POLLUTION REDUCTION & TMDL PLAN

PLUMSTEAD TOWNSHIP

BUCKS COUNTY, PA

Prepared by:

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Introduction

Plumstead Township located in Bucks County consists of 27.2 square miles of land area tributary to the North Branch Neshaminy Creek and unnamed tributaries, Tohickon Creek, and Delaware River South. North Branch Neshaminy Creek and Tohickon Creek (which includes the sub-watersheds of Cabin Run, Geddes Run and Deep Run) have PA Code Chapter 93 use designation of WWF (warm water fishery). Portions of the Township are located within the Philadelphia (NE) Urbanized Area/Urbanized Area 12 as referenced by PADEP with Municipal Separate Storm Sewer Systems (MS4s) located in Urban Areas of both the North Branch Neshaminy Creek and Tohickon Creek watersheds. North Branch Neshaminy Creek also has a Total Maximum Daily Load (TMDL) Waste Load Allocation (WLA). (Refer Table 1) The Township owns and maintains MS4s permitted pursuant to NPDES Permit #PAI130059 to allow discharge of stormwater runoff to the Waters of the Commonwealth of Pennsylvania. This pollution reduction and TMDL plan is required as part of the 2019 National Pollutant Discharge Elimination System (NPDES) MS4 permit application to the Pennsylvania Department of Environmental Protection (PADEP) for the stormwater discharge to the surface waters impaired for sediment.

The purpose of the Pollution Reduction Plan (PRP) is to improve water quality discharging to surface waters which are listed as impaired by sediment and/or nutrients by establishing existing sediment pollutant loading, reducing the sediment loading by existing BMP to determine net sediment loading, and providing options for Best Management Practices (BMPs) to reduce the sediment load by 10% and meet the North Branch Neshaminy Creek WLA within five years following PADEP approval of coverage under the general permit.

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APPENDICES

A. Public Participation

- A copy of the draft PRP & TMDL Plan was made available for review on October 29, 2019. A copy of the public notice is included as Appendix J.

- The public was given 30 days to provide written comments on the contents of the PRP & TMDL Plan. No written comments were received. (October 29, 2019 thru November 27, 2019)

- The Township held a public meeting on December 10, 2019 to review the NPDES permit renewal and PRP; and receive verbal comments on the contents of the PRP/TMDL. No public comments were received.

- The Township adopted PRP at a public meeting held on December 10, 2019.

B. Map

The attached maps identify land uses and impervious/pervious surfaces and the storm sewershed boundary associated with each MS4 outfall that discharges to PRP/TMDL waters, and identifies the storm sewershed drainage area. In addition, the mapping identifies the proposed location(s) of structural BMP(s) that will be implemented to achieve required pollutant load reductions.

The Township reviewed and significantly revised and updated the MS4 storm sewer map to include the following:

- Updated tax map parcels.
- Streets.
- Urban Area based on the 2010 census.
- Watersheds and subwatersheds.
- Streams and watercourses based on PADEP GIS data.
- Storm sewer, inlets, manholes, and endwalls.
- Location of all MS4s
- Outfalls and observation points.
- Storm sewersheds based upon LIDAR topography.
- Storm sewershed drainage areas.
- Distance from the outfall (or observation point) to surface water.
- Basin ownership.
- Outfall IDs.
- Basin IDs.

The following GIS mapping was utilized for analysis and development of the Township's PRP.

1. Storm Sewer – existing base map showing the municipal storm sewer system with outfall locations, streams and drainage channels and field inspection.

2. Topography – contour information was provided by LIDAR shapefile information downloaded from Pennsylvania Spatial Data Access (PASDA) website.

3. Storm Drainage Areas – drainage areas to each MS4 outfall were evaluated by the Township Engineer's office using the MS4 mapping, contours, development plans, and field observation.

4. Impairment Area – after the drainage areas were outlined, a storm sewershed boundary was delineated. This boundary shows which areas of the Township drain to and have impact on the impaired streams within the Urban areas.

5. Impervious Area – Impervious surface areas were generated from 2015 DVRPC Land Use Data

6. Parsing – Urban Areas outside of the MS4s were "parsed" from the planning area. As indicated on mapping, areas that bypass the municipal MS4 system were also parsed. Where land area was removed from the planning area, BMPs implemented on that area were not be used as credit toward meeting the MS4's pollutant loading reduction requirements.

C. Pollutants of Concern:

The Township is required to identify the pollutants of concern for each storm sewershed or the overall PRP planning area. PADEP's MS4 Requirements Table identified that both Tohickon Creek and North Branch Neshaminy Creek are listed as impaired on the PADEP MS4 Requirements Table. The streams are impaired due to sediment. The terms "sediment", "siltation" and "suspended solids" all refer to inorganic solids.

The table below shows each of the impaired waters receiving discharges from the Township, and The pollutant(s) that are of concern to that stream.

Table 1: PADEP MS4 Requirements Table (last revised 6/26/17)

MS4 Name	NPDES ID	Individual Permit Required?	Reason	Impaired Downstream Waters or Applicable TMDL Name	Requirement(s)	Other Cause(s) of Impairment
PLUMSTEAD TOWNSHIP	PAG 130106	Yes	TMDL PLAN	Lake Galena (Peace Valley PA617)	Appendix E-Suspended Solids (4a), Appendix E-Nutrients (5)	
				Delaware River		Mercury (5)
				Neshaminy Creek	Appendix B-Pathogens (5), Appendix E-Nutrients, Organic Enrichment/Low D.O. (5)	
				Neshaminy Creek TMDL	TMDL Plan-Siltation, Suspended Solids (4a)	
				North Branch Neshaminy Creek		Water/Flow Variability (4c)
				Pine Run	Appendix E-Excessive Algal Growth (5)	
				Deep Run	Appendix E-Nutrients, Siltation (5)	

D. Existing Load for Pollutant(s) of Concern:

PRP

There are several possible methods to estimating the existing load, ranging from simplistic to complex. The method used in this report to estimate existing loading is the Simplified Method. This method determines the percent of impervious and pervious surface within the urbanized area of the storm sewershed and calculates the existing loading by multiplying those land areas (acres) by pollutant loading rates (lbs. /acre/yr.). This method does not take into consideration the different types of land uses within the storm sewershed.

Appendix C – Identifies a summary of PRP calculations based on using the simplified method.

Appendix D – Consists of a map which identifies impervious surfaces and summary for each planning area.

Appendix E – Consists of a spreadsheet which identifies base sediment loading calculations within the Plumstead Township MS4 PRP planning area. The spreadsheet also summarizes the sediment removal completed by existing BMPs (refer Appendix F), which is used to determine the overall existing sediment load for Plumstead Township MS4 facilities, within each HUC watershed. The spreadsheet further indicates the PRP sediment reduction requirement within each HUC watershed, which is 10% of the existing sediment loading.

Structural BMPs installed and implemented prior to development of this PRP were credited to reduce the Township's existing loading estimates. Street sweeping and other non-structural BMPs which may have been implemented in the past, were not credited. The Township may not reduce its obligations for achieving permit term pollutant load reductions through previously installed BMPs. Pollutant reduction credit was included in the form of reduced existing loading for structural BMPs that were implemented prior to development of the PRP and have been continually operated and maintained.

Existing sediment pollution loading was calculated for the portion of the Township Urban Area (UA) draining to the impaired waters as of the date of the development of this plan. Structural BMPs with stormwater management basins constructed prior to the development of the PRP continue to be operated and maintained and were included in the calculations to reduce the existing loading. BMP effectiveness values contained within Appendix I, PADEP BMP Effectiveness Values document (3800 – PM – BCW0100m), were utilized to determine pollutant load reductions.

Total required sediment loading reduction for all the combined planning areas accounting for existing BMPs is 85,821 lbs./yr. (refer sediment loading spreadsheets, Appendix E). (34,243 lbs./yr. within Tohickon Creek (TC) and 51,489 lbs./yr. within the North Branch Neshaminy Creek (NBNC)

PRP Parsing Procedures/Calculations

When the identified amount of pollution load required to be reduced was determined, areas within the Township to be studied for BMP improvements could be identified. The proposed implementation of BMPs or land use changes must be within the storm sewershed that will result in meeting the minimum required reductions. For example, a BMP cannot be installed within the North Branch Neshaminy Creek planning area with those pollution reduction amounts used to satisfy reductions required in the Tohickon Creek planning area.

BMPs must be implemented within five (5) years of PADEP's approval date for coverage under the PAG-13 General Permit. The BMPs may be located on public or private property. BMPs will be installed by the Township or by others in cooperation with the Township and will be located within the sewershed that will result in net pollutant loading reductions.

During the five (5) year permit, the Township may take credit for BMPs that are under one acre (for example single family swelling construction) and are not being implemented to meet minimum regulatory requirements, such as a Chapter 102 NPDES permit for construction activities. However, in cases where there is a Chapter 102 NPDES permit, the Township may only take credit for stormwater BMPs that exceed minimum requirements. To take credit for the additional pollution reduction provided by a BMP, the Township must demonstrate that the BMP exceeds its regulatory requirements. The credit may only include those additional reductions that result from exceeding the regulatory requirements.

TMDL

The options for evaluating existing load for TMDL Plans differs from PRPs. TMDL Plans must use: 1) the baseline load established in a TMDL, or 2) a load that is distributed from a bulk existing load for a group of MS4s in a TMDL, or 3) a recalculated load as determined using the MapShed model or equivalent. The Plumstead Township TMDL calculations are based on baseline loading established in the Pine Run of the North Branch Neshaminy Creek TMDL.

E. Wasteload Allocation(s) (WLA(s)) for TMDL Pine Run (North Branch Neshaminy Creek Watershed)

Figure 1: Planning Area Analysis

The following figure schematically identifies the overall Pine Run- Neshaminy Creek watershed, municipality boundaries, urbanized area, and planning areas which have been parsed pursuant to PADEP Attachment A of PRP/TDML Instruction forms. Refer to Appendix H for actual Plumstead Township TMDL Planning Area Map.

