

WHITPAIN TOWNSHIP

Pollutant Reduction Plan



Prepared by James E. Blanch, P.E.
Township Engineer
Whitpain Township
Montgomery County, PA

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I. PURPOSE AND SCOPE:

Whitpain Township is required to develop and implement a Pollutant Reduction Plan (PRP) for Municipal Separate Storm Sewer System (MS4) discharges into the Stony Creek, and Plymouth Creek as part of the 2018 National Pollutant Discharge Elimination System (NPDES) MS4 Individual Permit application to the Pennsylvania Department of Environmental Protection (PA DEP). This plan was generated using the best guidelines made available by DEP. It demonstrates the Township's compliance with the required timeline issued by DEP.

II. PERMIT REQUIREMENTS

To meet the requirements of the permit, we must first understand what is required of the Township. Whitpain Township is required by PADEP and EPA to reduce the sediment pollution from Total Suspended Solids (TSS) from stormwater discharges to surface waters impaired by Appendix E - Siltation from the Stony Creek, Sawmill Run, Mermaid Run, and Plymouth Creek by 10%. The Plymouth Creek drains to Schuylkill River, but only has the Siltation requirement. The nutrient impairment for Appendix E is 3% for Total Nitrogen (TN) and 5% for Total Phosphorus (TP). Figure 1.0 is a list of the MS4 Requirements table for Whitpain Township provided by DEP and is also found in Appendix C.

Figure 1.0

Wissahickon TMDL	TMDL Plan-Siltation, Suspended Solids (4a)	Cause Unknown (4a)
Plymouth Creek	Appendix E-Siltation (5)	Water/Flow Variability (4c)
Sawmill Run	Appendix E-Siltation (5)	Turbidity (5), Water/Flow Variability (4c)
Schuylkill River	Appendix C-PCB (4a)	
Stony Creek	Appendix E-Siltation (5)	Cause Unknown, Turbidity (5), Water/Flow Variability (4c)
Unnamed Tributaries to Wissahickon Creek		Other Habitat Alterations (4c)
Willow Run		Water/Flow Variability (4c)
Wissahickon Creek	Appendix E-Nutrients (4a), Appendix B-Pathogens (5)	Water/Flow Variability (4c)

Revised 6/21/2017

These requirements must be met over the 5-year permit term starting March, 16, 2018 and ending March 15, 2023.

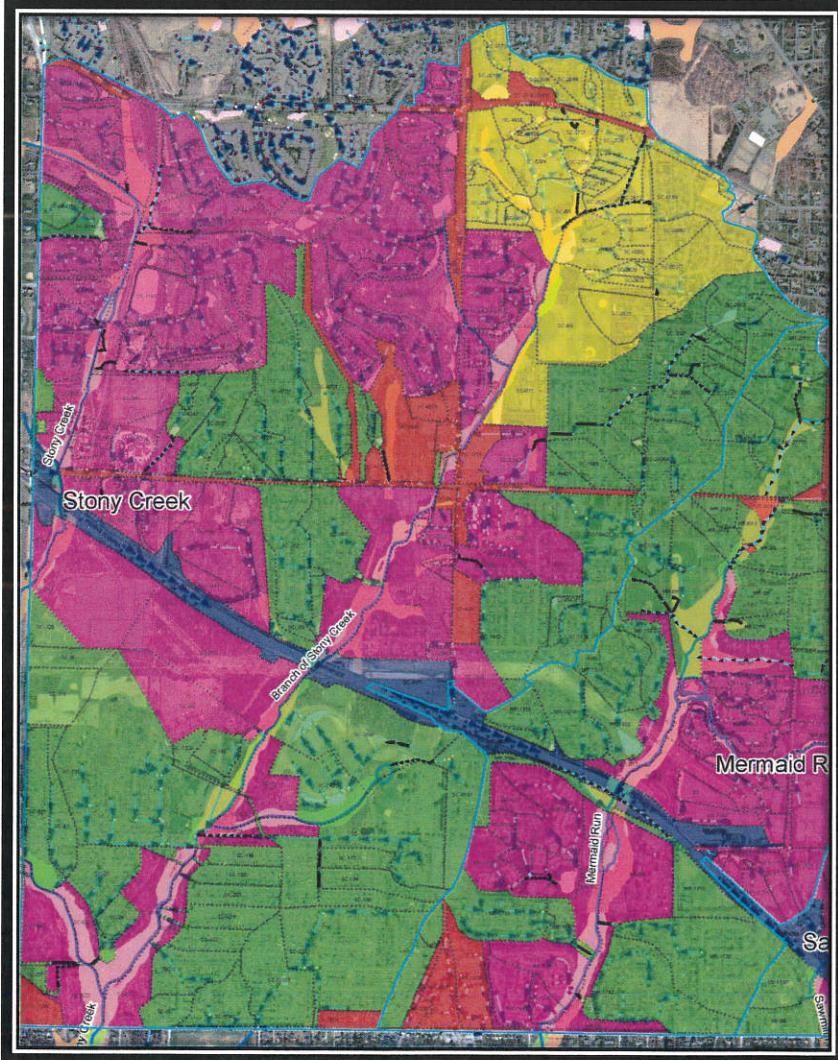
III. BACKGROUND WATERSHED INFORMATION

Whitpain Township is comprised of the following watersheds, Wissahickon Creek watershed, Stony Creek/Mermaid Run/Sawmill Run watershed, and Plymouth Creek – Schuylkill Watershed. Below is a brief synopsis of each watershed required to have a PRP. The Wissahickon Creek is under a Total Maximum Daily Load (TMDL) plan and not required to have a PRP. A map of each watershed can be found in Appendix G.

1. Stony Creek

The Stony Creek covers approximately 2,817 acres in Whitpain Township. This does not include the tributary areas that drain to the Stony Creek. Of that tract area, approximately 39% is the Township's area of responsibility and 20.24% of that area is impervious. The area of responsibility refers to any drainage entering into a Municipal owned storm sewer system. This may include private, state, county or other lands not owned by the Township.

