenezer Rd.

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

[BUILDING RELATIONSHIPS.
DESIGNING SOLUTIONS.]

Lower Swatara Township
Chesapeake Bay Pollutant Reduction Plan (CBPRP)

August 2, 2017

2013 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 without 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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[BUILDING RELATIONSHIPS. DESIGNING SOLUTIONS.]

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

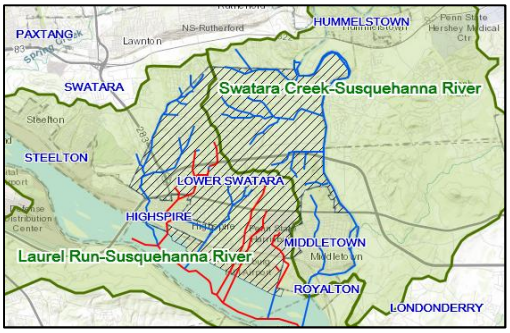
- Includes all Urbanized Area (UA) within Township (hatched area)

Swatara Creek – Susquehanna River Watershed

- No local impairments

Laurel Run- Susquehanna River Watershed

- Unnamed Tributaries to Sherman Creek (TSS)
- Unnamed Tributaries to Susquehanna River (TSS)



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[BUILDING RELATIONSHIPS. DESIGNING SOLUTIONS.]

Existing Pollutant Loading, Baseline

- **Township UA** (2010 US Census)
  7,943.2 acres
- **UA Land Use** (PADEP)
  26% Impervious / 74 % 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	7,943	5,889,845
Laurel Run PRP	4,648	3,446,173

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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**
- **Private Properties**
  - Susquehanna Regional Airport
  - Penn State Harrisburg Campus
- **PAG-03s**
  - Stormwater Associated w/ Industrial Activity Permittees
- **Direct Discharge Areas**

Existing BMPs

- Previously installed structural BMPs that provide water quality benefit

Planning Area	UA (acres)	Pollutant Load TSS (lbs/yr)	Pollutant Goal TSS (lbs/yr)
CBPRP	2,413	2,422,383	242,238
Laurel Run PRP	3,759	1,528,658	152,865

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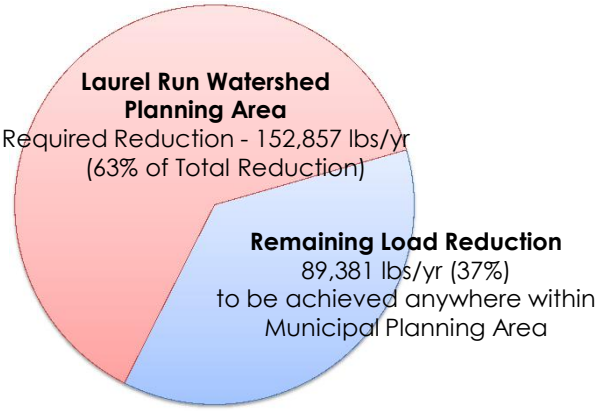
[BUILDING RELATIONSHIPS. DESIGNING SOLUTIONS.]

Pollutant (TSS) Reduction Requirements

Total Required Pollutant Reduction – 242,238 lbs/yr



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[BUILDING RELATIONSHIPS. DESIGNING SOLUTIONS.]

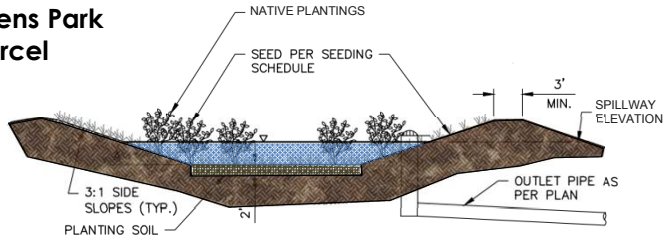
Pollutant Load Reduction Strategy

Site	BMP Type	Planning Area	Drainage Area (acres)	Length (ft)	Load Reduction
Shireman Parcel	Bioretention	CBPRP	1	n/a	667
	Buffer Plantings		20	700	7,415
Old Reliance Park	Bioretention	CBPRP	1	n/a	667
Shope Gardens Park	Bioretention	CBPRP	1	n/a	667
Middletown Area High School	Stream Restoration	CBPRP/ Laurel Run	n/a	1,600	71,808
Greenfield Park	Basin Retrofit	CBPRP/ Laurel Run	20	n/a	12,013
	Stream Restoration		n/a	1,600	71,808
Hershey Creamery	Stream Restoration	CBPRP/ Laurel Run	n/a	1,800	80,784
Total (CBPRP Planning Area)					**245,829**
Total (Laurel Run Planning Area)					**156,296**

Proposed BMPs

Bioretention - excavated shallow surface depressions with amended soil media (sand, soil, and organic material mix) planted with specially selected native vegetation to capture and treat stormwater runoff.

Old Reliance Park
Shope Gardens Park
Shireman Parcel



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Proposed BMPs

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.

Greenfield Park Basin

Proposed BMPs

Stream Restoration

- Repair/stabilization of eroded areas, reconnection to surrounding floodplain, in-stream calming measures
- Improvements to vegetated buffers, removal of invasive species, installation of native plantings

Hershey Creamery

Middletown Area High School

Greenfield Park

Next Steps

- **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: $1.2 million**

Questions?