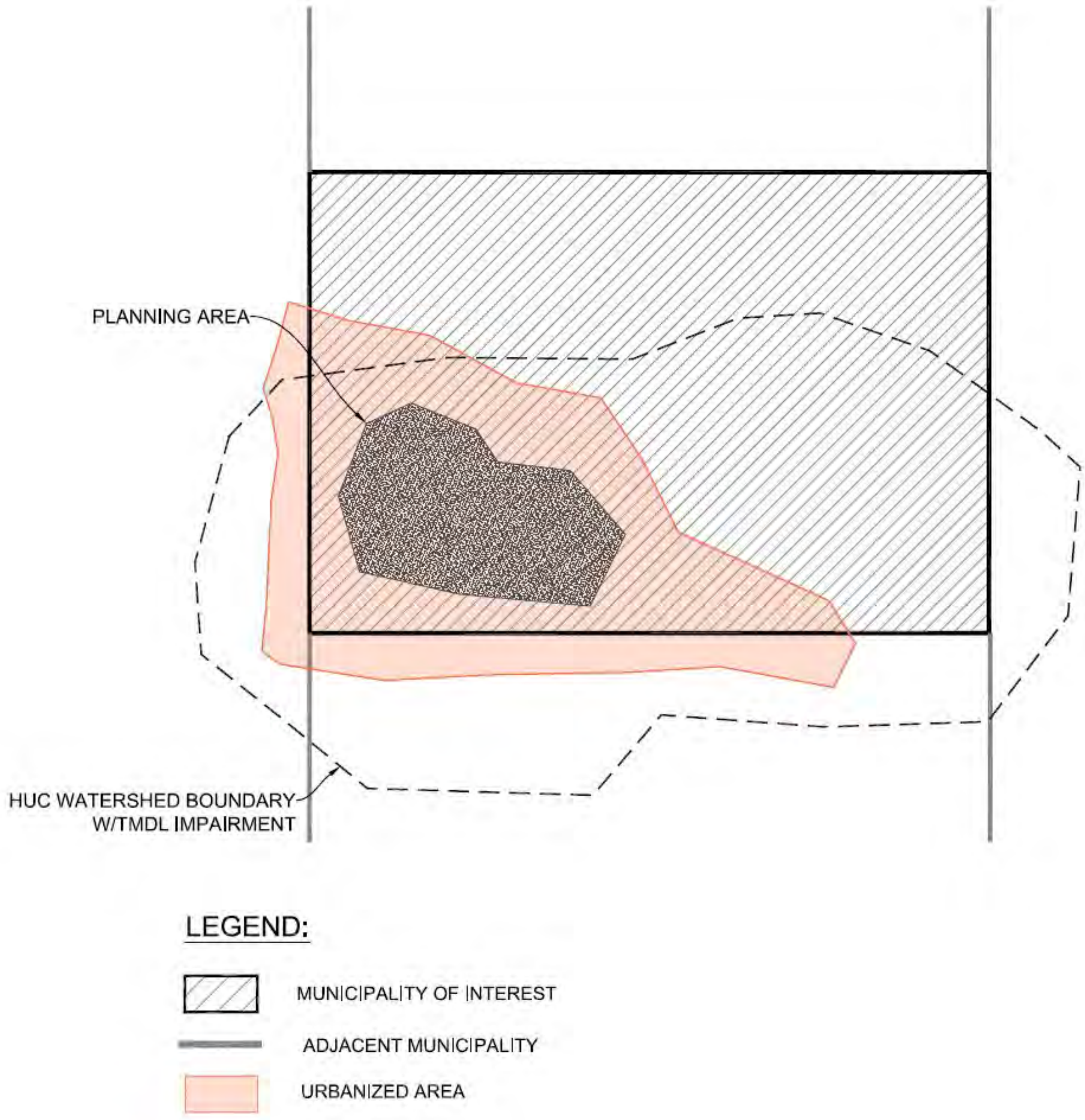

Table 1: Load Allocation by Each Land Use/Source in Neshaminy Creek
*The existing (baseline) loads and loading rates for Neshaminy Creek are shown consistent with the Existing Loading Table in the TMDL.

			Sediment				
Land Use Category	**Class**	**Area (AC)**	**1992 Load (lbs/yr)**	**2000 Load (lbs/yr)**	**WLA (annual average) (lbs/yr)**	**Reduction Required (%)**	**Unit Area Sediment Load (lbs/AC/yr)**
Hay/Past	81	657	25,320	23,969	11,395	52	17.34
Cropland	82	2,980	1,273,488	746,981	355,115	52	119.17
Coniferous Forest	42	86	110	110	53	52	0.62
Mixed Forest	43	612	1,722	1,722	819	52	1.34
Deciduous Forest	41	2,069	8,344	7,572	3,600	52	1.74
Unpaved Road		2	1,810	1,854	882	52	441
Transitional	33	40	24,409	2,441,347	1,160,640	52	29,016
Lo Intensity Dev	21	627	15,519	16,291	7,745	52	12.35
Hi Intensity Dev	22	212	6,452	5,629	2,677	52	12.62
Stream Bank			803,091	844,150	401,313	52	
Groundwater							
Point Source							
Septic Systems							
Total		**7,286**	**2,160,265**	**4,089,625**	**1,944,239**	**52**	

Table 2: Existing Loading Table Developed for Plumstead Township

*The land use distribution and existing loading rates for Plumstead Township are shown in the Existing Loading Table in the TMDL. This analysis is based on National Land Cover Database (NLCD) and the portion of the TMDL within Plumstead Township.

Land Use Category	Class	Area (AC)	Unit Area Sediment Load (lbs/AC/yr)	LA (annual average) (lbs/yr)
Hay/Past	81	328	17.34	5,688
Cropland	82	1,048	119.17	124,890
Coniferous Forest	42	14	0.62	9
Mixed Forest	43	158	1.34	212
Deciduous Forest	41	635	1.74	1,105
Unpaved Road		0	441	0
Transitional	33	15	29,016	435,240
Lo Intensity Dev	21	100	12.35	1,235
Hi Intensity Dev	22	8	12.62	101
Stream Bank				49,763* (refer below)
Groundwater				
Point Source				
Septic Systems				
Total		**2,306**		**618,243**

*As assumed in PADEP guidelines and pursuant to NLCD specifications, Lo Intensity Development is 34% Impervious, Hi Intensity Development is 70% Impervious, and Transition is 50% Impervious to determine stream bank load for Plumstead Township.

Stream bank load applicable to Plumstead Township	TMDL Shed (AC)	Plumstead Township (AC)	Plumstead Imp AC	Other (AC)	Other Imper AC
Lo Intensity Development (34% Impervious)	627	100	34	527	179
Hi Intensity Development (70% Impervious)	212	8	6	204	143
Transition (50% Impervious)	40	15	8	32	16
			48		338

Plumstead Township has 12.4% of the total impervious area (48/(48+338)). Therefore, 12.4% of streambank sediment is contributed from Plumstead Township.
(0.124 * 401,313 = 49,763 lbs/yr)

Table 3: Allowable Loading (WLA) for Plumstead Township
*The following waste load allocation (WLA) table was prepared to identify load allocation for Pine Run, Neshaminy Creek specifically within Plumstead Township. This will be further distributed based on planning area pursuant to Attachment A guidelines.

Land Use Category	**Class**	**Area (AC)**	**Reduction (%)**	**WLA (annual average) (lbs/yr)**	**Allowable Unit Area Sediment Load (lbs/AC/yr)**
Hay/Past	81	328	52	2,730	8.32
Cropland	82	1,048	52	59,947	57.20
Coniferous Forest	42	14	52	4	0.29
Mixed Forest	43	158	52	102	0.65
Deciduous Forest	41	635	52	530	0.83
Unpaved Road		0	52	0	
Transitional	33	15	52	208,915	13,928
Lo Intensity Dev	21	100	52	593	5.93
Hi Intensity Dev	22	8	52	48	6.00
Stream Bank			52	23,886	
Groundwater					
Point Source					
Septic Systems					
Totals		**2,306**		**296,755**	

Table 4: Recalculated MS4 Existing Load for Plumstead Township based on Planning Area
*The existing loads were calculated based on the Plumstead Township MS4 Planning Areas. Refer to Appendix H for the TMDL Planning Area Map.

Land Use Category	**Class**	**Area (AC)**	**Unit Area Sediment Load (lbs/AC/yr)**	**LA (annual average) (lbs/yr)**
Hay/Past	81	150	17.34	2,601
Cropland	82	417	119.17	49,694
Coniferous Forest	42	3	0.62	2
Mixed Forest	43	40	1.34	54
Deciduous Forest	41	204	1.74	355
Unpaved Road		0	441	0
Transitional	33	0	29,016	0
Lo Intensity Dev	21	42	12.35	519
Hi Intensity Dev	22	5	12.62	63
Stream Bank				5,883* (refer below)
Groundwater				
Point Source				
Septic Systems				
Total		**861**		**59,171**

Table 5: Calculation of Impervious Area within Planning Area to determine Stream Bank Load

Refer to Appendix D, Impervious Surface mapping, for depiction of impervious surface within each planning area. This table includes a summary of the required information which was prepared to determine the percentage of impervious area within TMDL planning areas. The percentage of impervious area was utilized to allocate the portion of streambank load which is contributed to the TMDL area.

Planning Area #	Area (AC)	Impervious (AC)
032 thru 052	420.0	127.0
055 thru 058	116.1	23.5
061 thru 064	177.7	31.6
067 thru 069	110.4	16.3
071, 095, 097, 098	22.4	9.0
110 thru 113	14.4	4.7
	861	**212.1**

% Impervious= 212.1(AC impervious) /861.0 (AC Planning Areas) x 100 = 24.63%.
Therefore 24.63% of Plumstead Township streambank sediment load gets allocated to Planning Areas. (0.2463 * 23,886 = 5,883 lbs/yr)

Table 6: Allowable WLA for Plumstead Township within Neshaminy Creek TMDL Planning Area

Land Use Category	Class	Area (AC)	Unit Area Sediment Load (lbs/AC/yr)	WLA (annual average) (lbs/yr)	Reduction (%)
Hay/Past	81	150	8.32	1,248	52
Cropland	82	417	57.20	23,853	52
Coniferous Forest	42	3	0.33	1	52
Mixed Forest	43	40	0.65	26	52
Deciduous Forest	41	204	0.83	170	52
Unpaved Road		0			52
Transitional	33	0	13,928	0	52
Lo Intensity Dev	21	42	5.93	249	52
Hi Intensity Dev	22	5	6	30	52
Stream Bank				5,883	52
Groundwater					
Point Source					
Septic Systems					
Total		**861**		**31,460**	

As a result of the weighted land use/imperviousness parsing approach, Plumstead Township's planning area WLA for sediment was reduced from 59,171 lbs/yr (Table 4) to 31,460 lbs/yr (Table 6). Therefore, a reduction of sediment in the amount of 27,711 lbs/yr is adequate to satisfy TMDL Sediment Reduction Requirements.

F. Analysis of TMDL Objectives.

The municipality has evaluated the following:

1. Long-Term Reduction – The pollutant load reduction required to meet the WLA(s), in lbs/yr., and percentage of existing load.

2. Short-Term Reduction – The MS4's decision on which objective will be pursued for the subsequent permit term, i.e., either 1) achieve the WLA(s) or 2) reduce existing load by 10% (sediment) or 5% (TP), as well as the pollutant load reduction, in lbs/yr.

Upon completion of the TMDL sediment reduction options, the municipality will have addressed both long-term and short-term reduction requirements.

G. Select BMPs To Achieve the Minimum Required Reductions in Pollutant Load.

PRP Sediment Load Reduction Options

Objective: Reduce Sediment Load by **34,243 lbs./yr.** within the Tohickon Creek (**TC**) Subwatershed and **51,489 lbs./yr.** within the North Branch Neshaminy Creek (**NBNC**) Subwatershed) as calculated in Appendix E Spreadsheet.

Item 1 – TC

Remove flow channel from Basin 001-01 and install outlet orifice control (to extend detention time) to increase basin TSS removal efficiency from 0% to 60% (60% Increase).

Sediment Reduction Calculation

Based on a drainage area of 32.43 AC (36.44% Impervious and 63.56% Pervious Urbanized Land) and a 60% TSS Removal Increase. Sediment Loading Rate is 1,839 lbs./AC/yr. for Impervious Urbanized Area and is 264.96 lbs./AC/yr. for Pervious Urbanized Area.