Exhibit of Stony Creek Watershed

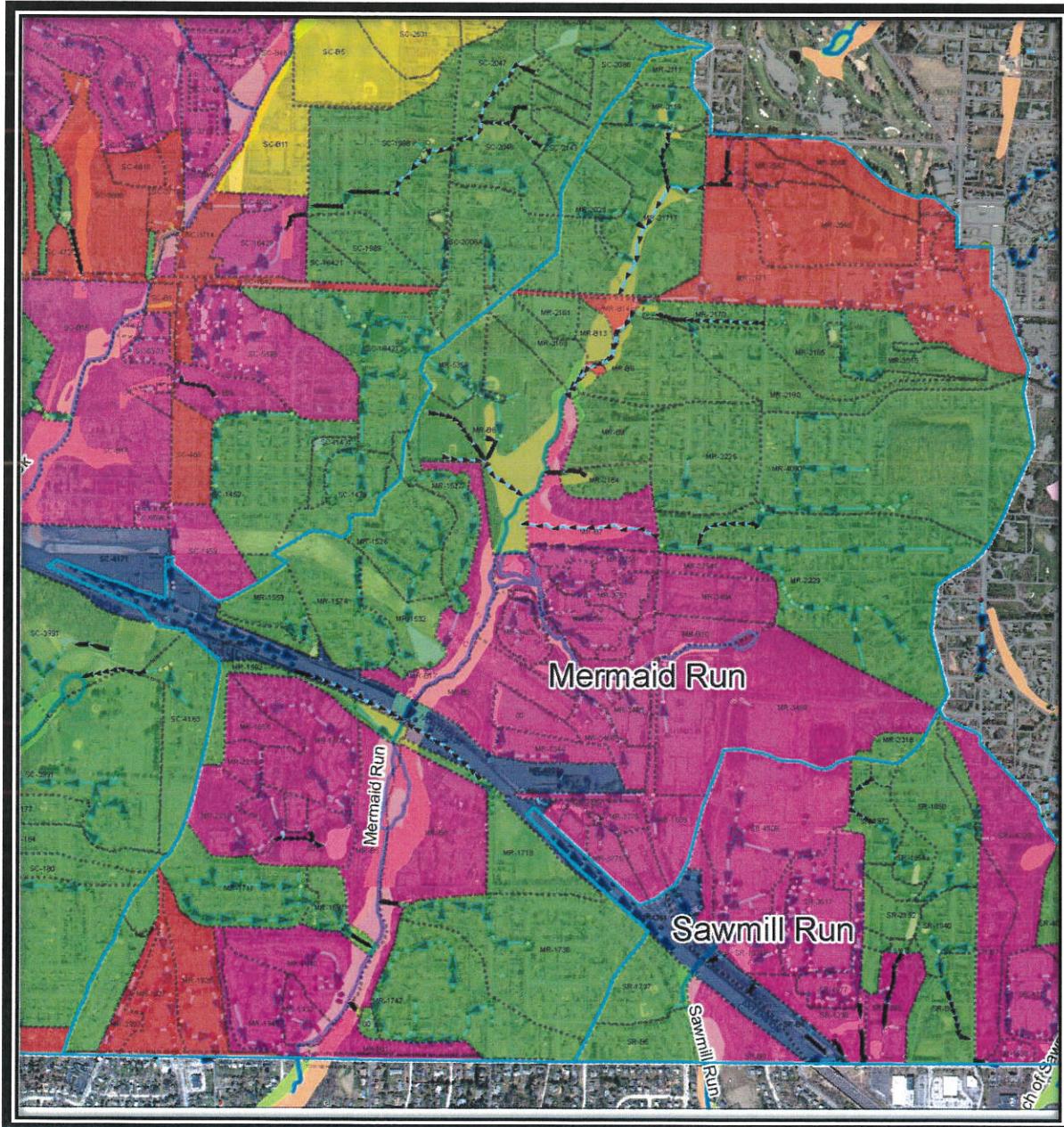


2. Tributary Areas Draining to the Stony Creek

i. Mermaid Run

The extent of the Mermaid Run is approximately 1,387 acres in Whitpain Township. Of that tract area, approximately 52% is considered Township responsibility and 25.6% of that area is impervious.

Exhibit of Mermaid Watershed

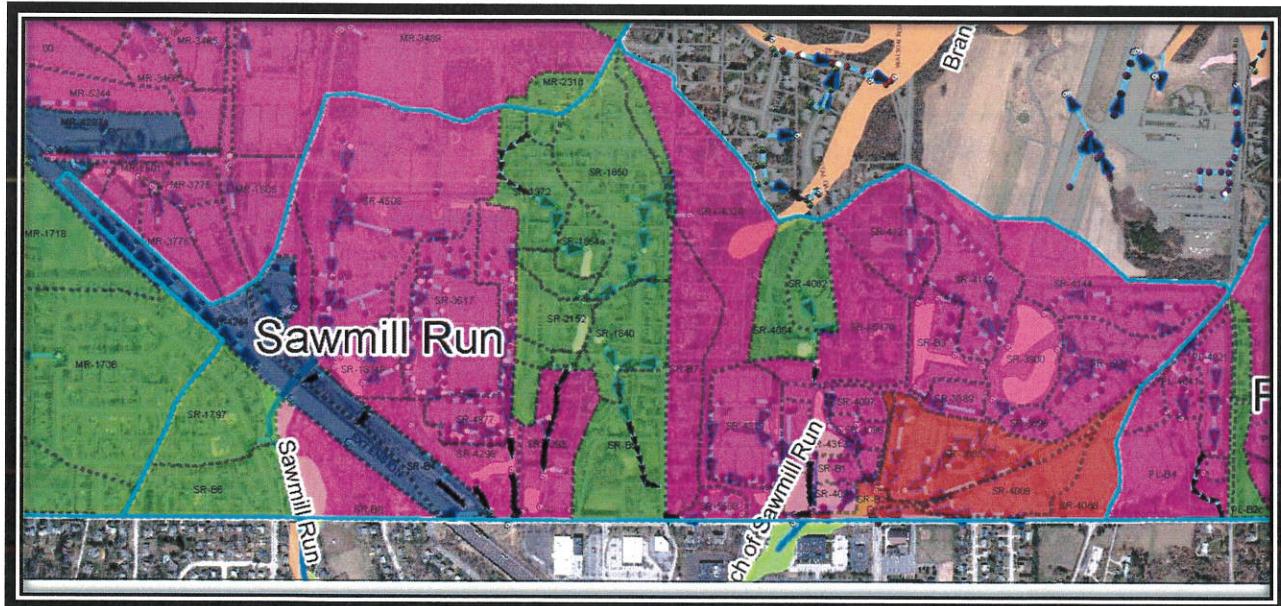


ii. Sawmill Run

The Sawmill Run spans approximately 491 acres in Whitpain Township. Of that tract area, approximately 25% is considered Township responsibility and 11.52% of that area is impervious.

According to the “MS4 NPDES Permits – Frequently Asked Questions (Revised January 25, 2017)” provided by DEP, to meet our requirements we are permitted to substitute additional reduction in another impaired stream. The Sawmill Run was found to have difficulty implementing any BMPs in the permit term due to conflicts with land ownership in the planning areas. The Township has elected to combine the excess from the load reductions from the Stony Creek and Mermaid Run to reach the load requirements for the Sawmill Run.

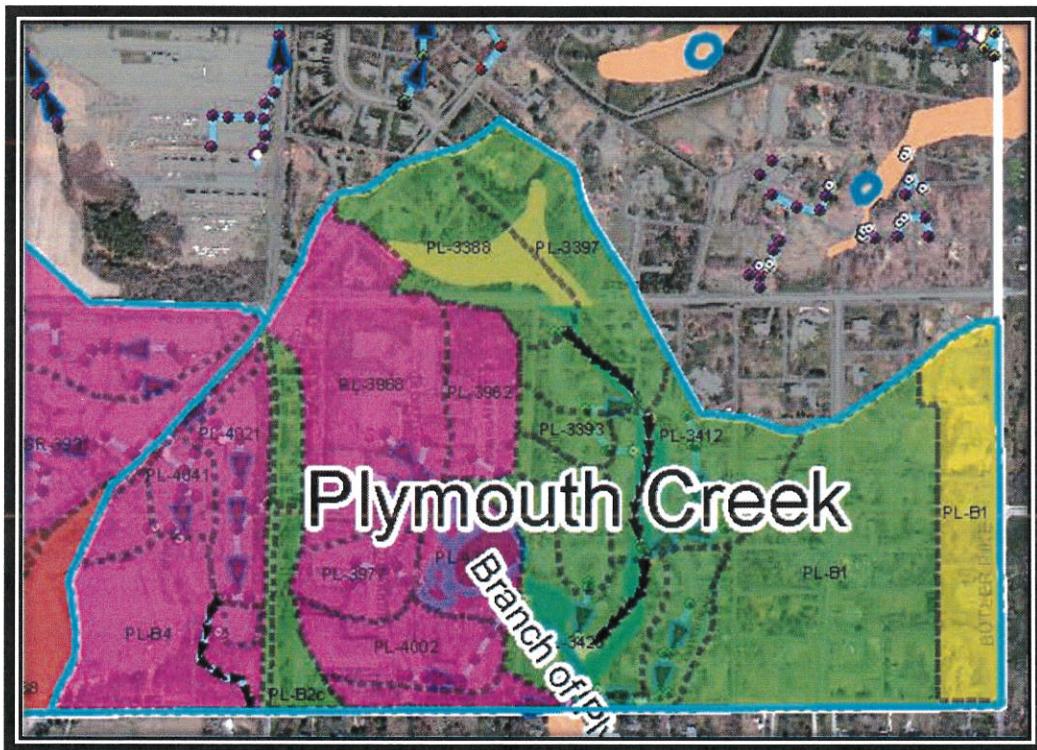
Exhibit of Sawmill Run Watershed



3. Plymouth Creek-Schuylkill River

The Plymouth Creek comprises the smallest area of Whitpain only a total of 178 acres. The Township is responsible for 52% of that drainage area, which is made up of 12.73% impervious land cover.