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[BUILDING RELATIONSHIPS. DESIGNING SOLUTIONS.]

Record of Consideration

Comment #1

Received from: Nancy Avolese

Date: 8/16/17

Comment: Email expressed support for the CBPRP and inquired if there were any ways homeowners could help.

Changes made to CBPRP in response to comment: Comment acknowledged, no changes to CBPRP required.

From: Ann Hursh <ahursh@lowerswatara.org>
Sent: Thursday, August 17, 2017 2:57 PM
To: 'lonewolffarm@verizon.net'
Cc: Letavic, Erin; Ben Hall; Frank Lynch
Subject: RE: Chesapeake Bay Pollutant Reduction Plan for LST

Hello Nancy:

Thank you for taking time to read the *Chesapeake Bay Pollutant Reduction Plan for Lower Swatara Township.* I agree that the report can be difficult to understand, but having citizens like you read the report and take away the importance of our Municipal Separate Storm Sewer System (MS4) and the Pollution Reduction Plan (PRP) requirements helps to educate our residents. Education is a very important part of our MS4 permit requirements. We have information on the Township website under the MS4 heading http://lowerswatara.org/stormwater.php. We publish homeowner information in the newsletter, watch for a new one in the Fall, and we also have information at the Township building that may be of interest to you. I received a new homeowner pamphlet today that can be accessed at: http://www.phrc.psu.edu/Publications/Land-Development-Briefs.aspx.

Lower Swatara Township also is concerned with Illicit Discharges. Our residents can help by being our eyes and notifying us if they see any suspicious or concerning discharges, people dumping into inlets, or unusual construction site runoff or erosion. There is also information concerning how to report illicit discharges on the Township website.

Again, I appreciate your time. If I can ever answer any questions concerning our MS4 Permit or our compliance requirements you may contact me at ahursh@lowerswatara.org or at (717) 939-9377.

Sincerely,

Ann M. Hursh
Planning & Zoning Coordinator
Lower Swatara Township
1499 Spring Garden Drive
Middletown, PA 17057
(717)939-9377 phone

From: Nancy Avolese [mailto:lonewolffarm@verizon.net]
Sent: Wednesday, August 16, 2017 8:26 PM
To: Ann Hursh <ahursh@lowerswatara.org>
Subject: Chesapeake Bay Pollutant Reduction Plan for LST

Public Comments:

I reviewed the *Chesapeake Bay Pollutant Reduction Plan for Lower Swatara Township* document and support the expertise of HRG in which areas are of most concern for pollutants (photos were very helpful). I also support the best management practices

for each of the given areas including bioretention, regrading, planting and/or expanding riparian buffers, bioswales, planting rain gardens, removal of debris, etc.

MS4 appears to be an expensive, ongoing mandate. I am happy to see LST take this seriously. The report, though not the easiest to understand for your average resident, appears to have tapped into the most needed areas to reduce water and soil pollutants and storm-water runoff.

I would also suggest that if there is something that a normal homeowner could do to prevent storm-water runoff, even on a tiny scale, that we be provided that information via the township website and/or public meetings.

Nancy Avolese
1451 N Union Street
Middletown, PA 17057
(717) 944-9891

APPENDIX B

Mapping

CBPRP Planning Area

Lower Swatara Township
Dauphin County, Pennsylvania

Swatara Creek-Susquehanna River Watershed

Laurel Run-Susquehanna River Watershed

Direct Drainage

PAG-03

Harrisburg International Airport (HIA)

PSU (Harrisburg)

PA Turnpike Commission

Susquehanna River

Lisa Lake

Laurel Run

Burd Run

Buser Run

Swatara Creek

COCKLEY RD

LONGVIEW DR

EISENHOWER BL

INTERSTATE 283

FRONT ST

LUMBER ST

EAST/WEST TURNPIKE

SECOND ST

ROSEDALE AV

WHITE HORSE LN

HARRISBURG PK

AIRPORT DR

AIRPORT CONNECTOR RD

OBERLIN RD

RAMP A RD

RAMP B RD

RAMP C RD

RAMP D RD

RAMP E RD

RAMP F RD

RAMP G RD

RAMP H RD

RAMP J RD

RAMP K RD

RAMP L RD

RAMP N RD

RAMP P RD

SPRING GARDEN DR

283RD FIELD ARTILLERY MEM

SPRING MILL RD

RIDDLERS ELBOW RD

ANN ST

VINE ST

1ST ST

BMP-1 BMP-2 BMP-3 BMP-4 BMP-5 BMP-6 BMP-7

Ex-1 Ex-2A Ex-3A Ex-5B Ex-6A Ex-6B Ex-7A Ex-7B Ex-8A Ex-8B Ex-10 Ex-11A Ex-12A Ex-13C Ex-14A Ex-15A Ex-16A Ex-17D Ex-20A Ex-20B Ex-21A Ex-23A Ex-25A Ex-29A Ex-33A Ex-34A Ex-39A Ex-39B Ex-39C Ex-43A Ex-45B Ex-45C

1,200 0 1,200 Feet

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

5/4/2018	PM: EGL	GIS: BLS	QA: MDW	R000257.0464

HRG Herbert, Rowland & Grubic, Inc
Engineering & Related Services
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369 East Park Drive
Harrisburg, PA 17111
717.564.1121 [phone]
717.564.1158 [fax]
www.hrg-inc.com