(.3644 x 32.43(AC) x 1,839 lbs./AC/yr. + .6356 x 32.43(AC) x 264.96 lbs./AC/yr.) x 0.60 TSS efficiency = **16,316 lbs./yr. removal**

Estimated Construction Cost: $40,000 to $45,000.

Item 2 – TC

Install outlet orifice control (to extend detention time) on Basin 003-01 to increase basin TSS removal efficiency from 10% to 60% (50% Increase).

Sediment Reduction Calculation

Based on a drainage area of 50.43 AC (30.66% Impervious and 69.34% Pervious Urbanized Land) and a 50% TSS Removal Increase. Sediment Loading Rate is 1,839 lbs./AC/yr. for Impervious Urbanized Area and is 264.96 lbs./AC/yr. for Pervious Urbanized Area.

(.3066 x 50.43(AC) x 1,839 lbs./AC/yr. + .6934 x 50.43(AC) x 264.96 lbs./AC/yr.) x 0.50 TSS efficiency = **18,850 lbs./yr. removal**

Estimated Construction Cost: $12,000 to $16,000.

Item 3 – NBNC

Remove flow channel from Basin 035-01 and install outlet orifice control (to extend detention time) to increase basin TSS removal efficiency from 0% to 60% (60% Increase).

Sediment Reduction Calculation

Based on a drainage area of 50.91 AC (34.14% Impervious and 65.86% Pervious Urbanized Land) and a 50% TSS Removal Increase. Sediment Loading Rate is 1,839 lbs./AC/yr. for Impervious Urbanized Area and is 264.96 lbs./AC/yr. for Pervious Urbanized Area.

(.3414 x 50.91(AC) x 1,839 lbs./AC/yr. + .6586 x 50.91(AC) x 264.96 lbs./AC/yr.) x 0.60 TSS efficiency = **24,508 lbs./yr. removal**

Estimated Construction Cost: $50,000 to $55,000.

Item 4 – NBNC

Install outlet orifice control (to extend detention time) on Basin 045-01 to increase basin TSS removal efficiency from 10% to 60% (50% Increase).

Sediment Reduction Calculation

Based on a drainage area of 7.72 AC (33.06% Impervious and 66.94% Pervious Urbanized Land) and a 50% TSS Removal Increase. Sediment Loading Rate is 1,839 lbs./AC/yr. for Impervious Urbanized Area and is 264.96 lbs./AC/yr. for Pervious Urbanized Area.

(.3306 x 7.72(AC) x 1,839 lbs./AC/yr. + .6694 x 7.72(AC) x 264.96 lbs./AC/yr.) x 0.50 TSS efficiency = **3,031 lbs./yr. removal**

Estimated Construction Cost: $12,000 to $16,000

Item 5 – NBNC

Install outlet orifice control (to extend detention time) on Basin 047-01 to increase basin TSS removal efficiency from 10% to 60% (50% Increase).

Sediment Reduction Calculation

Based on a drainage area of 13.90 AC (31.71% Impervious and 68.29% Pervious Urbanized Land) and a 50% TSS Removal Increase. Sediment Loading Rate is 1,839 lbs./AC/yr. for Impervious Urbanized Area and is 264.96 lbs./AC/yr. for Pervious Urbanized Area.

(.3171 x 13.90(AC) x 1,839 lbs./AC/yr. + .6829 x 13.90(AC) x 264.96 lbs./AC/yr.) x 0.50 TSS efficiency = **5,310 lbs./yr. removal**

Estimated Construction Cost: $12,000 to $16,000

Item 6 – NBNC

Install outlet orifice control (to extend detention time) on Basin 048-01 to increase basin TSS removal efficiency from 10% to 60% (50% Increase).

Sediment Reduction Calculation

Based on a drainage area of 16.06 AC (40.06% Impervious and 59.94% Pervious Urbanized Land) and a 50% TSS Removal Increase. Sediment Loading Rate is 1,839 lbs./AC/yr. for Impervious Urbanized Area and is 264.96 lbs./AC/yr. for Pervious Urbanized Area.

(.4006 x 16.06(AC) x 1,839 lbs./AC/yr. + .5994 x 16.06(AC) x 264.96 lbs./AC/yr.) x 0.50 TSS efficiency = **7,191 lbs./yr. removal**

Estimated Construction Cost: $12,000 to $16,000

Item 7 – NBNC

Install outlet orifice control (to extend detention time) on Basin 050-01 to increase basin TSS removal efficiency from 10% to 60% (50% Increase).

Sediment Reduction Calculation

Based on a drainage area of 5.15 AC (25.14% Impervious and 74.86% Pervious Urbanized Land) and a 50% TSS Removal Increase. Sediment Loading Rate is 1,839 lbs./AC/yr. for Impervious Urbanized Area and is 264.96 lbs./AC/yr. for Pervious Urbanized Area.

(.2514 x 5.15(AC) x 1,839 lbs./AC/yr. + .7486 x 5.15(AC) x 264.96 lbs./AC/yr.) x 0.50 TSS efficiency = **1,701 lbs./yr. removal**

Estimated Construction Cost: $12,000 to $16,000

Item 8 – NBNC

Install outlet orifice control (to extend detention time) on Basin 052-01 to increase basin TSS removal efficiency from 10% to 60% (50% Increase).

Sediment Reduction Calculation

Based on a drainage area of 13.32 AC (30.00% Impervious and 70.00% Pervious Urbanized Land) and a 50% TSS Removal Increase. Sediment Loading Rate is 1,839 lbs./AC/yr. for Impervious Urbanized Area and is 264.96 lbs./AC/yr. for Pervious Urbanized Area.

(.3000 x 13.32(AC) x 1,839 lbs./AC/yr. + .7000 x 13.32(AC) x 264.96 lbs./AC/yr.) x 0.50 TSS efficiency = **4,910 lbs./yr. removal**

Estimated Construction Cost: $12,000 to $16,000

Item 9 – NBNC

ITEM REMOVED FROM PLAN DUE TO ACCESS RESTRICTIONS FROM PRIVATE PROPERTY OWNER

Item 10 – NBNC

Install outlet orifice control (to extend detention time) on Basin 043-01 to increase basin TSS removal efficiency from 10% to 60% (50% Increase).

Sediment Reduction Calculation

Based on a drainage area of 10.40 AC (43% Impervious and 57% Pervious Urbanized Land) and a 60% TSS Removal Increase. Sediment Loading Rate is 1,839 lbs./AC/yr. for Impervious Urbanized Area and is 264.96 lbs./AC/yr. for Pervious Urbanized Area.

(.4300 x 10.40(AC) x 1,839 lbs./AC/yr. + .5700 x 10.40(AC) x 264.96 lbs./AC/yr.) x 0.50 TSS efficiency = **4,898 lbs./yr. removal**

Estimated Construction Cost: $12,000 to $16,000.

Item 11 – NBNC

Stream Restoration (44.88 lbs./ft./yr. TSS Removal) along 125 feet of an unnamed tributary to Pine Creek. The location of stream restoration is shown on Township Open Space TMP# 34-39-145. The Township has conducted two prior stream restoration projects in this area. This project would continue the efforts in a Phase 3.

Sediment Reduction Calculation

125 feet x 44.88 lbs./ft./yr. = **5,610 lbs./yr. removal**

Estimated Construction Cost: $48,000 to $60,000.

PRP Compliance Summary

It is not feasible to reduce sediment loading within every individual planning area so an analysis was completed based on HUC12 drainage sheds as permitted by the PADEP PRP Guideline Document. The spreadsheets used for determination of sediment loading and existing BMPs include the required breakdown of information by HUC drainage area.

The municipality shall complete items 1 and 2 (e.g. 35,166 lbs./yr. reduction) to satisfy the PRP sediment loading reduction requirement (e.g. 34,243 lbs./yr.) within the Impaired Portion of Tohickon Creek Watershed (HUC 12 020401050703).

The municipality shall complete items 3 thru 8 and either 10 or 11 to satisfy the PRP sediment loading reduction requirement (e.g. 51,549 lbs./yr.) within the North Branch Neshaminy Creek Watershed (HUC 12 020402010201).

The Township will comply with the total PRP reduction requirement upon satisfying the PRP sediment loading reduction requirements in each HUC12 subwatershed.

TMDL Sediment Reduction Options and TMDL Compliance Summary

Objective: Reduce Sediment Load by 27,711 lbs./yr. within the North Branch Neshaminy Creek (NBNC) Subwatershed as calculated in Section E to meet Long Term TMDL Objectives as indicated in Section F.

As indicated above, the municipality shall complete items 3 thru 8 and either 10 or 11, to satisfy the PRP sediment loading reduction requirement within the North Branch Neshaminy Creek Watershed (HUC 12 020402010201). In completing these items, the municipality will additional satisfy the Long Term TMDL Objective, since the proposed sediment reduction (51,549 lbs./yr.) exceeds the TMDL required sediment reduction (27,711 lbs./yr.).

H. Identify Funding Mechanism(s)

Proposed projects will be paid for by the taxpayers of Plumstead Township. Grant programs and/or partnerships with environmental groups or other entities will be explored to assist in the funding but are not required to implement BMP projects.

I. Identify Responsible Parties for Operation and Maintenance (O&M of BMPs)

Once implemented, the BMPs must be maintained in order to continue producing the expected pollutant reductions. The Township must identify the Party responsible for ongoing O&M, O&M activities for each BMP, and frequency at which O&M activities will occur for each selected BMP, and each BMP revised pursuant to the PRP/TMDL.

The Township Stormwater Basin Database identifies 30 facilities:16 are maintained by Plumstead Township. 14 are owned and maintained privately (either by Homeowners Association or individual lot owner). Only three of the basins were constructed after 2003 and pursuant to an NPDES Permit. Nine basins, all privately owned and maintained, contain concrete low flow channels; ten basins are maintained as lawn; nine basins have a naturized bottom, and two are wet ponds.

Homeowner Association and individual owned and maintained basins are inspected at least annually by the Township and any required maintenance is communicated to the responsible party. Maintenance items include removal of trash, removal of accumulated debris from the trash rack on the outlet structure, removal of non-native invasive plants, and periodic mowing.

The Township will identify actual O&M activities in Annual MS4 Status Reports submitted under General Permit.

APPENDIX A

Storm Sewer Map

NOTES:
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2. STORM SEWERSHED AREAS ARE PARSED TO EXCLUDE AREA THAT BYPASSES PTMS4 SYSTEM.
3. AREAS PARSED DRAINING TO PENNDOT MS4 OR OTHER MUNICIPALITIES CONTAIN NO TOWNSHIP STREETS OR FACILITIES.