Exhibit of Plymouth Creek Watershed



IV. POLLUTANT REDUCTION

A significant part of this plan is to calculate the required load reductions by Whitpain Township. To find out what the Township is required to reduce, an existing load discharge must be determined. In the following subsections, this plan covers the load rates of each watershed and is followed with summary tables. Table 1.0 refers to the determined total existing load discharged to the creek. Table 2.0 refers to the total loads determined to be the Township's required reductions.

a. EXISTING SEDIMENT LOADING

To determine the existing loading for the Stony Creek, Mermaid Run, Sawmill Creek and Plymouth Creek, the general methodology described in the DEP "PRP/TMDL MS4 Workshop Fall 2016". The Township selected the load rates from Attachment B "Developed Land Loading Rates for PA Counties" included under Appendix D. These rates are applied to urbanized land and there are additional rates for undeveloped land outside of the urbanized area. Unfortunately, the entire township can be considered urbanized and therefore unable to use the lower load rates. The Township applied the impervious and pervious data for "all other counties" to the land uses. The land uses were determined using a combination of the National Land Cover Database (NLCD) 2011 data and the storm sewer sheds obtained from ArcGIS. The Township's Zoning map was overlaid on the storm sewer shed area to determine the land use. Using the NLCD data and comparing it with the Zoning District descriptions, the land use fell into 3 categories: Developed High Intensity, Developed Low Intensity, Developed Open Space.

b. EXISTING BMPs USED TO REDUCE THE EXISTING LOAD

i. Blue Bell Run Basin

This basin was initially installed as part of the Blue Bell Run Development back in 1979. It handles a drainage area of approximately 72 acres. In 2009, a basin retrofit was performed and changed a detention basin into a complex system that now includes a sediment forebay. At the time of construction in 1979 there was no NPDES permit requirement and therefore no known number associated with it. As part of the remediation in 2013, the basin was waived from an NPDES because it was an existing basin and close to an acre. The basin is maintained by the Township and regularly inspected per the O&M guidelines.

Total Drainage Area (acres) = 72 acres

Impervious = 6.37 acres

Pervious = 65.63 acres and 10 acres are pretreated in a forebay (2.5 ac ¼ res. And 7.5 ac are straight row crops

$$\begin{aligned} \text{TN} &= [(6.73 \text{ ac} * 23.06 \text{ lb/ac/yr}) + (65.63 \text{ ac} * 20.72 \text{ lb/ac/yr})] - \\ &[(6.73 \text{ ac} * 23.06 \text{ lb/ac/yr}) + (65.63 \text{ ac} * 20.72 \text{ lb/ac/yr}) * 0.3] = 1,054.72 \text{ lb/yr} \end{aligned}$$

$$\begin{aligned} \text{TP} &= [(6.73 \text{ ac} * 2.28 \text{ lb/ac/yr}) + (65.63 \text{ ac} * 0.84 \text{ lb/ac/yr})] - \\ &[(6.73 \text{ ac} * 2.28 \text{ lb/ac/yr}) + (65.63 \text{ ac} * 0.84 \text{ lb/ac/yr}) * 0.85] = 10.45 \text{ lb/yr} \end{aligned}$$

$$\begin{aligned} \text{TSS} &= [(6.73 \text{ ac} * 1839 \text{ lb/ac/yr}) + (65.63 \text{ ac} * 264.96 \text{ lb/ac/yr})] - \\ &[(6.73 \text{ ac} * 1839 \text{ lb/ac/yr}) + (65.63 \text{ ac} * 264.96 \text{ lb/ac/yr}) * 0.9] = 2,910.38 \text{ lb/yr} \end{aligned}$$

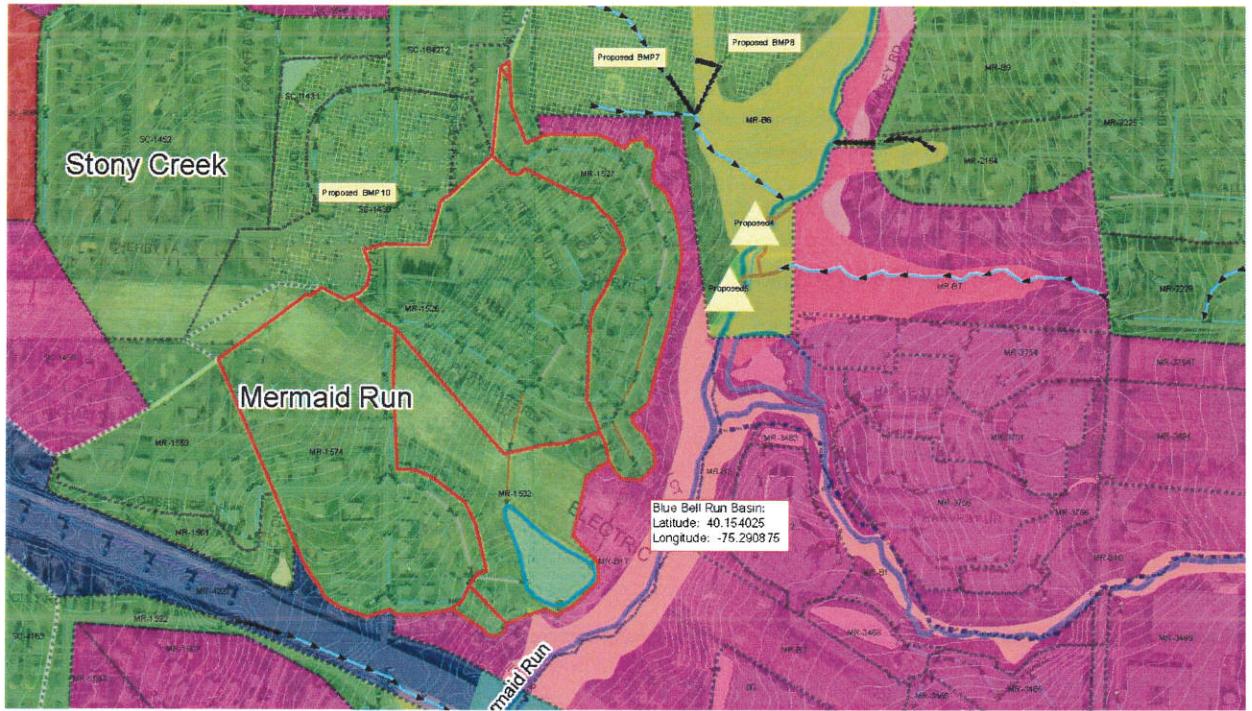
Removal efficiencies

	Removal Efficency	Existing load without BMP	New Existing Load with BMP
TN	0.3	1,506.75	1,054.72
TP	0.85	14.52	10.45
TSS*	0.9	29,103.75	2,910.38

*Point Precipitation from NOAA is 3.26 and exceeds 2.5 on the RR/ST Chart so it is 90% efficient

See Appendix F for Operation & Maintenance activities associated with the BMP.

Blue Bell Run Basin



ii. Pemberton Road Infiltration Systems

As part of the Township's stormwater regulations and ordinance, three homes on Pemberton Road have installed seepage bed infiltration systems to account for the additional impervious from the new homes. These were not subject to any NPDES permits as they were all under an acre. These residential BMPs are inspected on a 3 to 5-year period to ensure continued functionality.