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

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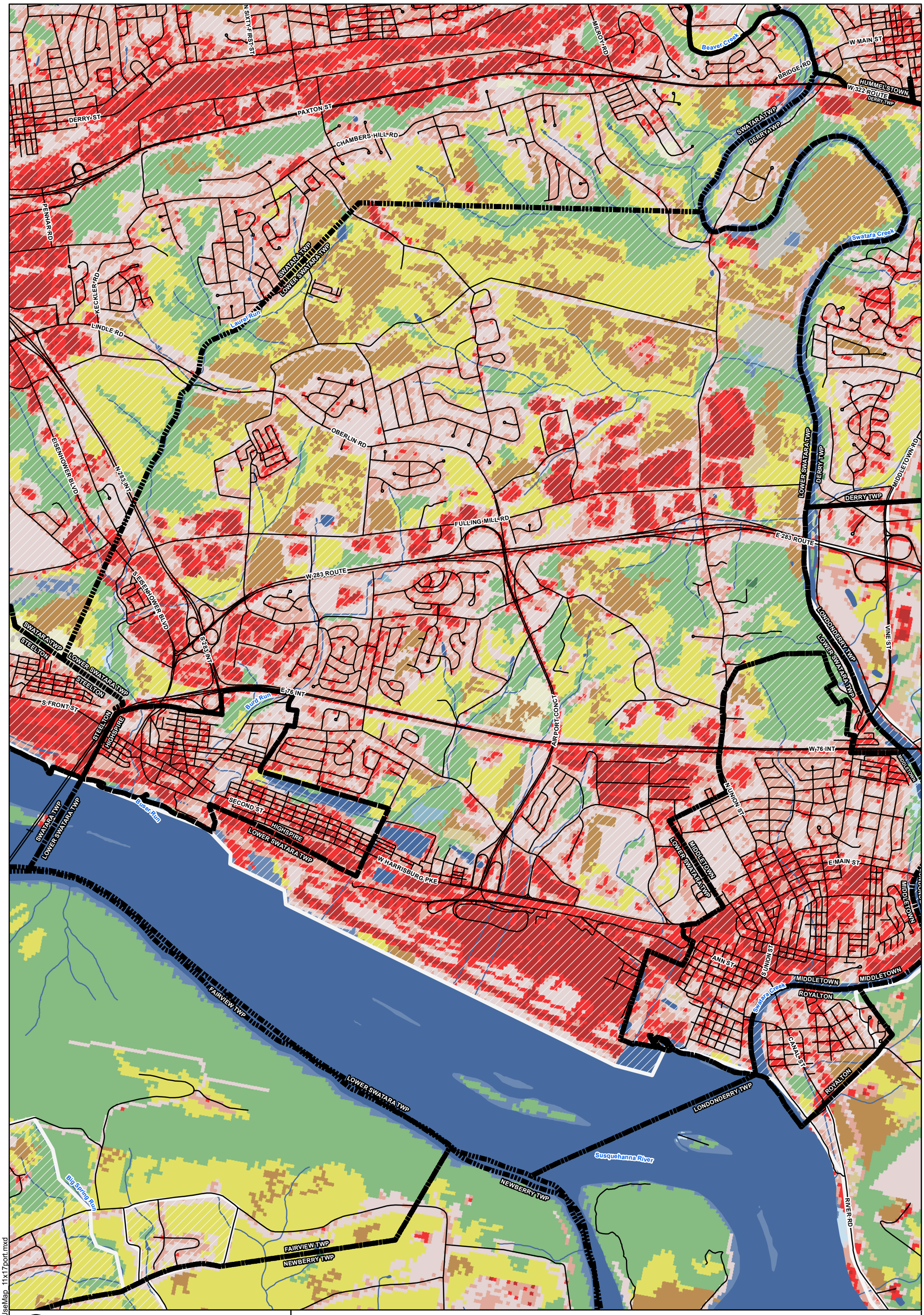

2,500 0 2,500 Feet

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

5/5/2017	PM: EGL	GIS: BLS/HMG	QA: HSH	R000257.0439

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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