LEGEND:

BMP Township Maintained
BMP Privately Maintained
Parcels with Private Stormwater Facilities
Urbanized Area
Parcels
NESHAMINY CREEK Watershed Designation
PINE RUN Subwatershed Designation
Unimpaired Streams
Impaired Streams
Matchline
Municipal Boundary
Watersheds
Subwatersheds
Swale
Storm Sewershed
Planning Area

PARSING LEGEND:

Non-Urbanized Drainage Area
Parsed Area (Note #2)
Parsed Area Flowing to PennDOT MS4 (Note #3)
Parsed Area - Private Areas not containing Township MS4 Facilities
Parsed Area - Sheet Flow From A Road Less than 300' From Stream
Parsed Area - Urbanized Area Flowing to Unimpaired Stream and Not Within 5 Miles of Impaired Stream

STORM STRUCTURES:

Inlet
Endwall
Headwall
Manhole
Outlet Control Structure
001 Outfall to Impaired Waters or Waters Within 5 Miles of Impaired Waters (PRP/TMDL MS4)
Outfall to Unimpaired Waters (Other MS4)
023 Observation Point
12 Stormwater BMP (Typ)
Drainage Pipes
001-01 Detention Basin

600 300 0 600 1,200 1,800
SCALE: 1" = 600'

NO.	DATE	REVISIONS
2	1-18-24	ADD STORM FACILITIES FROM NEW DEVELOPMENTS
1	11-29-18	PER DEP COMMENTS

PLUMSTEAD TOWNSHIP STORM SEWER MAP

WYNN ASSOCIATES, INC.
MUNICIPAL & CIVIL ENGINEERING
211 W. Broad Street, Quakertown, PA 18951 Phone 215-536-7336 Fax 215-536-5361

DWN BY KAD | CKD BY CJG | DATE: JUN 29, 2017 | SCALE 1"= 600' | JOB NO.: 103-081

DRAWING NO. 1 OF 4

G:\MUNICIPAL\PLUMSTEAD\103 - File Numbers\103-081 MS-4\acad\2024\1-18-24 MS4 Map Base.dwg

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LEGEND:

- BMP Township Maintained
- BMP Privately Maintained
- Parcels with Private Stormwater Facilities
- Urbanized Area
- Parcels
- Matchline
- NESHAMINY CREEK — Watershed Designation
- PINE RUN — Subwatershed Designation
- Unimpaired Streams
- Impaired Streams
- Municipal Boundary
- Watersheds
- Subwatersheds
- Swale
- Storm Sewershed
- Planning Area

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- Headwall
- Manhole
- Outlet Control Structure
- Outfall to Impaired Waters or Waters Within 5 Miles of Impaired Waters (PRP/TMDL MS4)
- Outfall to Unimpaired Waters (Other MS4)
- 001 — Outfall number
- 023 — Observation Point
- 12 — Stormwater BMP (Typ)
- Drainage Pipes
- 001-01 — Detention Basin

600 300 0 600 1,200 1,800

SCALE: 1" = 600'

NO.	DATE	REVISIONS
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PLUMSTEAD TOWNSHIP STORM SEWER MAP

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DRAWING NO. 2 OF 4

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PLUMSTEAD TOWNSHIP STORM SEWER MAP

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DWN BY KAD | CKD BY CJG | DATE: JUN 29, 2017 | SCALE 1"= 600' | JOB NO.: 103-081

DRAWING NO. 3 OF 4

G:\MUNICIPAL\PLUMSTEAD\103 - File Numbers\103-081 MS-4\acad\2024\1-18-24 MS4 Map Base.dwg

NOTES:

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LEGEND:

- BMP Township Maintained
- BMP Privately Maintained
- Parcels with Private Stormwater Facilities
- Urbanized Area
- Parcels
- Matchline
- NESHAMINY CREEK — Watershed Designation
- PINE RUN — Subwatershed Designation
- Unimpaired Streams
- Impaired Streams
- Municipal Boundary
- Watersheds
- Subwatersheds
- Swale
- Storm Sewershed
- Planning Area

PARSING LEGEND:

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- 023 Observation Point
- 12 Stormwater BMP (Typ)
- Drainage Pipes
- 001-01 Detention Basin

600 300 0 600 1,200 1,800

SCALE: 1" = 600'

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PLUMSTEAD TOWNSHIP STORM SEWER MAP

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DWN BY	CKD BY	DATE	SCALE	JOB NO.	DRAWING NO.
KAD	CJG	JUN 29, 2017	1"= 600'	103-081	4 OF 4

APPENDIX B

HUC 12 Stream Classification Spreadsheet

HUC12 Stream Classification Spreadsheet

Job Number: 103-081
Date: 9/3/2019

MUNICIPALITY	WATERSHED	HUC12 #	PLANNING AREA ID
Plumstead Township	Tohickon Creek	020401050703	001
Plumstead Township	Tohickon Creek	020401050703	002
Plumstead Township	Tohickon Creek	020401050703	003
Plumstead Township	Tohickon Creek	020401050703	004
Plumstead Township	Tohickon Creek	020401050703	005
Plumstead Township	Tohickon Creek	020401050703	006
Plumstead Township	Tohickon Creek	020401050703	007
Plumstead Township	Tohickon Creek	020401050703	008
Plumstead Township	Tohickon Creek	020401050703	065
Plumstead Township	Tohickon Creek	020401050703	074
Plumstead Township	Tohickon Creek	020401050703	101
Plumstead Township	Tohickon Creek	020401050703	102
Plumstead Township	Tohickon Creek	020401050703	103
Plumstead Township	Tohickon Creek	020401050703	104
Plumstead Township	Tohickon Creek	020401050703	105
Plumstead Township	Tohickon Creek	020401050703	106
Plumstead Township	Tohickon Creek	020401050703	107
Plumstead Township	North Branch Neshaminy Creek	020402010201	032
Plumstead Township	North Branch Neshaminy Creek	020402010201	033
Plumstead Township	North Branch Neshaminy Creek	020402010201	034
Plumstead Township	North Branch Neshaminy Creek	020402010201	035
Plumstead Township	North Branch Neshaminy Creek	020402010201	036
Plumstead Township	North Branch Neshaminy Creek	020402010201	037
Plumstead Township	North Branch Neshaminy Creek	020402010201	038
Plumstead Township	North Branch Neshaminy Creek	020402010201	039
Plumstead Township	North Branch Neshaminy Creek	020402010201	040
Plumstead Township	North Branch Neshaminy Creek	020402010201	041
Plumstead Township	North Branch Neshaminy Creek	020402010201	042
Plumstead Township	North Branch Neshaminy Creek	020402010201	043
Plumstead Township	North Branch Neshaminy Creek	020402010201	044
Plumstead Township	North Branch Neshaminy Creek	020402010201	045
Plumstead Township	North Branch Neshaminy Creek	020402010201	046
Plumstead Township	North Branch Neshaminy Creek	020402010201	047

HUC12 Stream Classification Spreadsheet

MUNICIPALITY	WATERSHED	HUC12 #	PLANNING AREA ID
Plumstead Township	North Branch Neshaminy Creek	020402010201	048
Plumstead Township	North Branch Neshaminy Creek	020402010201	049
Plumstead Township	North Branch Neshaminy Creek	020402010201	050
Plumstead Township	North Branch Neshaminy Creek	020402010201	051
Plumstead Township	North Branch Neshaminy Creek	020402010201	052
Plumstead Township	North Branch Neshaminy Creek	020402010201	055
Plumstead Township	North Branch Neshaminy Creek	020402010201	056
Plumstead Township	North Branch Neshaminy Creek	020402010201	057
Plumstead Township	North Branch Neshaminy Creek	020402010201	058
Plumstead Township	North Branch Neshaminy Creek	020402010201	061
Plumstead Township	North Branch Neshaminy Creek	020402010201	062
Plumstead Township	North Branch Neshaminy Creek	020402010201	063
Plumstead Township	North Branch Neshaminy Creek	020402010201	064
Plumstead Township	North Branch Neshaminy Creek	020402010201	067
Plumstead Township	North Branch Neshaminy Creek	020402010201	068
Plumstead Township	North Branch Neshaminy Creek	020402010201	069
Plumstead Township	North Branch Neshaminy Creek	020402010201	071
Plumstead Township	North Branch Neshaminy Creek	020402010201	095
Plumstead Township	North Branch Neshaminy Creek	020402010201	096
Plumstead Township	North Branch Neshaminy Creek	020402010201	097
Plumstead Township	North Branch Neshaminy Creek	020402010201	098
Plumstead Township	North Branch Neshaminy Creek	020402010201	110
Plumstead Township	North Branch Neshaminy Creek	020402010201	111
Plumstead Township	North Branch Neshaminy Creek	020402010201	112
Plumstead Township	North Branch Neshaminy Creek	020402010201	113

APPENDIX C

Pollution Reduction Plan
Technical Development Summary

PRP Technical Development Summary

Step 1. Map/delineate storm sewersheds draining to impaired surface water.

Step 2. Determine which storm sewersheds drain to MS4 regulated outfalls.

Step 3. Select loading rates.

Option 1. Chesapeake Bay Program.

Option 2. Literature or other scientifically valid sources.

Step 4. Determine area of storm sewersheds and % of each land use or land cover, based on your mapping.

Option 1. Simplified method.

Step 5. Parse out areas as described in the PRP Instructions, including areas which contribute flow into the system but have their own NPDES Stormwater Permit. Examples include PENNDOT roads and private property that discharges directly to surface waters without contributing flow into the MS4 system. The combined sewersheds, less any parsed-out areas, represents the "planning area," and is the area for which current loads will be calculated.

Step 6. Calculate Existing Load using Loading Rates and Land Area from previous steps.

Step 7. Evaluate and deduct existing structural BMP load reductions from Step 6 existing load to determine final existing load.

Step 8. Evaluate potential and types of new BMPs, considering drainage area to BMP, impairment, cost and funding mechanisms (total load reduction of BMP selection must meet load reduction requirements).

Basic Steps to Calculate Existing Load

1. Select loading rates
2. **Determine area of storm sewersheds and % of each land use or land cover, based on your mapping**
3. Calculate load using loading rates and land area from previous steps
4. Evaluate existing structural BMPs to reduce existing loading (optional)

Step 2: Determine Land Area

- Load = Land Use/Cover Based Loading Rate X **Land Area**
- Land Area is typically mixed land use
- Need land use distribution within defined drainage area

Basic Steps to Calculate Existing Load

1. Select loading rates
2. Determine area of storm sewersheds and % of each land use or land cover, based on your mapping
3. **Calculate load using loading rates and land area from previous steps**
4. Evaluate existing structural BMPs to reduce existing loading (optional)

Option 1: DEP Simplified Method

Table of municipal distributions by land cover

County	Municipality Name	Municipality Type	Urban Area % Impervious	Urban Area % Pervious	Outside of Urban Area % Impervious	Outside of Urban Area % Pervious	Urban Area Acres
Adams	ABBOTSTOWN	BORO	30%	70%	28%	72%	321
Adams	BERWICK	TWP	15%	85%	7%	93%	372
Adams	BUTLER	TWP	41%	59%	3%	97%	45
Adams	CONWEGO	TWP	21%	79%	13%	87%	3,233
Adams	CUMBERLAND	TWP	18%	82%	6%	94%	1,677
Adams	GETTYSBURG	BORO	47%	53%	47%	53%	1,064
Adams	HAMILTON	TWP	9%	91%	4%	96%	422
Adams	MCSHERRYSTOWN	BORO	48%	52%	8%	52%	327

- Multiply calculated acreage by corresponding loading rate and sum
- Not appropriate for land use determinations at finer scales (e.g. individual sewershed, BMP treatment area)

Calculations were done in GIS to determine impervious percentages within each urbanized planning area.