	Total Drainage Area	Impervious	Pervious
BMP 1	0.1195 ac	0.1195 ac	0 ac
BMP 2	0.2679 ac	0.2679 ac	0 ac
BMP 3	0.1016 ac	0.1016 ac	0 ac

BMP 1

$$TN = [(0.1195 \text{ ac} * 23.06 \text{ lb/ac/yr})] - [(0.1195 * 23.06 \text{ lb/ac/yr}) * 0.8] = 2.21 \text{ lb/yr}$$

$$TP = [(0.1195 \text{ ac} * 2.28 \text{ lb/ac/yr})] - [(0.1195 * 2.28 \text{ lb/ac/yr}) * 0.85] = 0.2317 \text{ lb/yr}$$

$$TSS = [(0.1195 \text{ ac} * 1839 \text{ lb/ac/yr})] - [(0.1195 * 1839 \text{ lb/ac/yr}) * 0.85] = 186.85 \text{ lb/yr}$$

BMP 2

$$TN = [(0.2679 \text{ ac} * 23.06 \text{ lb/ac/yr})] - [(0.2679 * 23.06 \text{ lb/ac/yr}) * 0.8] = 4.94 \text{ lb/yr}$$

$$TP = [(0.2679 \text{ ac} * 2.28 \text{ lb/ac/yr})] - [(0.2679 * 2.28 \text{ lb/ac/yr}) * 0.85] = 0.52 \text{ lb/yr}$$

$$TSS = [(0.2679 \text{ ac} * 1839 \text{ lb/ac/yr})] - [(0.2679 * 1839 \text{ lb/ac/yr}) * 0.85] = 418.78 \text{ lb/yr}$$

BMP3

$$TN = [(0.1016 \text{ ac} * 23.06 \text{ lb/ac/yr})] - [(0.1016 * 23.06 \text{ lb/ac/yr}) * 0.8] = 1.87 \text{ lb/yr}$$

$$TP = [(0.1016 \text{ ac} * 2.28 \text{ lb/ac/yr})] - [(0.1016 * 2.28 \text{ lb/ac/yr}) * 0.85] = 0.1969 \text{ lb/yr}$$

$$TSS = [(0.1016 \text{ ac} * 1839 \text{ lb/ac/yr})] - [(0.1016 * 1839 \text{ lb/ac/yr}) * 0.85] = 158.79 \text{ lb/yr}$$

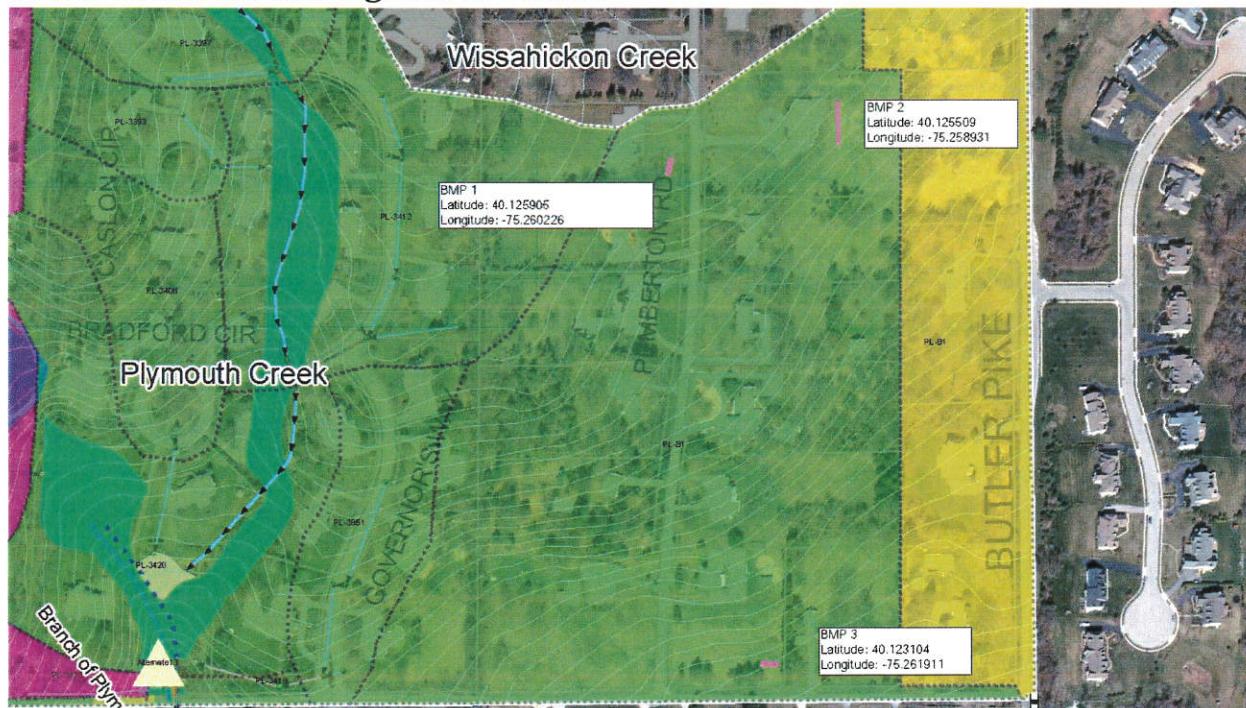
Removal efficiencies

	Removal Efficacy	Existing load without BMP	New Existing Load with BMP
TN	0.8	11.28	9.02
TP	0.85	1.11	0.95
TSS*	0.85	899.32	764.42

*Point Precipitation from NOAA is 3.27 and exceeds 2.5 on the RR/ST Chart, but used BMP Manual guidelines

See Appendix F for Operation & Maintenance activities associated with the BMP.

Pemberton Road Existing BMP Locations



Summary of Existing Load Calculations for Each Watershed

Stony Creek Existing Load Calculations lbs/year

Using Attachment B All Other Counties	
Total Discharge of Township TSS	1,190,979.09
Total Responsibility Township TSS to be controlled	119,097.91
Total Discharge of Township TN	24,274.66
Total Responsibility Township TN to be controlled	728.24
Total Discharge of Township TP	1,751.20
Total Responsibility Township TP to be controlled	87.56

Mermaid Run Existing Load Calculations lbs/year

Using Attachment B All Other Counties WITH BMP - Blue Bell Run Basin	
Total Discharge of Township TSS	722,326.17
Total Responsibility Township TSS to be controlled	72,232.62
Total Discharge of Township TN	15,224.94
Total Responsibility Township TN to be controlled	456.75
Total Discharge of Township TP	1,053.77
Total Responsibility Township TP to be controlled	52.69

Sawmill Run Existing Load Calculations lbs/year

Using Attachment B All Other Counties	
Total Discharge of Township TSS	121,843.85
Total Responsibility Township TSS to be controlled	12,184.39
Total Discharge of Township TN	2,697.04
Total Responsibility Township TN to be controlled	80.91
Total Discharge of Township TP	185.44
Total Responsibility Township TP to be controlled	9.27

Plymouth Creek Existing Load Calculations lbs/year

Using Attachment B All Other Counties and Including BMP	
Total Discharge of Township TSS	59,790.74
Total Responsibility Township TSS to be controlled	5,979.07
Total Discharge of Township TN	1,985.11
Total Responsibility Township TN to be controlled	59.55
Total Discharge of Township TP	110.41
Total Responsibility Township TP to be controlled	5.52

Table 1.0 – Existing Load Calculation

Existing Loads discharged into the Creeks from Township Areas of Responsibility			
Watershed	Total Nitrogen	Total Phosphorus	Total Suspended Solids
Stony Creek	24,274.66	1,751.20	1,190,979.09
Mermaid Run	15,224.94	1,053.77	722,326.17
Sawmill Run	2,697.04	185.44	121,843.85
Combined Total (Tributaries Drain To Stony Creek)	42,196.64	2,990.41	2,035,149.11
Plymouth Creek	1,985.11	110.41	59,790.74