Lower Swatara 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				
LOWER PAXTON TWP	PAG133643	Beaver Creek	Nyes Run	Appendix B-Pathogens
		Laurel Run-Susquehanna River, Paxton Creek	Asylum Run, Paxton Creek, Paxton Creek TMDL	Appendix B-Pathogens, Appendix E-Siltation, Suspended Solids, TMDL Plan-Siltation, Suspended Solids
		Laurel Run-Susquehanna River, Paxton Creek, Spring Creek	Asylum Run, Chesapeake Bay Nutrients\Sediment, Paxton Creek, Paxton Creek TMDL	Appendix D-Siltation/Nutrients, Appendix E-Siltation, Suspended Solids, TMDL Plan-Siltation, Suspended Solids
		Laurel Run-Susquehanna River	Susquehanna River	Appendix C-PCB
		Beaver Creek, Swatara Creek-Susquehanna River	Chesapeake Bay Nutrients\Sediment	Appendix D-Siltation/Nutrients
LOWER SWATARA TWP	PAG133543	Laurel Run-Susquehanna River	Chesapeake Bay Nutrients\Sediment, Susquehanna River, Unnamed Tributaries to Sherman Creek, Unnamed Tributaries to Susquehanna River	Appendix C-PCB, Appendix D-Siltation/Nutrients, Appendix E-Siltation
		Swatara Creek-Susquehanna River	Chesapeake Bay Nutrients\Sediment	Appendix D-Siltation/Nutrients
MIDDLE PAXTON TWP	PAG133688	Clark Creek, Cove Creek-Susquehanna River, Fishing Creek-Dauphin County, Fishing Creek-Perry County, Laurel Run-Susquehanna River, Stony Creek	Chesapeake Bay Nutrients\Sediment	Appendix D-Siltation/Nutrients
		Cove Creek-Susquehanna River, Laurel Run-Susquehanna River	Susquehanna River	Appendix C-PCB
MIDDLETOWN BORO	PAG133645	Laurel Run-Susquehanna River	Chesapeake Bay Nutrients\Sediment, Susquehanna River, Unnamed Tributaries to Sherman Creek, Unnamed Tributaries to Susquehanna River	Appendix C-PCB, Appendix D-Siltation/Nutrients, Appendix E-Siltation
		Swatara Creek-Susquehanna River	Chesapeake Bay Nutrients\Sediment	Appendix D-Siltation/Nutrients
PAXTANG BORO	PAG133554	Laurel Run-Susquehanna River, Spring Creek	Chesapeake Bay Nutrients\Sediment, Unnamed Tributaries to Spring Creek	Appendix D-Siltation/Nutrients, Appendix E-Siltation
		Laurel Run-Susquehanna River	Susquehanna River	Appendix C-PCB
		Spring Creek	Unnamed Tributaries to Spring Creek	Appendix E-Siltation
PENBROOK BORO	PAG133555	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
		Laurel Run-Susquehanna River, Paxton Creek, Spring Creek	Asylum Run, Chesapeake Bay Nutrients\Sediment, Paxton Creek, Paxton Creek TMDL, Unnamed Tributaries to Spring Creek	Appendix D-Siltation/Nutrients, Appendix E-Siltation, Suspended Solids, TMDL Plan-Siltation, Suspended Solids
ROYALTON BORO	PAG133641	Hartman Run-Susquehanna River	Chesapeake Bay Nutrients\Sediment, Susquehanna River	Appendix C-PCB, Appendix D-Siltation/Nutrients
		Laurel Run-Susquehanna River	Chesapeake Bay Nutrients\Sediment, Susquehanna River	Appendix C-PCB, Appendix D-Siltation/Nutrients
		Swatara Creek-Susquehanna River	Chesapeake Bay Nutrients\Sediment	Appendix D-Siltation/Nutrients
SOUTH HANOVER TWP	PAG133500	Beaver Creek	Unnamed Tributaries to Beaver Creek	Appendix E-Siltation
		Beaver Creek, Manada Creek, Swatara Creek-Susquehanna River	Chesapeake Bay Nutrients\Sediment, Unnamed Tributaries to Beaver Creek	Appendix D-Siltation/Nutrients, Appendix E-Siltation
		Manada Creek, Swatara Creek-Susquehanna River	Manada Creek	Appendix B-Pathogens
		Beaver Creek, Manada Creek, Swatara Creek-Susquehanna River	Chesapeake Bay Nutrients\Sediment, Unnamed Tributaries to Beaver Creek	Appendix D-Siltation/Nutrients, Appendix E-Siltation
STEELTON BORO	PAG133625	Laurel Run-Susquehanna River	Chesapeake Bay Nutrients\Sediment, Pennsylvania Canal, Susquehanna River, Unnamed Tributaries to Spring Creek, Unnamed Tributaries to Susquehanna River, Unnamed Tributaries to Swatara Creek	Appendix C-PCB, 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** (lb/ac/yr)		Total Load TSS (lb/yr)
	UA (acres)	% Imperv.	% Perv.	Imperv. (acres)	Perv. (acres)	Imperv.	Perv.	
Lower Swatara CBPRP	7,943	26%	74%	2065.2	5878.0	1999.14	299.62	5,889,845
Parsed Areas (State Roads)	274	n/a	n/a	169.8	103.6	1999.14	299.62	370,525
Parsed Areas (Properties)	892	26%	74%	31.4	36.9	1999.14	299.62	661,525
Parsed Areas (PAG-03)	116	26%	74%	30.2	85.9	1999.14	299.62	86,088
Parsed Areas (Direct Drainage)	2,902	26%	74%	754.6	2,147.8	1999.14	299.62	2,152,153
Existing BMPs	n/a	n/a	n/a	n/a	n/a	n/a	n/a	197,171
Adjusted Baseline Total	**3,759**							**2,422,383**