Option 1: DEP Simplified Method

Conewago Township, Adams County

Urban Area % Impervious	Urban Area % Pervious	Total UA Area (Acres)
21%	79%	3,233

3,233 acres * .21 = 679 acres impervious developed

3,233 acres – 679 acres = 2,554 acres pervious developed

Option 1: DEP Simplified Method

Impervious developed

679 acres x 1,398.77 lbs sediment/ac/yr = 949,242 lbs sediment/yr

Pervious developed

+

2,554 acres x 207.67 lbs sediment/ac/yr = 530,389 lbs sediment/yr

Total Developed Load = 1,479,631 lbs sediment/yr

Step 4: Evaluate Existing BMPs

- MS4s may account for structural BMPs that are currently installed and maintained in existing load estimates
- Any existing structural BMPs must be identified in Section D of the PRP along with required information in order to claim credit
- Pollutant reduction calculations for existing BMPs will be discussed in BMP Selection session

Calculate Load to BMP

- Impervious area = 4,284 ac
- Pervious area = 10.781 ac
- Impervious sediment load:
  4.284 ac X 1,614.15 lb/ac/yr = 6,914.929 lb/yr
- Pervious sediment load:
  10.781 ac X 220.4 lb/ac/yr = 2,376.112 lb/yr
- Total sediment load:
  6,914.929 lb/yr + 2,376.112 = **9,291 lb/yr**

Determine sediment removal percentage from PA DEP form 3800-PM-BCW0100M (BMP effectiveness values) for each BMP. Refer to Basin Database Spreadsheet.

Existing Loading Summary

- Total Sediment Load without accounting for existing BMPs:

  362,118 lb/yr
- Sediment removed from the existing load calculations by BMPs:

  115,419 lb/yr
- Overall existing load for "Model Municipality"

  362,118 lb/yr – 115,419 = **246, 699 lb/yr**

Required Reductions

1. Existing load to locally impaired sewershed areas is 126, 698 lb/yr

- Required reduction from locally impaired waters

  126,698 lb/yr * .10 = <u>12,670 lb/yr</u>

2. Existing load to Bay sewershed areas is 120,001 lb/yr

- Required reduction from Bay sewersheds are **120,001 lb/yr * .10 = <u>12,000 lb/yr</u>**

APPENDIX D

Impervious Surface Map

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LEGEND:

- Parcels
- Water Bodies
- Impervious Area
- Unimpaired Streams
- Impaired Streams
- Storm Sewershed
- 023 Observation Point
- Municipal Boundary
- Watersheds
- Subwatersheds
- Planning Area
- Matchline
- NESHAMINY CREEK — Watershed Designation
- PINE RUN — Subwatershed Designation

IMPERVIOUS AREA FROM 2015 DVRPC LAND USE DATA

600 300 0 600 1,200 1,800

SCALE: 1" = 600'

NO.	DATE	REVISIONS

PLUMSTEAD TOWNSHIP
IMPERVIOUS SURFACES MODELED WITHIN PLANNING AREAS

C. ROBERT WYNN ASSOCIATES, INC.
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DWN BY KAD | CKD BY CJG | DATE: FEB. 20, 2019 | SCALE 1"= 600' | JOB NO.: 103-081

DRAWING NO. 1 OF 4

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IMPERVIOUS AREA FROM 2015 DVRPC LAND USE DATA

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SCALE: 1" = 600'

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PLUMSTEAD TOWNSHIP
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DWN BY KAD | CKD BY CJG | DATE: FEB. 20, 2019 | SCALE 1"= 600' | JOB NO.: 103-081

DRAWING NO. 2 OF 4

LEGEND:

Parcels	Unimpaired Streams
Water Bodies	Impaired Streams
Impervious Area	Storm Sewered
023 Observation Point	Municipal Boundary
Watersheds	Subwatersheds
Planning Area	Matchline
NESHAMINY CREEK	Watershed Designation
PINE RUN	Subwatershed Designation

IMPERVIOUS AREA FROM 2015 DVRPC LAND USE DATA

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DRAWING NO. 3 OF 4

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- Water Bodies
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- 023 Observation Point
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DRAWING NO. 4 OF 4

APPENDIX E

Sediment Loading Spreadsheet within Planning Areas

Sediment Loading Spreadsheet

MUNICIPALITY	ACRES	PLShpArea (SF)	ImpShparea(SF)	%Impervious	%Pervious	Sediment Loading (lbs/yr)*	Obs#
Plumstead Township	17476.16	1,491,078	481,404	32.29	67.71	26,468	PT-001
Plumstead Township	17476.16	399,412	53,033	13.28	86.72	4,346	PT-002
Plumstead Township	17476.16	2,213,570	678,745	30.66	69.34	37,988	PT-003
Plumstead Township	17476.16	994,877	339,388	34.11	65.89	18,314	PT-004
Plumstead Township	17476.16	1,865,872	735,934	39.44	60.56	37,941	PT-005
Plumstead Township	17476.16	511,480	24,719	4.83	95.17	4,004	PT-006
Plumstead Township	17476.16	2,701,847	829,455	30.70	69.30	46,407	PT-007
Plumstead Township	17476.16	1,488,263	234,187	15.74	84.26	17,517	PT-008
Plumstead Township	17476.16	699,676	291,204	41.62	58.38	14,779	PT-032
Plumstead Township	17476.16	577,350	157,753	27.32	72.68	9,211	PT-033
Plumstead Township	17476.16	602,831	264,420	43.86	56.14	13,221	PT-034
Plumstead Township	17476.16	4,582,895	1,564,577	34.14	65.86	84,413	PT-035
Plumstead Township	17476.16	863,849	555,618	64.32	35.68	25,332	PT-036
Plumstead Township	17476.16	492,763	58,313	11.83	88.17	5,104	PT-037
Plumstead Township	17476.16	909,109	125,056	13.76	86.24	10,050	PT-038
Plumstead Township	17476.16	2,069,985	456,912	22.07	77.93	29,099	PT-039
Plumstead Township	17476.16	957,128	184,383	19.26	80.74	12,483	PT-040
Plumstead Township	17476.16	404,200	121,421	30.04	69.96	6,846	PT-041
Plumstead Township	17476.16	1,550,814	257,634	16.61	83.39	18,741	PT-042
Plumstead Township	17476.16	550,140	236,680	43.02	56.98	11,898	PT-043
Plumstead Township	17476.16	303,464	98,447	32.44	67.56	5,403	PT-044
Plumstead Township	17476.16	336,455	111,227	33.06	66.94	6,066	PT-045
Plumstead Township	17476.16	479,759	72,802	15.17	84.83	5,548	PT-046
Plumstead Township	17476.16	892,025	282,855	31.71	68.29	15,647	PT-047
Plumstead Township	17476.16	699,565	280,226	40.06	59.94	14,382	PT-048
Plumstead Township	17476.16	23,880	12,350	51.72	48.28	592	PT-049
Plumstead Township	17476.16	497,472	125,086	25.14	74.86	7,545	PT-050
Plumstead Township	17476.16	208,938	104,932	50.22	49.78	5,062	PT-051
Plumstead Township	17476.16	614,592	184,396	30.00	70.00	10,401	PT-052
Plumstead Township	17476.16	1,498,646	315,845	21.08	78.92	20,531	PT-055
Plumstead Township	17476.16	71,335	17,746	24.88	75.12	1,075	PT-056
Plumstead Township	17476.16	61,782	26,285	42.54	57.46	1,326	PT-057
Plumstead Township	17476.16	3,423,542	664,661	19.41	80.59	44,836	PT-058
Plumstead Township	17476.16	3,618,233	596,594	16.49	83.51	43,568	PT-061
Plumstead Township	17476.16	1,282,118	170,772	13.32	86.68	13,970	PT-062
Plumstead Township	17476.16	2,677,702	555,638	20.75	79.25	36,365	PT-063
Plumstead Township	17476.16	169,021	56,408	33.37	66.63	3,066	PT-064
Plumstead Township	17476.16	2,539,400	631,890	24.88	75.12	38,276	PT-065
Plumstead Township	17476.16	2,378,380	433,203	18.21	81.79	30,117	PT-067
Plumstead Township	17476.16	789,245	60,786	7.70	92.30	6,997	PT-068
Plumstead Township	17476.16	1,640,699	214,364	13.07	86.93	17,729	PT-069
Plumstead Township	17476.16	528,776	114,305	21.62	78.38	7,347	PT-071
Plumstead Township	17476.16	293,337	46,812	15.96	84.04	3,476	PT-074
Plumstead Township	17476.16	70,946	9,169	12.92	87.08	763	PT-095

Sediment Loading Spreadsheet

Job Number: 103-081
Date: 5/14/2024

MUNICIPALITY	ACRES	PLShpArea (SF)	ImpShparea(SF)	%Impervious	%Pervious	Sediment Loading (lbs/yr)*	Obs#
Plumstead Township	17476.16	59,689	11,475	19.22	80.78	778	PT-096
Plumstead Township	17476.16	74,255	30,934	41.66	58.34	1,569	PT-097
Plumstead Township	17476.16	301,842	235,546	78.04	21.96	10,348	PT-098
Plumstead Township	17476.16	154,612	40,989	26.51	73.49	2,422	PT-101
Plumstead Township	17476.16	387,015	56,167	14.51	85.49	4,383	PT-102
Plumstead Township	17476.16	1,013,436	296,588	29.27	70.73	16,883	PT-103
Plumstead Township	17476.16	1,214,914	464,314	38.22	61.78	24,169	PT-104
Plumstead Township	17476.16	2,798,387	595,433	21.28	78.72	38,540	PT-105
Plumstead Township	17476.16	2,225,768	103,912	4.67	95.33	17,295	PT-106
Plumstead Township	17476.16	976,814	101,538	10.39	89.61	9,609	PT-107
Plumstead Township	17476.16	93,634	30,235	32.29	67.71	1,662	PT-110
Plumstead Township	17476.16	144,927	79,699	54.99	45.01	3,761	PT-111
Plumstead Township	17476.16	269,334	55,727	20.69	79.31	3,652	PT-112
Plumstead Township	17476.16	120,649	38,220	31.68	68.32	2,115	PT-113

Total Sediment Loading=	**911,437**	(lbs/yr)	
Within HUC12 020401050703 (Tohickon Creek)=	**348,038**	(lbs/yr)	38.19%
Within HUC12 020402010201 (North Branch Neshaminy Creek)=	**563,399**	(lbs/yr)	61.81%

* Sediment Loading for Impervious Land within Urbanized Area is 1,839 lbs/AC/yr
* Sediment Loading for Pervious Land within Urbanized Area is 264.96 lbs/AC/yr

Total Base Sediment Loading w/o accounting for BMPs = 911,437 lbs/yr (455.72 tons/yr)

Sediment Loading Removed by Existing BMPs= 53,229 lbs/yr (26.61 tons/yr)
(Refer to sediment removal calculations on Stormwater Basin Database)
Removed within HUC12 020401050703 (Tohickon Creek)= 5,602 lbs/yr
Removed within HUC12 020402010201 (North Branch Neshaminy Creek)= 47,627 lbs/yr