Table 2.0-Township Load Reduction Responsibility of the Existing Load

Using All Other County Information from PRP Appendix B Township Responsibility			
Watershed	Total Nitrogen	Total Phosphorus	Total Suspended Solids
Stony Creek	728.24	87.56	119,097.91
Mermaid Run	456.75	52.69	72,232.62
Sawmill Run	80.91	9.27	12,184.39
Combined Total (Tributaries Drain To Stony Creek)	1,265.90	149.52	203,514.91
Plymouth Creek	59.55	5.52	5,979.07

c. PROPOSED BMPs AND SUPPORTING CALCULATIONS

BMP locations were identified using a set of key parameters. The Township first selected areas that are already owned and maintained by the Township and located within the planned area of the affected watershed. This was done to reduce the time needed to acquire Easements and permits with others as the DEP required timeline is only 5 years. The overall best management practice efficiency rating for that area was selected to reach our goal reduction and eliminate a number of projects to save on cost. The cost of the system will impact the size and location during the design phase. The drainage area to the system also impacts the location of the chosen BMP from an efficiency standpoint. The Township selected BMPs that would be easy to access or would have low maintenance requirements. The next several pages contain supporting calculations for the BMPs selected within each watershed. The BMP selection has been divided into two parts. Part one details streambank restoration projects and the part two refers to all other BMPs with unique project IDs. There are 11 projects that will need to be completed to reach the required load reductions in the next permit term.

Table 3.0 – PRP/TMDL Plans MS4 Workshop Fall 2016

All Other Counties from Appendix B			
	TN(lbs/ac/yr)	TP(lbs/ac/yr)	TSS (lb/ac/yr)
Impervious	23.06	2.28	1839
Pervious	20.72	0.84	264.96
GOAL REDUCTION	3%	5%	10%

Table 4.0 -BMP Efficiency Ratings

BMP TYPE	BMP EFFICIENCIES		
	TN	TP	TSS
Bioswale	0.7	0.75	0.8
Dry Extended Detention Basin	0.2	0.2	0.6
Streambank Restoration From DEP BMP Manual	0.075	0.068	44.18

Stony Creek

1. Part I - Streambank Restoration

Centre Square Park

Centre Square Park is a recently created park constructed through a public-private partnership with Walsh Construction. A portion of the Stony Creek passes through the Township owned land that will be analyzed and addressed through erosion control projects. The park itself has many Best Management Practices already installed (level spreaders, cisterns, bioswales, basins) and these projects would augment the natural environment within the park while controlling erosion along the streambanks.

a. Project ID 1 – Centre Square Park (2021)

(Length of streambank stabilization * BMP efficiency Value) = Load Removed

$$TN = 539.21\text{ft} * 0.075\text{lb/ft/yr} * 2 = 80.88 \text{ lb/yr}$$

$$TP = 539.21\text{ft} * 0.068\text{lb/ft/yr} * 2 = 73.33 \text{ lb/yr}$$

$$TSS = 539.21\text{ft} * 44.18\text{lb/ft/yr} * 2 = 47,644.60 \text{ lb/yr}$$

$$\text{Cost Estimate} = 539.21\text{LF} * \$200/\text{LF} = \$107,842.00$$

b. Project ID 2 – Centre Square Park (Year 2020)

(Length of streambank stabilization * BMP efficiency Value) = Load Removed

$$TN = 817.25\text{ft} * 0.075\text{lb/ft/yr} * 2 = 122.59 \text{ lb/yr}$$

$$TP = 817.25\text{ft} * 0.068\text{lb/ft/yr} * 2 = 111.15 \text{ lb/yr}$$

$$TSS = 817.25\text{ft} * 44.18\text{lb/ft/yr} * 2 = 72,212.48 \text{ lb/yr}$$

$$\text{Cost Estimate} = 817.25\text{LF} * \$200/\text{LF} = \$163,450.00$$

c. Project ID 3 – Centre Square Park (Year 2020)

(Length of streambank stabilization * BMP efficiency Value) = Load Removed

$$TN = 463.28\text{ft} * 0.075\text{lb/ft/yr} * 2 = 69.49 \text{ lb/yr}$$

$$TP = 463.28\text{ft} * 0.068\text{lb/ft/yr} * 2 = 63.01 \text{ lb/yr}$$

$$TSS = 463.28\text{ft} * 44.18\text{lb/ft/yr} * 2 = 40,935.60 \text{ lb/yr}$$

$$\text{Cost Estimate} = 463.28\text{LF} * \$200/\text{LF} = \$92,656.00$$

2. Part II – Other Selected BMPs

a. Project ID 9 Bioswale (Dog Park) (Year 2020)

The bioswale will treat 6.36 acres of land primarily used by pets. 1.04 acres is impervious for parking and the other 5.32 is pervious grass area. The bioswale will capture nutrients and improve water quality.

[Drainage Area Impervious * Impervious load rate from appendix B + Drainage Area Pervious * Pervious load rate from appendix B] * BMP efficiency Value = Load Removed

$$TN = (1.04\text{ac} * 23.06\text{lb/ac/yr} + 5.32 * 20.72\text{lb/ac/yr}) * 0.7 = 93.99 \text{ lb/yr}$$

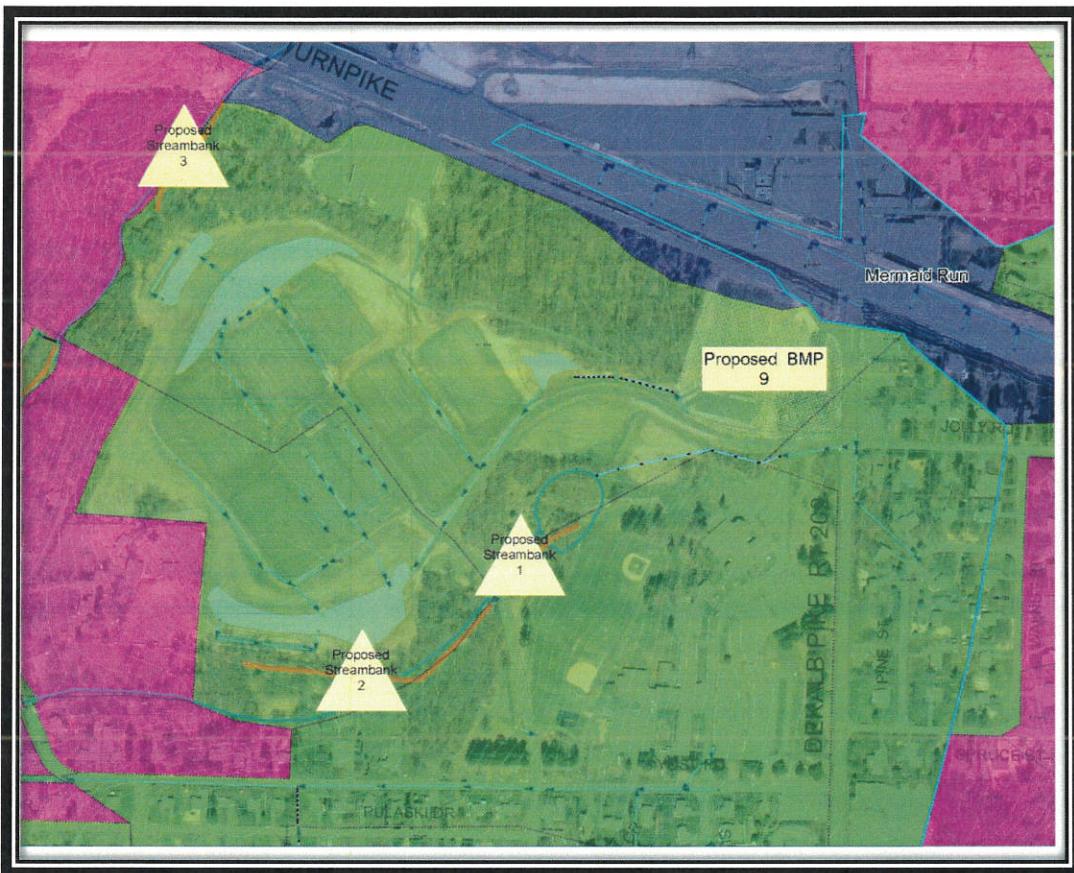
$$TP = (1.04\text{ac} * 2.28\text{lb/ac/yr} + 5.32 * 0.84\text{lb/ac/yr}) * 0.75 = 5.13 \text{ lb/yr}$$

$$TSS = (1.04\text{ac} * 1839\text{lb/ac/yr} + 5.32 * 264.96\text{lb/ac/yr}) * 0.8 = 2,658.35 \text{ lb/yr}$$