*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, Laurel Run Planning Area

Planning Area	Urbanized Area*					Loading Rate TSS** (lb/ac/yr)		Total Load TSS (lb/yr)
	UA (acres)	% Imperv.	% Perv.	Imperv. (acres)	Perv. (acres)	Imperv.	Perv.	
Laurel Run PRP	4,647	26%	74%	1,208.4	3,439.2	1999.14	299.62	3,446,173
Parsed Areas (State Roads)	200	n/a	n/a	115.8	84.4	1999.14	299.62	256,819
Parsed Areas (Properties)	892	26%	74%	232.0	660.2	1999.14	299.62	661,525
Parsed Areas (PAG-03)	53	26%	74%	13.8	39.4	1999.14	299.62	39,448
Parsed Areas (Direct Drainage)	1,089	26%	74%	283.0	805.6	1999.14	299.62	807,229
Existing BMPs	n/a	n/a	n/a	n/a	n/a	n/a	n/a	152,584
Adjusted Baseline Total	**2,413**							**1,528,568**

*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 Area (Roadway Name)	UA Length (ft)	UA Width (ft)	Roadway surface Width (ft)	Urbanized Area					Loading Rate* TSS (lb/ac/yr)		Total Load TSS (lb/yr)
				UA (acres)	% Imperv.	% Perv.	Imperv. (acres)	Perv. (acres)	Imperv.	Perv.	
PA Turnpike	16,767.5	200	60	77.0	n/a	n/a	23.1	53.9	1999.14	299.62	62,318
283	21,615.0	150	90	74.5	n/a	n/a	44.7	29.8	1999.14	299.62	98,200
Rosedale Ave	10,148.3	24	24	5.6	100%	0%	5.6	0.0	1999.14	299.62	11,173
Whitehouse Lane	1,520.3	26	26	0.9	100%	0%	0.9	0.0	1999.14	299.62	1,813
W Harrisburg Pike	9,079.2	38	38	7.9	100%	0%	7.9	0.0	1999.14	299.62	15,827
Airport Connecter	21,762.0	130	90	64.9	n/a	n/a	45.0	20.0	1999.14	299.62	95,874
Oberlin Rd	19,010.8	26	26	11.3	100%	0%	11.3	0.0	1999.14	299.62	22,674
N Union St	13,022.0	24	24	7.2	100%	0%	7.2	0.0	1999.14	299.62	14,337
S 80th St	385.1	22	22	0.2	100%	0%	0.2	0.0	1999.14	299.62	388
Cockley Rd	4,073.3	22	22	2.1	100%	0%	2.1	0.0	1999.14	299.62	4,111
Fulling Mill Rd	19,422.2	48	48	18.2	100%	0%	21.4	0.0	1999.14	299.62	36,270
Eisenhower Blvd	4,834.1	34	34	3.8	100%	0%	3.8	0.0	1999.14	299.62	7,540
Total				**273.6**							**370,525**

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

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

Parsed Area (Roadway Name)	UA Length (ft)	UA Width (ft)	Roadway surface Width (ft)	Urbanized Area					Loading Rate* TSS (lb/ac/yr)		Total Load TSS (lb/yr)
				UA (acres)	% Imperv.	% Perv.	Imperv. (acres)	Perv. (acres)	Imperv.	Perv.	
PA Turnpike		200	60	76.0	n/a	n/a	22.8	53.2	1999.14	299.62	61,575
283	11,450.0	150	90	39.4	n/a	n/a	23.7	15.8	1999.14	299.62	52,019
Rosedale Ave	10,148.3	24	24	5.6	100%	0%	5.6	0.0	1999.14	299.62	11,173
Whitehouse Lane	1,520.3	26	26	0.9	100%	0%	0.9	0.0	1999.14	299.62	1,813
W Harrisburg Pike	9,079.2	38	38	7.9	100%	0%	7.9	0.0	1999.14	299.62	15,826
Airport Connecter	16,762.0	130	90	50.0	n/a	n/a	34.6	15.4	1999.14	299.62	73,846
Oberlin Rd	12,367.8	26	26	7.7	100%	0%	7.4	0.0	1999.14	299.62	14,751
Fulling Mill Rd	8,300.0	48	48	9.1	100%	0%	9.1	0.0	1999.14	299.62	18,276
Eisenhower Blvd	4,834.1	34	34	3.8	100%	0%	3.8	0.0	1999.14	299.62	7,540
Total				**200.4**							**256,819**

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

Appendix D – Table 3A: Parsed Area Load Reductions – Private Properties, CBPRP Planning Area

Parsed Areas	Urbanized Area*					Loading Rate** TSS (lb/ac/yr)		Total Load TSS (lb/yr)
	UA (acres)	% Imperv.	% Pervious	Imperv. (acres)	Pervious (acres)	Imperv.	Pervious	
Susquehanna Regional Airport	686.9	26%	74%	178.6	508.3	1999.14	299.62	509,333
Penn State Harrisburg	176.6	26%	74%	45.9	130.7	1999.14	299.62	130,948
Turnpike Commission Offices	28.7	26%	74%	7.5	21.2	1999.14	299.62	21,244
Total	**892.2**							**661,525**

*PADEP - Statewide MS4 Land Cover Estimates

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

Appendix D – Table 3B: Parsed Area Load Reductions – Private Properties, Laurel Run Planning Area

Parsed Areas	Urbanized Area*					Loading Rate** TSS (lb/ac/yr)		Total Load TSS (lb/yr)
	UA (acres)	% Imperv.	% Pervious	Imperv. (acres)	Pervious (acres)	Imperv.	Pervious	
Susquehanna Regional Airport	686.9	26%	74%	178.6	508.3	1999.14	299.62	509,333
Penn State Harrisburg	176.6	26%	74%	45.9	95.4	1999.14	299.62	130,948
Turnpike Commission Offices	28.7	26%	74%	7.5	21.2	1999.14	299.62	21,244
Total	**892.2**							**661,525**