Overall Existing Sediment Load for Plumstead Township= 911,437 lbs/yr - 53,229 lbs/yr = 858,208 lbs/yr (429.10 tons/yr)
Within HUC12 020401050703 (Tohickon Creek)= 348,038 lbs/yr - 5,602 lbs/yr = 342,436 lbs/yr (171.22 tons/yr)
Within HUC12 020402010201 (North Branch Neshaminy Creek)= 563,399 lbs/yr - 48,508 lbs/yr = 514,891 lbs/yr (257.44 tons/yr)

Total PRP Requirement Reduction (10%) = 858,208 * .10 = 85,821 lbs/yr (42.91 tons/yr)
Within HUC12 020401050703 (Tohickon Creek)= 342,436 lbs/yr * .10 = 34,243 lbs/yr
Within HUC12 020402010201 (North Branch Neshaminy Creek)= 514,891 lbs/yr * .10 = 51,489 lbs/yr

APPENDIX F

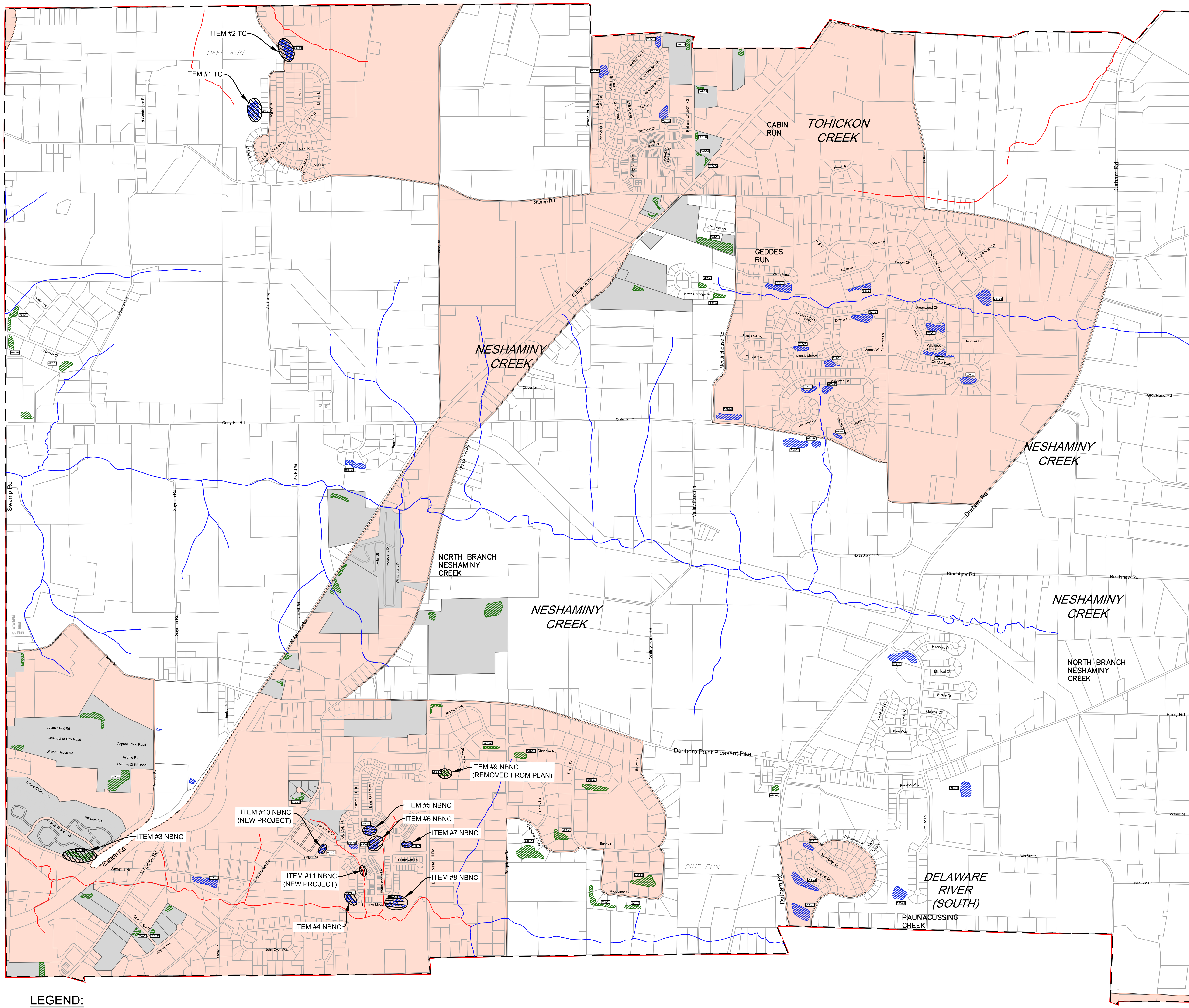
Stormwater Basin Database

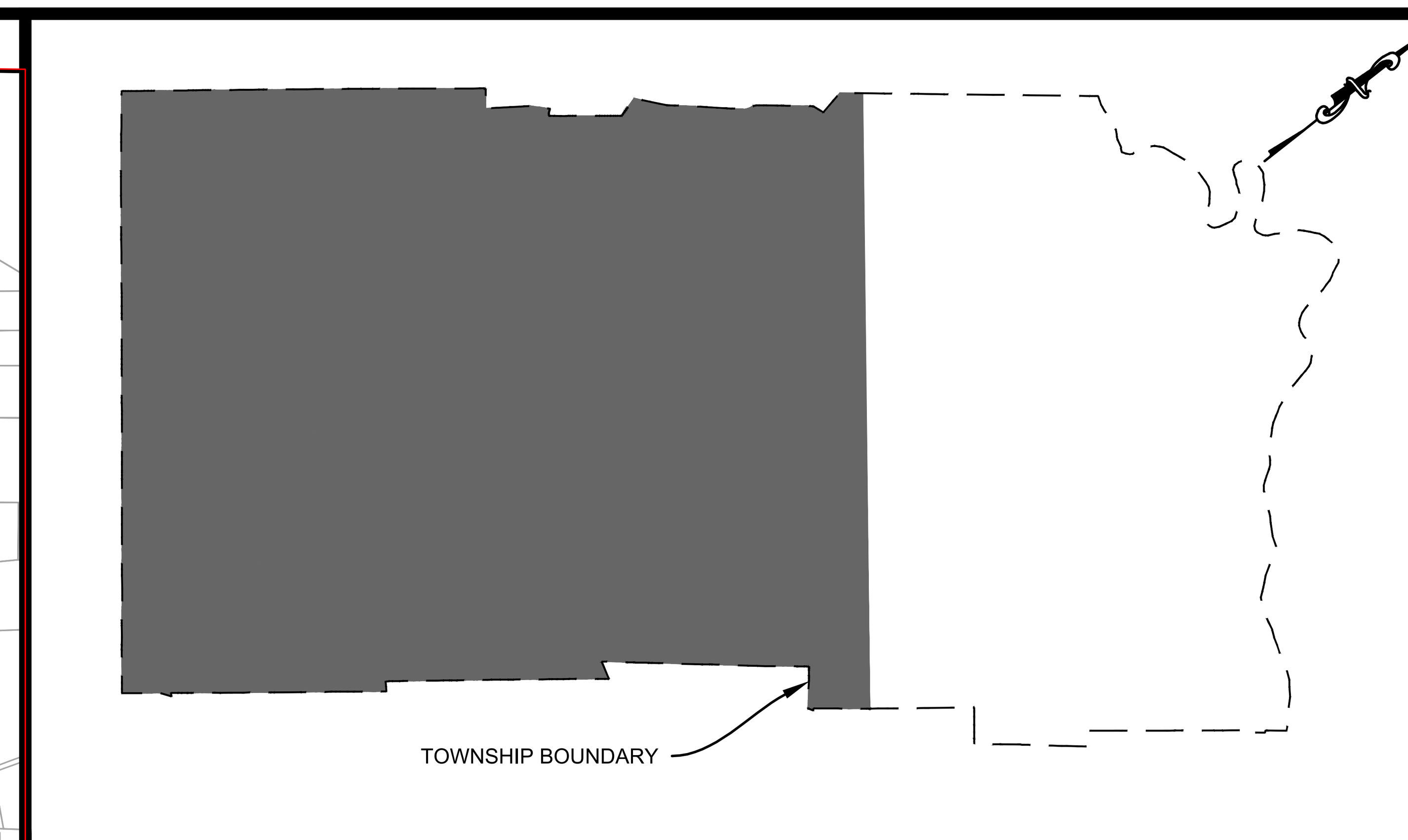
Stormwater Basin Database

Basin ID	Maintained By	Description	Street/Access	Year (Appx.)	NPDES Permit	Basin Type	DWF*	Improvements/Comments	TSS %	Basin Drainage Area (AC)	Adj Factor	% Impervious	% Pervious	Sed. Removal (lbs/yr)	Latitude	Longitude
001-01	Township	LANDIS GREENE	Gregory Drive	1997	N/A	Dry Detention Basin	N	Dry Basin, Mowed W/Concrete Flow Channels	0%	32.43	1	32.29	67.71	0	40°22'16.20"N	75°10'16.31"W
003-01	Township	LANDIS GREENE	Miriam Drive	1998	N/A	Dry Detention Basin	Y	Naturalized with Wet Tolerant Vegetation	10%	50.43	1	30.66	69.34	3,770	40°22'29.64"N	75°10'23.78"W
004-01	Township	CABIN RUN	Rolling Glen Drive	1992	N/A	Dry Detention Basin	N	Dry Basin, Mowed	10%	22.84	1	34.11	65.89	1,831	40°23'16.98"N	75° 9'27.18"W
005-01	Township	CABIN RUN	Cabin Run Road	1992	N/A	Dry Detention Basin	N	Dry Basin, Mowed W/Concrete Flow Channels	0%	18.30	1	39.44	60.56	0	40°23'29.71"N	75° 9'24.10"W
007-06	Township	CABIN RUN	Heritage Drive	1992	N/A	Dry Detention Basin	N	Dry Basin, Mowed W/Concrete Flow Channels	0%	48.38	1	30.70	69.30	0	40°23'21.72"N	75° 9'8.06"W
035-01	Private	PATRIOTS RIDGE SUBDIVISION	Patriots Ridge Drive	1994	N/A	Dry Detention Basin	Y	Dry Basin, Naturlized, W/Concrete Flow Channels	10%	50.91	1	34.14	65.86	4,085	40°20'14.16"N	75° 8'8.73"W
035-02	Private	CARRIAGE HILL SUBDIVISION	Cephas Child Road	2015	PAG2000905014R	Dry Extended Detention Basin	Y	Dry Basin, Mowed (NPDES)	60%	24.90	1	34.14	65.86	11,987	40°20'30.84"N	75° 8'17.62"W
036-01	Private	COMMERCIAL	Cross Keys Drive	unknown	N/A	Dry Detention Basin	N	Dry Basin, Partially Mowed, Partially Naturlized	10%	3.09	1	64.32	35.68	395	40°20'14.12"N	75° 7'43.39"W
036-02	Private	COMMERCIAL	Cross Keys Drive	unknown	N/A	Dry Detention Basin	N	Dry Basin, Naturalized	10%	1.89	0	64.32	35.68	0	40°20'16.19"N	75° 7'41.00"W
038-01	Township	VENTRESCA SUBDIVISION	Sawmill Road	2006	PAG0200915016	Wet Pond	Y	Wet Pond (NPDES)	60%	20.24	1	13.76	86.24	5,848	40°20'31.24"N	75° 7'42.57"W
042-01	Private	FERGUSON TRACT	Ferguson Drive	2008	PAR10D623-R	Dry Extended Detention Basin	N	Naturalized with Wet Tolerant Vegetation (NPDES)	60%	19.69	1	16.61	83.39	6,219	40°20'56.79"N	75° 7'44.24"W
043-01	Township	SUMMERHILL SUBDIVISION	Signature Lane	1998	N/A	Dry Detention Basin	N	Dry Basin, Mowed	10%	10.40	1	43.02	56.98	980	40°20'53.90"N	75° 7'29.95"W
044-01	Township	SUMMERHILL SUBDIVISION	Signature Lane	1998	N/A	Dry Detention Basin	N	Dry Basin, Mowed	10%	6.97	1	32.44	67.56	540	40°20'59.21"N	75° 7'25.76"W
045-01	Township	SUMMER MEADOW SUBDIVISION	Summer Meadow Drive	1998	N/A	Dry Detention Basin	N	Dry Basin Partially naturalized with Wet Tolerant Vegetation	10%	7.72	1	33.06	66.94	607	40°20'51.69"N	75° 7'15.41"W
047-01	Township	SUMMERHILL SUBDIVISION	Summer Hill Drive	1998	N/A	Dry Detention Basin	N	Dry Basin, Mowed	10%	13.90	1	31.71	68.29	1,062	40°21'4.12"N	75° 7'26.03"W
048-01	Township	SUMMERHILL SUBDIVISION	Summer Hill Drive	1998	N/A	DryDetention Basin	N	Naturalized with Wet Tolerant Vegetation	10%	16.06	1	40.06	59.94	1,438	40°21'3.06"N	75° 7'22.50"W
050-01	Township	SUMMERHILL SUBDIVISION	Old Oak Road	1998	N/A	Dry Detention Basin	N	Naturalized with Wet Tolerant Vegetation	10%	5.15	1	25.14	74.86	340	40°21'8.16"N	75° 7'16.98"W