LF * conservative value (\$8-\$50) BMP Manual + LF*cost of plantings

$$\text{Cost Estimate} = 658\text{LF} * \$50/\text{LF} + 658\text{LF} * \$300/10\text{LF} = \$52,640.00$$

Centre Square Park Proposed BMP Locations



b. Project ID 10 - Silo Circle Basin (Year 2021)

The Silo Circle basin is an existing basin that has a drainage area of 17.43 acres. It will be modified to include a bioswale upstream of the entry into the basin. The basin will be inspected and any issues found shall be corrected with this project. It will most likely undergo a retrofit at the same time to comply with current stormwater regulation standards.

[Drainage Area Impervious * Impervious load rate from appendix B +Drainage Area Pervious * Pervious load rate from appendix B] * BMP efficiency Value = Load Removed

$$TN = (5.46ac * 23.06lb/ac/yr + 11.97 * 20.72lb/ac/yr) * 0.7 = 261.75 \text{ lb/yr}$$

$$TP = (5.46ac * 2.28lb/ac/yr + 11.97 * 0.84lb/ac/yr) * 0.75 = 16.88 \text{ lb/yr}$$

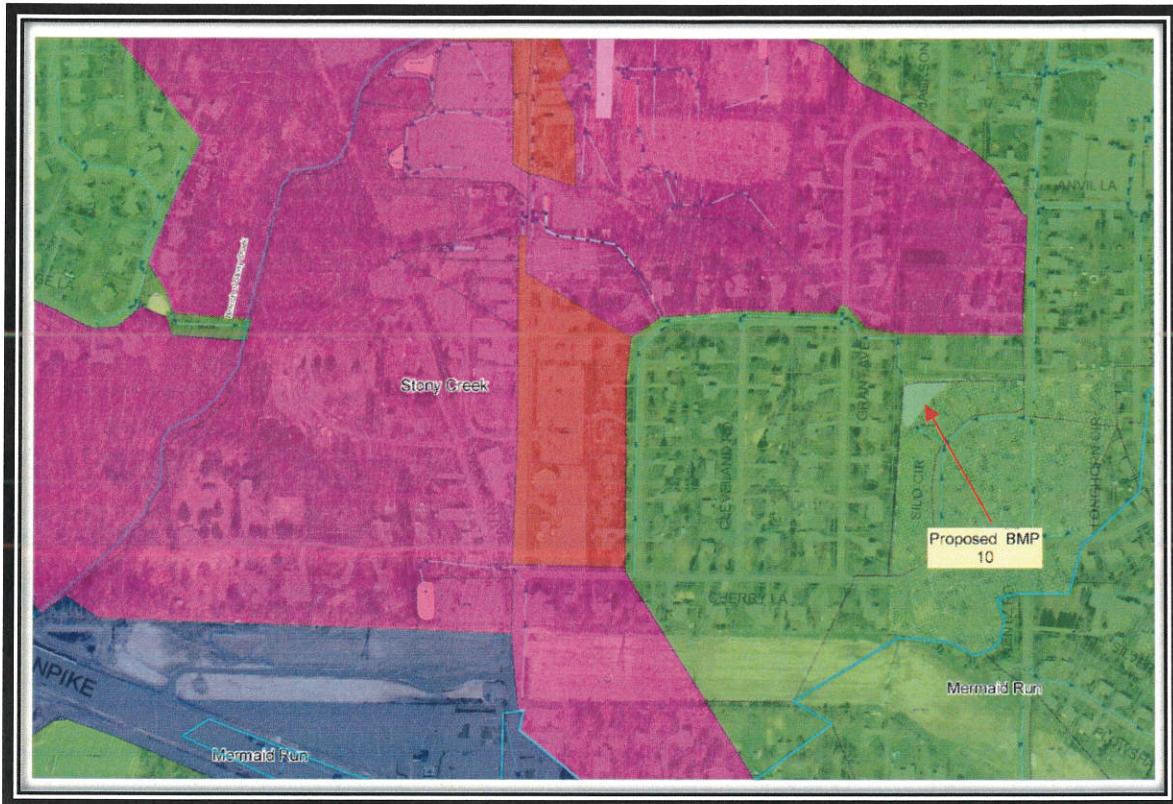
$$TSS = (5.46ac * 1839lb/ac/yr + 11.97 * 264.96lb/ac/yr) * 0.8 = 10,570.01 \text{ lb/yr}$$

$$\text{PA DEP BMP Manual Basin Cost} = 12.4 * (\text{Volume for 10yr storm CF})^{0.76}$$

$$\text{Cost Estimate} = 12.4 * 325,538^{0.76} + \text{bioswale cost}$$

$$(500LF * \$50/LF + 500LF * \$300/10LF) = \$231,866.42$$

Silo Circle Basin Proposed BMP Location



Mermaid Run

1. Part I - Streambank Restoration

Wentz Run Park- Wentz Run Park is owned and maintained by the Township. Part of the park is crossed by the Mermaid Run, a tributary that drains to the Stony Creek. These two projects will minimize the erosion along the streambank thereby reducing the sediment being discharged into the creek.

a. Project ID 4 – Wentz Run Park (Year 2019)

(Length of streambank stabilization * BMP efficiency Value) = Load Removed

$$TN = 455.77ft * 0.075lb/ft/yr * 2 = 68.37\text{ lb/yr}$$

$$TP = 455.77ft * 0.068lb/ft/yr * 2 = 61.98\text{ lb/yr}$$

$$TSS = 455.77ft * 44.18lb/ft/yr * 2 = 40,271.84\text{ lb/yr}$$

Cost Estimate = 455.77LF * \$200/LF = \$91,154.00

b. Project ID 5 – Wentz Run Park (Year 2019)

(Length of streambank stabilization * BMP efficiency Value) = Load Removed

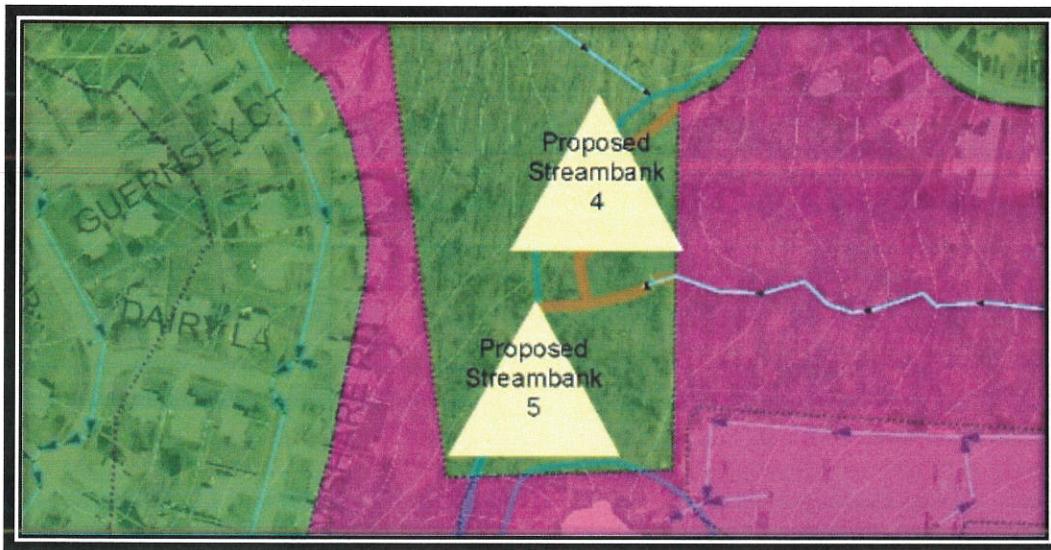
$$TN = 392.74\text{ft} * 0.075\text{lb/ft/yr} * 2 = 58.91 \text{ lb/yr}$$