*PADEP - Statewide MS4 Land Cover Estimates

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

Appendix D - Table 4A: Parsed Area Load Reductions - PAG-03 Discharge of Stormwater Associated with Industrial Activities, CBPRP Planning Area

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.	
FEDEX Freight	4/26/16	2030 N Union St Middletown PA 17057-2958	62.9	26%	74%	16.35	46.55	1999.14	299.62	46,640
Borger Concrete	12/2/15	401 Richardson Rd Middletown PA 17057-5512	2.7	26%	74%	0.702	2.0	1999.14	299.62	2,002
Highspire Terminals DE LLC	4/14/15	911 S Eisenhower Blvd Middletown PA 17057-5504	36.0	26%	74%	9.36	26.64	1999.14	299.62	26,694
Mack Trucks Remanufa0turing Center	6/13/14	2800 Commerce Dr Middletown PA 17057-3294	14.5	26%	74%	3.77	10.73	1999.14	299.62	10,752
Total			116.1							**86,088**

*As listed on EFACTS (7/2017)
**PADEP - Statewide MS4 Land Cover Estimates
***PADEP PRP Instructions - Attachment B, Developed Land Loading Rates for PA Counties

Appendix D - Table 4B: Parsed Area Load Reductions - PAG-03 Discharge of Stormwater Associated with Industrial Activities, Laurel Run PRP Planning Area

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.	
Borger Concrete	12/2/15	401 Richardson Rd Middletown PA 17057-5512	2.7	26%	74%	0.702	2.0	1999.14	299.62	2,002
Highspire Terminals DE LLC	4/14/15	911 S Eisenhower Blvd Middletown PA 17057-5504	36.0	26%	74%	9.36	26.64	1999.14	299.62	26,694
Mack Trucks Remanufacturing Center	6/13/14	2800 Commerce Dr Middletown PA 17057-3294	14.5	26%	74%	3.77	10.73	1999.14	299.62	10,752
Total			53.2							**39,448**

*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 – Direct Discharge by Planning Area

Planning Area	Urbanized Area*					Loading Rate** TSS (lb/ac/yr)		Total Load TSS (lb/yr)
	UA (acres)	% Imperv.	% Perv.	Imperv. (acres)	Perv. (acres)	Imperv.	Perv.	
Laurel Run PRP	1,088.7	26%	74%	283.0	805.6	1999.14	299.62	807,229
CBPRP	2,902.5	26%	74%	754.6	2,147.8	1999.14	299.62	2,152,153

*PADEP - Statewide MS4 Land Cover Estimates

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

Appendix D – Table 6: Baseload Reduction Documentation - Previously Installed BMPs