052-01	Township	SUMMER MEADOW SUBDIVISION	Summer Meadow Drive	1998	N/A	Dry Detention Basin	N	Dry Basin Partially naturalized with Wet Tolerant Vegetation	10%	13.32	1	30.00	70.00	982	40°20'58.63"N	75° 7'6.77"W
055-01	Private	COUNTRY RIDGE SUBDIVISION	Burnt House Hill Road	1994	N/A	Dry Detention Basin	N	Dry Basin, Partially Mowed, Partially Naturlized, W/Conc Channels	0%	15.58	1	21.08	78.92	0	40°21'23.19"N	75° 7'25.84"W
058-01	Private	FOX HUNT SUBDIVISION	Nottingham Way	1989	N/A	Dry Detention Basin	N	Dry Basin Partially naturalized with Wet Tolerant Vegetation	10%	78.60	1	19.41	80.59	4,484	40°21'33.49"N	75° 6'53.46"W
058-02	Private	FOX HUNT SUBDIVISION	Essex Drive	1989	N/A	Dry Detention Basin	N	Dry Basin, Mowed W/Concrete Flow Channels	0%	78.60	0	19.41	80.59	0	40°21'45.61"N	75° 6'57.85"W
061-01	Private	FOX HUNT SUBDIVISION	Gloucester Drive	1989	N/A	Dry Detention Basin	N	Dry Basin, Partially Mowed, Partially Naturlized	10%	81.02	1	16.49	83.51	4,250	40°21'41.39"N	75° 6'29.05"W
062-01	Township	DURHAM RIDGE SUBDIVISION	Blue Ridge Drive	1992	N/A	Dry Detention Basin	N	Dry Basin, Mowed	10%	19.58	1	13.32	86.68	929	40°22'12.36"N	75° 6'10.62"W
063-01	Township	DURHAM RIDGE SUBDIVISION	Grandview Lane	1992	N/A	Wet Pond	Y	Wet Pond with Wet Tolerant Vegetation	10%	47.90	1	20.75	79.25	2,834	40°22'2.65"N	75° 5'57.23"W
063-02	Township	DURHAM RIDGE SUBDIVISION	Grandview Lane	1992	N/A	Dry Detention Basin	N	Naturalized with Wet Tolerant Vegetation	10%	13.34	0	20.75	79.25	0	40°22'6.42"N	75° 6'5.54"W
067-01	Private	FOX HUNT SUBDIVISION	Cheshire Road	1989	N/A	Dry Detention Basin	N	Dry Basin, Mowed W/Concrete Flow Channels	0%	26.21	1	18.21	81.79	0	40°21'36.99"N	75° 7'16.62"W
067-02	Private	COUNTRY RIDGE SUBDIVISION	Ridgetop Road	1994	N/A	Dry Detention Basin	N	Dry Basin, Mowed	10%	14.46	1	18.21	81.79	797	40°21'29.90"N	75° 7'33.56"W
068-01	Private	FOX HUNT SUBDIVISION	Nottingham Way	1989	N/A	Dry Detention Basin	N	Dry Basin, Partially Mowed, Partially Naturlized, W/Conc Channels	0%	18.12	1	7.70	92.30	0	40°21'27.16"N	75° 6'54.99"W
069-01	Private	FOX HUNT SUBDIVISION	Gloucester Drive	1989	N/A	Dry Detention Basin	N	Dry Basin, Mowed W/Concrete Flow Channels	0%	36.50	1	13.07	86.93	0	40°21'30.73"N	75° 6'34.21"W
071-01	Private	FOX HUNT SUBDIVISION	Gloucester Drive	1989	N/A	Dry Detention Basin	N	Dry Basin, Mowed	10%	12.10	1	21.62	78.38	732	40°21'36.68"N	75° 6'26.33"W
													Sediment Removal for BMP's (lbs/yr)=	54,110		
													Removed within HUC12 020401050703 (Tohickon Creek)=	5,602	10.35%	
													Removed within HUC12 020402010201 (North Branch Neshaminy Creek)=	48,508	89.65%	
	* DWF - Dry Weather Flow															
	NOTE: Basins with concrete flow channels are modeled as 0% TSS since they allow sediment to be conveyed downstream of basin.															

APPENDIX G

Pollution Reduction Plan Location Map





KEY MAP

N.T.S.

NOTES:

1. STREAM LOCATIONS AND IMPAIRMENT DESIGNATIONS ARE SHOWN BASED ON DATA PROVIDED BY PADEP AND HOSTED ON THE PASDA WEBSITE. STREAM LOCATIONS MAY NOT ACCURATELY REPRESENT PHYSICAL/FIELD CONDITIONS. THIS OFFICE HAS MODIFIED STREAM AND WATERSHED LOCATIONS TO THE MOST ACCURATE CONTOURS AVAILABLE.
2. STORM SEWERSHED AREAS ARE PARSED TO EXCLUDE AREA THAT BYPASSES PTMS4 SYSTEM.
3. AREAS PARSED DRAINING TO PENNDOT MS4 OR OTHER MUNICIPALITIES CONTAIN NO TOWNSHIP STREETS OR FACILITIES.

LEGEND:

PRP/TMDL Item Locations
Unimpaired Streams
Impaired Streams
Urbanized Area
Watersheds
NESHAMINY CREEK Watershed Designation

600 300 0 600 1,200 1,800

SCALE: 1" = 600'

NO.	DATE	REVISIONS

PRP & TMDL SEDIMENT REDUCTION PLAN LOCATIONS

PLUMSTEAD TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

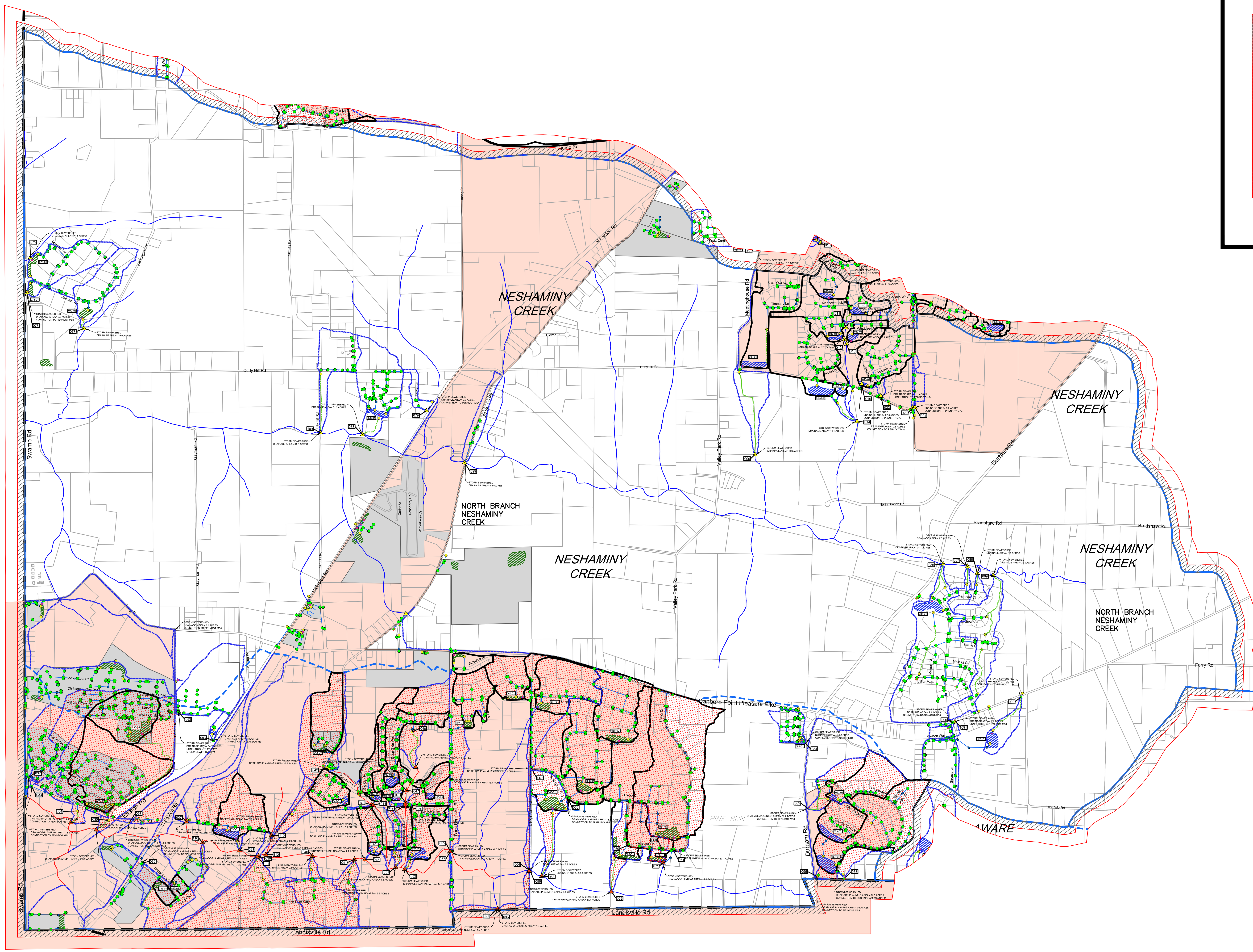
WYNN ASSOCIATES, INC.
MUNICIPAL & CIVIL ENGINEERING
211 W. Broad Street, Quakertown, PA 18951 Phone 215-536-7336 Fax 215-536-5361