$$TP = 392.74\text{ft} * 0.068\text{lb/ft/yr} * 2 = 53.41 \text{ lb/yr}$$

$$TSS = 392.74\text{ft} * 44.18\text{lb/ft/yr} * 2 = 34,702.51 \text{ lb/yr}$$

Cost Estimate = $392.74\text{LF} * \$200/\text{LF} = \$78,548.00$

Wentz Run Park Proposed Streambank BMP Locations



Jolly Road and Turnpike

The Mermaid Run passes under the Turnpike and Jolly Road. This area is targeted to restore some of the lost vegetation from the Turnpike Widening, to stabilize the embankments from past flood events, and to improve the water quality through sediment reduction.

a. Project ID 6 – Jolly Road and Turnpike Overpass (Year 2022)

(Length of streambank stabilization * BMP efficiency Value) = Load Removed

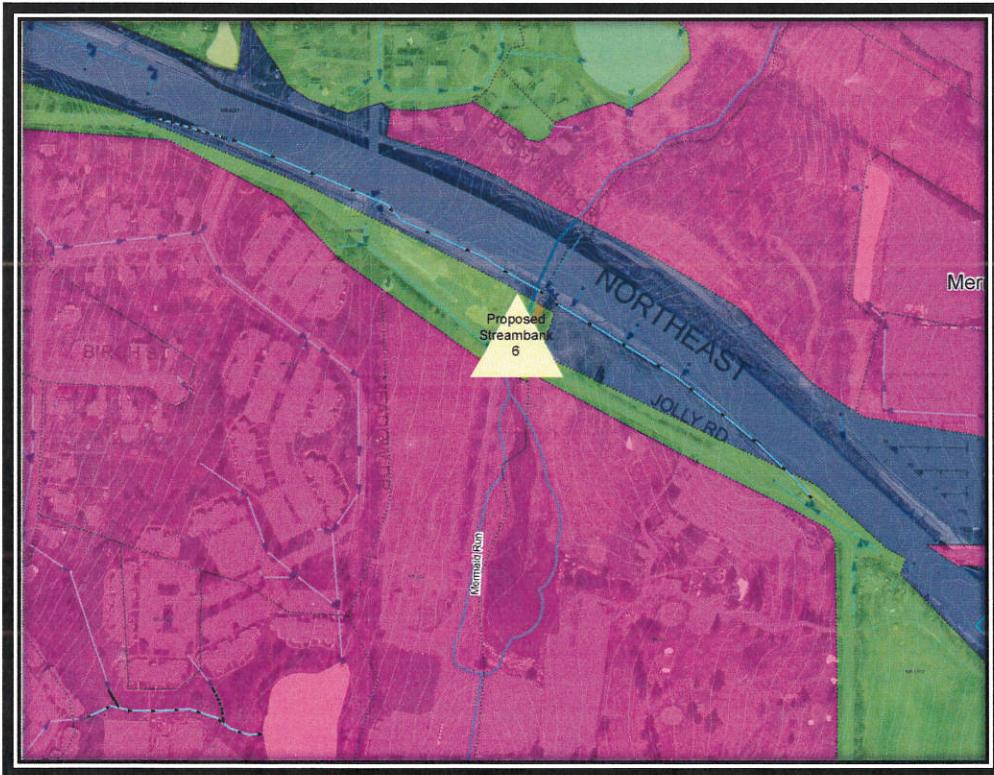
$$TN = 133.44\text{ft} * 0.075\text{lb/ft/yr} * 2 = 20.02 \text{ lb/yr}$$

$$TP = 133.44\text{ft} * 0.068\text{lb/ft/yr} * 2 = 18.15 \text{ lb/yr}$$

$$TSS = 133.44\text{ft} * 44.18\text{lb/ft/yr} * 2 = 11,790.49 \text{ lb/yr}$$

Cost Estimate = $133.44\text{LF} * \$200/\text{LF} = \$26,688.00$

Jolly Road and Turnpike Bridge Proposed BMP Location



2. Part II – Other Selected BMPs

b. Project ID 7 – Wentz Run Park (Year 2019)

The drainage area to this bioswale is 22.72 acres. Wentz Run Park is owned and maintained by the Township. There are currently grass swales that will be converted to provide an aesthetic feature to the park in addition to improving the water quality.

[Drainage Area Impervious * Impervious load rate from appendix B +Drainage Area Pervious * Pervious load rate from appendix B] * BMP efficiency Value = Load Removed

$$TN = (3.83ac * 23.06lb/ac/yr + 18.89 * 20.72lb/ac/yr) * 0.7 = 335.76 \text{ lb/yr}$$

$$TP = (3.83ac * 2.28lb/ac/yr + 11.97 * 0.84lb/ac/yr) * 0.75 = 18.45 \text{ lb/yr}$$

$$TSS = (3.83ac * 1839lb/ac/yr + 11.97 * 264.96lb/ac/yr) * 0.8 = 9,638.14 \text{ lb/yr}$$

LF * conservative value (\$8-\$50) BMP Manual + LF*cost of plantings

Cost Estimate = 1000LF*\$50/LF +1000LF*\$300/10LF = \$80,000.00

c. Project ID 8 – Wentz Run Park

The drainage area to this second bioswale is 11.224 acres. Wentz Run Park is owned by the Township and has some grass swales with minor erosion. This project will convert and stabilize the existing swale to a more naturalized swale to improve water quality.

[Drainage Area Impervious * Impervious load rate from appendix B +Drainage Area Pervious * Pervious load rate from appendix B] * BMP efficiency Value = Load Removed

$$TN = (0.5ac * 23.06lb/ac/yr + 10.72 * 20.72lb/ac/yr) * 0.7 = 163.61 \text{ lb/yr}$$

$$TP = (0.5ac * 2.28lb/ac/yr + 10.72 * 0.84lb/ac/yr) * 0.75 = 7.61 \text{ lb/yr}$$

$$TSS = (0.5ac * 1839lb/ac/yr + 10.72 * 264.96lb/ac/yr) * 0.8 = 3,008.74 \text{ lb/yr}$$

LF * conservative value (\$8-\$50) BMP Manual + LF*cost of plantings

Cost Estimate = 1000LF*\$50/LF +1000LF*\$300/10LF = \$80,000.00

Wentz Run Park Proposed BMP Locations



PLYMOUTH CREEK

Project ID 11 – Butler Pike and Township Line Road (S) – bioswale

The drainage area to this bioswale is 29.72 acres. There is currently no storm sewer system to assist with the control of storm runoff resulting in erosion along the roadway and reducing its life span. This bioswale will provide a place for the water to pond in the smaller storm events to prevent the erosion; the Township's intent is to install it within the Township owned right-of-way (ROW).