BMP ID	Development Name	Location	Long	Lat	BMPs	Size (acre) / Length (ft)	Drainage area (acre)	Drainage Area Characteristics					Loading Rate TSS (lb/ac/yr)		Total Load TSS (lb/yr)	BMP Efficiency	Load Reduction TSS (lbs/yr)
								% imperv.	% Pervious	Imperv. (acres)	Pervious (acres)	Acres Total	Imperv.	Pervious			
Ex-1	Morgans Run	Rear of Lot 6. N. of Morgan Dr, S. of Turnpike	-76.767197	40.212306	Detention Basin	0.09 ac	9.53	35.37%	64.63%	3.37	6.16	9.53	1,999.14	299.62	8,587.47	0.6	5,152.48
Ex-2A	Stone Ridge Commerce Park Lot 7	Rear of Lot 7. S.W. corner of the Lot	-76.754064	40.232968	Detention Basin	0.30 ac	2.66	6.58%	93.42%	0.18	2.49	2.66	1,999.14	299.62	1,094.80	0.6	656.88
Ex-3A	Stone Ridge Commerce Park Lot 3	North of building	-76.751398	40.234565	Detention Basin	0.39 ac	5.10	23.91%	76.09%	1.22	3.88	5.10	1,999.14	299.62	3,600.21	0.6	2,160.13
Ex-5B	Conway Dr	Conway Dr. East of Lot 51, South of Rt. 283	-76.780973	40.222379	Detention Basin	0.08 ac	2.66	34.00%	66.00%	0.90	1.76	2.66	1,999.14	299.62	2,334.46	0.6	1,400.68
Ex-6A	Middletown Area School District Middle School	Middletown Middle School 215 Oberlin Rd. Middletown, PA 17057 (Greenfield Rd.)	-76.747500	40.214061	Detention Basins (1,2)	0.30 ac	22.46	20.63%	79.37%	4.63	17.83	22.46	1,999.14	299.62	14,605.03	0.6	8,763.02
Ex-6B			-76.745022	40.216599		0.08 ac	3.99	23.28%	76.72%	0.93	3.06	3.99	1,999.14	299.62	2,774.48	0.6	1,664.69
Ex-7A	Lakeside Towns	Southern corner of development behind Lots 27-32	-76.771669	40.206538	Detention Basin	0.20 ac	5.99	52.33%	47.67%	3.13	2.85	5.99	1,999.14	299.62	7,117.69	0.6	4,270.61
Ex-7B			-76.773048	40.206837	Swale	100 ft	5.75	47.89%	52.11%	2.75	3.00	5.75	1,999.14	299.62	6,665.54	0.6	3,999.32
Ex-8A	Highspire Road (Emerald Pointe)	Southeast corner of development, Along Rt 283	-76.794675	40.227760	Basin A	0.72 ac	9.98	48.33%	51.67%	4.82	5.15	9.98	1,999.14	299.62	11,184.55	0.6	6,710.73
Ex-8B		Northeast corner of development along Rt 283	-76.796499	40.231426	Basin B												
Ex-10	Woody Waste Recycling Facility	Western edge of parking area, south of industrial rd.	-76.739725	40.209578	Detention Basin	0.07 ac	2.22	49.00%	51.00%	1.09	1.13	2.22	1,999.14	299.62	2,510.58	0.6	1,506.35
Ex-11A	Old Reliance Farms Section 19	Rear of Lot 336	-76.756986	40.240788	Detention Basin	0.24 ac	9.09	7.17%	92.83%	0.65	8.44	9.09	1,999.14	299.62	3,831.31	0.6	2,298.79
Ex-12A	Hollywood Motel Expansion	155 Richardson Rd. Middletown PA 17057. Adjacent to parking area.	-76.794498	40.218069	Infiltration Trenches (1, 2)	0.08 ac	2.66	34.00%	66.00%	0.90	1.76	2.66	1,999.14	299.62	2,334.46	0.6	1,400.68
Ex-13C	1399 Fulling Mill Rd	Northern and Eastern sides of Office / Warehouse	-76.759972	40.228527	Detention Basin (1) and Forebay(2)	0.69 ac	14.85	19.21%	80.79%	2.85	12.00	14.85	1,999.14	299.62	9,300.01	0.6	5,580.01
Ex-15A	Phoenix Contact Land Development	586 Fulling Mill Road, Middletown, PA 17057	-76.750355	40.228977	Detention Basins (2)	1.34 ac	57.20	36.13%	63.87%	20.67	36.54	57.20	1,999.14	299.62	52,259.46	0.6	31,355.68
Ex-16A	Re-subdiv. Lot 100 Georgetown	Southeastern corner of development NW of White House Lane	-76.772584	40.209667	Infiltration Basin	0.24 ac	18.85	52.18%	47.82%	9.83	9.01	18.85	1,999.14	299.62	22,357.29	0.6	13,414.38
Ex-17D	Fulling Mill Rd Lot 185	2035 Fulling Mill Rd	-76.771748	40.225422	Detention Basin	0.43 ac	7.98	39.78%	60.22%	3.17	4.81	7.98	1,999.14	299.62	7,787.11	0.6	4,672.27
Ex-20A	Linden Centre Land Development	Northwest corner of the site, wrapping around to the east along University Drive	-76.756180	40.199333	Stormwater channel stabilization	1400 ft	n/a			n/a	n/a		1,999.14	299.62	n/a	44.88	62,832.00
Ex-20B		Southeast corner of site	-76.754538	40.202268	Detention Basin	0.08 ac	5.10	67.26%	32.74%	3.43	1.67	5.10	1,999.14	299.62	7,358.11	0.6	4,414.86
Ex-21A	Land Development Lot 11A Stoneridge Commerce Park AIS Property Management	Americhem International 1401 AIP Dr. Suite 100 Middletown, PA 17057 North side of lot	-76.751387	40.234568	Retention Basin	0.2 ac	15.96	34.47%	65.53%	5.50	10.46	15.96	1,999.14	299.62	14,134.84	0.6	8,480.91
Ex-23A	Stoneridge Commerce Park Land Development Lot 13	AIP Dr. at Kreider Dr. Middletown, PA 17057	-76.750397	40.232300	Detention Basin	0.44 ac	5.37	31.07%	68.93%	1.67	3.70	5.37	1,999.14	299.62	2,995.45	0.6	1,797.27
Ex-25A	Stoneridge Commerce Park Land Development Lot 6	500' North of the Kreider Dr. and Stoneridge Dr. intersection	-76.752512	40.233134	Detention Basin	0.61 ac	6.65	29.40%	70.60%	1.96	4.70	6.65	1,999.14	299.62	5,316.17	0.6	3,189.70
Ex-29A	Medical Office Building (Family Care and Radiology / Lab Suite)	Southern edge of site, along Harrisburg Pike S.R. 230	-76.750497	40.198246	Detention Basin	0.19	4.21	28.47%	71.53%	1.20	3.01	4.21	1,999.14	299.62	3,300.60	0.6	1,980.36
Ex-33A	Flagger Force Parking Lot Stoneridge Commerce Park Lot 7	1411 Stoneridge Dr., Middletown, PA 17057	-76.754969	40.233083	Detention Basin	0.33 ac	19.73	37.20%	62.80%	7.34	12.39	19.73	1,999.14	299.62	18,387.75	0.6	11,032.65
Ex-34A	PA Turnpike Highspire Service Plaza	PA Turnpike Eastbound, mile post 249.7	-76.743562	40.209336	Rain Garden	0.2 ac	6.65	68.00%	32.00%	4.52	2.13	6.65	1,999.14	299.62	9,679.48	0.6	5,807.69
Ex-39A	Middletown Home Access Driveways and Parking Revisions	Middletown Home 999 West Harrisburg Pike Middletown, PA 17057	-76.749167	40.199192	Detention Basins 1	0.24 ac	3.10	36.14%	63.86%	1.12	1.98	3.10	1,999.14	299.62	2,836.58	0.6	1,701.95
Ex-39B			-76.747107	40.200436	Detention Basins 2	0.22 ac	1.77	49.00%	51.00%	0.87	0.90	1.77	1,999.14	299.62	2,008.47	0.6	1,205.08
Ex-39C			-76.746300	40.199827	Detention Basins 3	0.1 ac	3.33	41.00%	59.00%	1.36	1.96	3.33	1,999.14	299.62	3,313.72	0.6	1,988.23
Ex-42A	William Young / Accord Restoration SWMP	Northern side of Longview Dr, approx. 1500' east of Ebenezer Road / Longview Dr	-76.767262	40.243648	Infiltration Berm	.04 ac	0.67	19.00%	81.00%	0.13	0.54	0.67	1,999.14	299.62	414.06	0.6	248.43
Ex-43A	Fulling Mill Rd	201 Fulling Mill Road eastern side of existing parking lot and southern side of prop paving	-76.738697	40.23078	Subsurface Infiltration	100 ft	19.07	38.88%	61.12%	7.41	11.65	19.07	1,999.14	299.62	18,312.82	0.6	10,987.69
Ex-45B	Harris Corp.	Oberlin Rd	-76.757296	40.229187	Infiltration Basins(2)	0.68 ac	7.76	51.97%	48.03%	4.03	3.73	7.76	1,999.14	299.62	9,178.88	0.6	5,507.33
Ex-45C	Securitas Security Services	Kreider Dr	-76.754943	40.231122	Infiltration Basin	0.18 ac	4.21	12.16%	87.84%	0.51	3.70	4.21	1,999.14	299.62	2,132.52	0.6	1,279.51
TOTAL																	**217,460.35**