[Drainage Area Impervious * Impervious load rate from appendix B + Drainage Area Pervious * Pervious load rate from appendix B] * BMP efficiency Value = Load Removed

$$TN = (3.983\text{ac} * 23.06\text{lb/ac/yr} + 25.809 * 20.72\text{lb/ac/yr}) * 0.7 = 438.63 \text{ lb/yr}$$

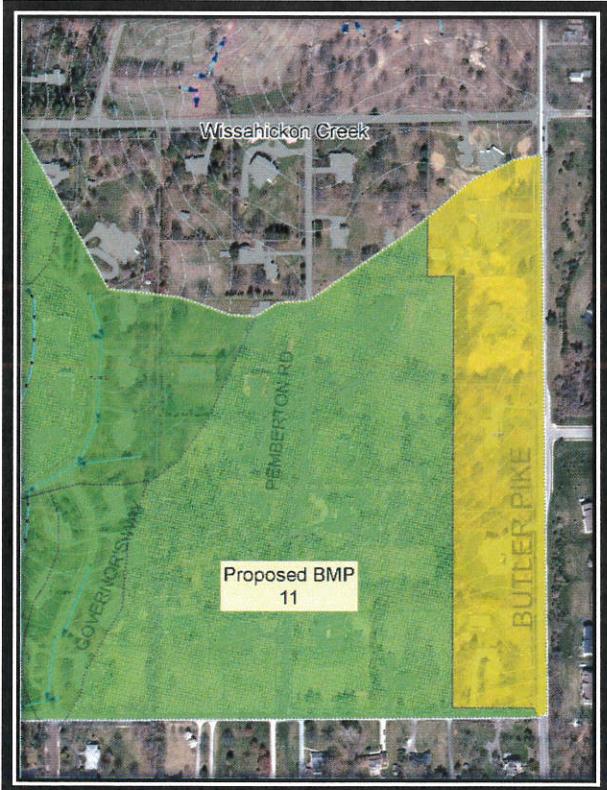
$$TP = (3.983\text{ac} * 2.28\text{lb/ac/yr} + 25.809 * 0.84\text{lb/ac/yr}) * 0.75 = 23.07 \text{ lb/yr}$$

$$TSS = (3.983\text{ac} * 1839\text{lb/ac/yr} + 25.809 * 264.96\text{lb/ac/yr}) * 0.8 = 11,330.47 \text{ lb/yr}$$

LF * conservative value (\$8-\$50) BMP Manual + LF*cost of plantings + concrete aprons

Cost Estimate = $1500\text{LF} * \$50/\text{LF} + 1500\text{LF} * \$300/10\text{LF} + \$3000 * 3 \text{ concrete aprons} = \$129,000.00$

Plymouth Creek Proposed BMP Location Township Line Road (ROW)



FUNDING

The Township will pursue grant funding and partnership opportunities wherever possible; however, it is expected that most of these projects will be mostly funded by Township capital sources due to a lack of grant opportunities. Table 5.0 below depicts the estimated cost using a variety of sources from the PA BMP manual and current project costs of materials.

Streambank restoration costs fluctuate greatly and can range anywhere from \$28/LF to \$250/LF. The Township took a conservative approach and is assuming a general rate of \$200/LF for each project.

Table 5.0 Summary of Estimated Costs for Proposed BMPS

BMP Project ID	BMP Type	Owner	Funding Source	Total Estimated Cost
1	Streambank restoration at Centre Square Park	St. Helens Church and Township	Township	\$129,410.40
2	Streambank restoration at Wentz Park	Township	Township	\$109,384.80
3	Streambank Restoration Jolly Road and Turnpike	Township	Township	\$32,024.88
4	Streambank restoration at Centre Square Park	Township	Township	\$196,140.72
5	Streambank restoration at Centre Square Park	Township	Township	\$111,187.68
6	Streambank restoration at Wentz Park	Township	Township	\$94,257.60
7	Bioswale Wentz Run Park	Township	Township	\$80,000.00
8	Bioswale Wentz Run Park	Township	Township	\$80,000.00
9	Bioswale Centre Square Park (Dog Park)	Township	Township	\$52,640.00
10	Bioswale and Basin Retrofit Silo Circle	Township	Township	\$231,866.42
11	Bioswale on Twp Line Rd.	Township (ROW)	Township	\$129,000.00

The following Table 5.1 is a list of the alternative BMPs that would be used should an unforeseen circumstance occur with one of the other proposed BMPs.

Table 5.1 Summary of Estimated Costs for Alternate BMPS

BMP Project ID	BMP Type	Owner	Funding Source	Total Estimated Cost
12	Streambank restoration Township Line (S) (ROW)	Township	Township	\$6,000.00
13	Bioswale Governors Way	Private	Township	\$320,936.65
14	Streambank Restoration Sheffield Drive	PECO	Township	\$61,200.00
15	Streambank restoration Creek View Lane Near Yost Bridge	Private/Township	Township	\$220,800.00
16	Streambank restoration near Cernan and McDivitt	Private	Township	\$30,624.00
17	Bioswale in Township Building Parking Lot	Township	Township	\$10,480.00
18	Bioswale Stony Creek Sports Park	Township	Township	\$125,600.00
19	Basin on Shepard Drive	Township	Township	\$132,093.54
20	Basin on Royal Oak Drive	Private	Township	\$253,389.61

d. OPERATION AND MAINTENANCE

To ensure the proper life cycle of these proposed BMPs, operation and maintenance (O&M) will be an integral part of the process. As most of these are located on Township owned property, a majority of these BMPs will be maintained by the Township. The Township will follow the general criteria from the Pennsylvania Best Management Practices Manual regarding Operation and Maintenance and any additional comments provided by the chosen consultant.

V. PUBLIC PARTICIPATION PLAN

As a part of the preparation and submission requirements for the MS4 Pollutant Reduction Plan (PRP), PA DEP requires that the Township solicit public involvement and participation. The following requirements are part of the Whitpain Township Public Involvement and Participation Plan:

1. A complete copy of the MS4 Pollutant Reduction Plan for Whitpain Township is available for public review both at the Township Administration Office and online at the Township website, www.whitpaintownship.net
2. Publish, in a newspaper of general circulation in the area, a public notice containing a statement describing the plan, where it may be reviewed by the public, and the length of time provided for the receipt of comments.
3. Accept written comments for a minimum of thirty (30) days from the date of public notice. It may be submitted to Whitpain Township Administration Offices, 960 Wentz Road, Blue Bell, PA 19422 (Attn: Township Manager) or by email to rpronczak@whitpaintownship.org and must include commenter's name and address. Comments by facsimile will not be accepted.
4. Accept any verbal or written comments from any interested member of the public at a public meeting or hearing.
5. Consider and make a record of the consideration of each timely comment received from the public comment period concerning the PRP, and identify any changes made to the plan in response to the comment.

Submission of the MS4 PRP to PA DEP must include a copy of the newspaper notice, a copy of all written comments from the public and a copy of the record of consideration of all timely comments received in the public comment period. Documentation of the public participation will be included in Appendix B, and shall include a copy of the presentation from the public meeting.

VI. CONCLUSION

Table 6.0 depicts the amount of total load reductions from the proposed projects. Once these projects have been implemented, the load reductions are in some areas greater than what is required by March 15, 2023. This plan is subject to change based on the potential of new stormwater regulations or stormwater management solutions. For example, if new Best Management Practices are developed in the coming years that would address our impairments more efficiently then the Township may investigate the installation of different BMPs.

Table 6.0 Total Load Reductions

Using All Other County information from PRP Appendix B			
Watershed	TN Responsibility	TP Responsibility	TSS Responsibility
STONY	728.24	87.56	119,097.91
MERMAID	456.75	52.69	72,232.62
SAWMILL	80.91	9.27	12,184.39
COMBINED TOTAL (TRIBUTARIES DRAIN TO STONY)	1,265.90	149.52	203,514.91
PLYMOUTH	59.38	5.51	5,963.96
GOAL MET?	TN Responsibility	TP Responsibility	TSS Responsibility
STONY	100.94	(181.01)	(53,843.96)
MERMAID	(189.92)	(106.92)	(27,179.10)
SAWMILL	80.91	9.27	12,184.39
COMBINED TOTAL (TRIBUTARIES DRAIN TO STONY)	(8.06)	(278.65)	(68,838.67)
PLYMOUTH	(417.96)	(23.74)	(9,626.94)