*Plan on file in municipal office

**PADEP - Statewide MS4 Land Cover Estimates

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

****PADEP – BMP Effectiveness Values

Notes:

As of May 2018, this chart was updated per PADEP's request using WikiWatershed "Model my Watershed" tool, as it provides additional accuracy for smaller areas.

In addition to the calculation changes the following BMP's were removed:

- BMPs Ex-31A, Ex-31B, Ex-26C – were removed as these BMPs treat drainage from the parsed areas.
- BMP Ex-46 – was removed because it is not within the Township's boundaries.

APPENDIX E

Proposed BMP Pollutant Load Reduction Calculations

Appendix E – Table 1: Proposed BMPs

Site	Map ID	BMP Type	Location	Lat	Long	Drainage Area (acres)	Length (ft)	Drainage Area Characteristics*				Loading Rate** TSS (lbs/yr)		Total Load TSS (lbs/yr)	BMP Effectiveness	Pollutant Load Reduction TSS lbs/yr
								% Imperv.	Imperv. (acres)	% Perv.	Perv. (acres)	Imperv.	Perv.			
Shireman Park	BMP-1	Rain Garden	Ebenezer Road at Longview Drive	40.239802	-76.770266	1.08	n/a	4%	0.04	96%	1.04	1,999.14	299.62	396.1146	90%	322
	BMP-2	Buffer Planting		40.241676	-76.765194	1.61	700	5%	0.08	95%	1.53	1,999.14	299.62	625.6164	50%	322
Old Reliance Park	BMP-3	Rain Garden	Powderhorn Road	40.237214	-76.760967	1.11	n/a	19%	0.21	81%	0.90	1,999.14	299.62	690.094	90%	622
Shope Gardens	BMP-4	Rain Garden	Theodore Ave, Middletown	40.214081	-76.772251	1.33	n/a	54%	0.72	46%	0.61	1,999.14	299.62	1619.387	90%	1458
High School	BMP-5	Stream Restoration	Blue Raider Lane, Middletown	40.212065	-76.744124	n/a	1,600	n/a	n/a	n/a	n/a	n/a	n/a	n/a	44.88 (lbs/yr)	71,808
Greenfield Park	BMP-6	Stream Restoration	Greenfield Drive	40.214075	-76.747488	n/a	1,600	n/a	n/a	n/a	n/a	n/a	n/a	n/a	44.88 (lbs/yr)	71,808
		Basin Retrofit		40.2134345	-76.750750	8.65	n/a	20	1.71	80	6.94	1999.14	299.62	5495.788	90	4452
Hershey Creamery	BMP-7	Stream Restoration	Aip Dr, Middletown	40.235171	-76.747341	n/a	1800	n/a	n/a	n/a	n/a	n/a	n/a	n/a	44.88 (lbs/yr)	89,760
Total																**240,586**

* Land Cover Estimates calculated using WikiWatershed "Model My Watershed" tool
**PADEP PRP Instructions - Attachment B, Developed Land Loading Rates for PA Counties
***PADEP – BMP Effectiveness Values
Note: Per PADEP's request the following changes were made as of May 2018:

- Proposed BMP-2 was updated as the proposed buffer area is approximately 700 feet in length and 50 feet wide, therefore the drainage area was revised to 1.61 acres.