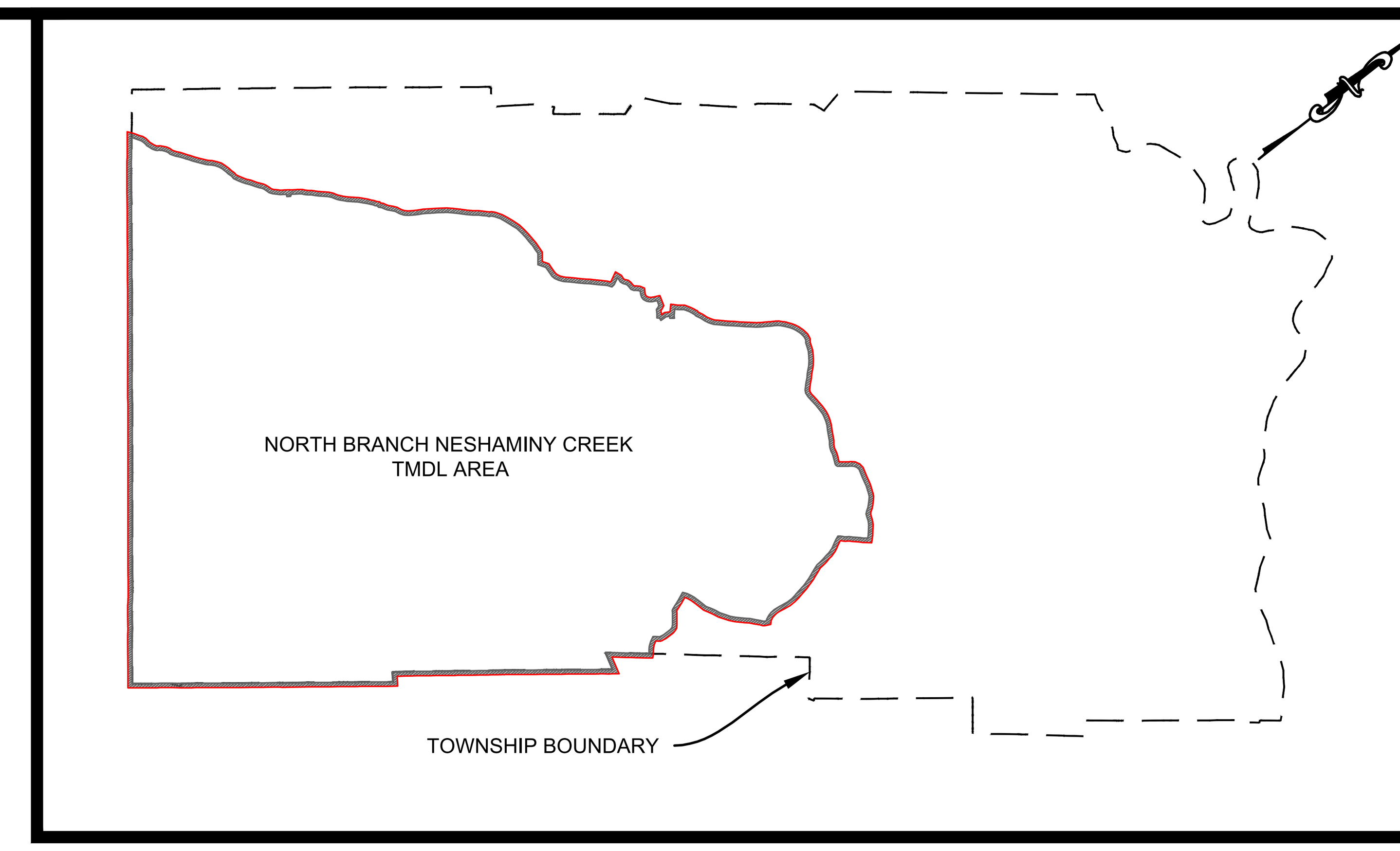
DWN BY AJP | CKD BY TAF | DATE: MAY 7, 2024 | SCALE 1"= 600' | JOB NO.: 103-081

DRAWING NO. 1 OF 1

APPENDIX H

TMDL Planning Area Map





KEY MAP
N.T.S.

NOTES:
1. STREAM LOCATIONS AND IMPAIRMENT DESIGNATIONS ARE SHOWN BASED ON DATA PROVIDED BY PADEP AND HOSTED ON THE PASDA WEBSITE. STREAM LOCATIONS MAY NOT ACCURATELY REPRESENT PHYSICAL/FIELD CONDITIONS. THIS OFFICE HAS MODIFIED STREAM AND WATERSHED LOCATIONS TO THE MOST ACCURATE CONTOURS AVAILABLE.
2. STORM SEWERSHED AREAS ARE PARSED TO EXCLUDE AREA THAT BYPASSES PTMS4 SYSTEM.
3. AREAS PARSED DRAINING TO PENNDOT MS4 OR OTHER MUNICIPALITIES CONTAIN NO TOWNSHIP STREETS OR FACILITIES.

LEGEND:

- BMP Township Maintained
- BMP Privately Maintained
- Parcels with Private Stormwater Facilities
- Urbanized Area
- Parcels
- *NESHAMINY CREEK* Watershed Designation
- PINE RUN Subwatershed Designation
- Unimpaired Streams
- Impaired Streams
- Municipal Boundary
- Watersheds
- Subwatersheds
- Swale
- Storm Sewershed
- Planning Area
- Neshaminy Creek TMDL Impairment

STORM STRUCTURES:

- Inlet
- Endwall
- Headwall
- Manhole
- Outlet Control Structure
- Outfall to Impaired Waters or Waters Within 5 Miles of Impaired Waters (PRP/TMDL MS4)
- Outfall to Unimpaired Waters (Other MS4)
- 023 Observation Point
- 12 Stormwater BMP (Typ)
- Drainage Pipes
- 001-01 Detention Basin

600 300 0 600 1,200 1,800
SCALE: 1" = 600'

NO.	DATE	REVISIONS

PLUMSTEAD TOWNSHIP TMDL PLANNING AREA MAP

C. ROBERT WYNN ASSOCIATES, INC.
MUNICIPAL & CIVIL ENGINEERING
211 W. Broad Street, Quakertown, PA 18951 Phone 215-536-7336 Fax 215-536-5361

DWN BY EFS | CKD BY CJG | DATE: MAR 1, 2019 | SCALE 1"= 600' | JOB NO.: 103-081

DRAWING NO. 1 OF 4

APPENDIX I

PADEP BMP Effectiveness Values Table

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
STORMWATER DISCHARGES FROM
SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS
BMP EFFECTIVENESS VALUES

This table of BMP effectiveness values (i.e., pollutant removal efficiencies) is intended for use by MS4s that are developing and implementing Pollutant Reduction Plans and TMDL Plans to comply with NPDES permit requirements. The values used in this table generally consider pollutant reductions from both overland flow and reduced downstream erosion, and are based primarily on average values within the Chesapeake Assessment Scenario Tool (CAST) (www.casttool.org). Design considerations, operation and maintenance, and construction sequences should be as outlined in the Pennsylvania Stormwater BMP Manual, Chesapeake Bay Program guidance, or other technical sources. The Department of Environmental Protection (DEP) will update the information contained in this table as new information becomes available. Interested parties may submit information to DEP for consideration in updating this table to DEP's MS4 resource account, RA-EPPAMS4@pa.gov. Where an MS4 proposes a BMP not identified in this document or in Chesapeake Bay Program expert panel reports, other technical resources may be consulted for BMP effectiveness values. Note – TN = Total Nitrogen and TP = Total Phosphorus.

BMP Name	BMP Effectiveness Values			BMP Description
	TN	TP	Sediment	
Wet Ponds and Wetlands	20%	45%	60%	A water impoundment structure that intercepts stormwater runoff then releases it to an open water system at a specified flow rate. These structures retain a permanent pool and usually have retention times sufficient to allow settlement of some portion of the intercepted sediments and attached nutrients/toxics. Until recently, these practices were designed specifically to meet water quantity, not water quality objectives. There is little or no vegetation living within the pooled area nor are outfalls directed through vegetated areas prior to open water release. Nitrogen reduction is minimal.
Dry Detention Basins and Hydrodynamic Structures	5%	10%	10%	Dry Detention Ponds are depressions or basins created by excavation or berm construction that temporarily store runoff and release it slowly via surface flow or groundwater infiltration following storms. Hydrodynamic Structures are devices designed to improve quality of stormwater using features such as swirl concentrators, grit chambers, oil barriers, baffles, micropools, and absorbent pads that are designed to remove sediments, nutrients, metals, organic chemicals, or oil and grease from urban runoff.
Dry Extended Detention Basins	20%	20%	60%	Dry extended detention (ED) basins are depressions created by excavation or berm construction that temporarily store runoff and release it slowly via surface flow or groundwater infiltration following storms. Dry ED basins are designed to dry out between storm events, in contrast with wet ponds, which contain standing water permanently. As such, they are similar in construction and function to dry detention basins, except that the duration of detention of stormwater is designed to be longer, theoretically improving treatment effectiveness.

BMP Name	BMP Effectiveness Values			BMP Description
	TN	**TP**	**Sediment**	
Infiltration Practices w/ Sand, Veg.	85%	85%	95%	A depression to form an infiltration basin where sediment is trapped and water infiltrates the soil. No underdrains are associated with infiltration basins and trenches, because by definition these systems provide complete infiltration. Design specifications require infiltration basins and trenches to be built in good soil, they are not constructed on poor soils, such as C and D soil types. Engineers are required to test the soil before approval to build is issued. To receive credit over the longer term, jurisdictions must conduct yearly inspections to determine if the basin or trench is still infiltrating runoff.
Filtering Practices	40%	60%	80%	Practices that capture and temporarily store runoff and pass it through a filter bed of either sand or an organic media. There are various sand filter designs, such as above ground, below ground, perimeter, etc. An organic media filter uses another medium besides sand to enhance pollutant removal for many compounds due to the increased cation exchange capacity achieved by increasing the organic matter. These systems require yearly inspection and maintenance to receive pollutant reduction credit.
Filter Strip Runoff Reduction	20%	54%	56%	Urban filter strips are stable areas with vegetated cover on flat or gently sloping land. Runoff entering the filter strip must be in the form of sheet-flow and must enter at a non-erosive rate for the site-specific soil conditions. A 0.4 design ratio of filter strip length to impervious flow length is recommended for runoff reduction urban filter strips.
Filter Strip Stormwater Treatment	0%	0%	22%	Urban filter strips are stable areas with vegetated cover on flat or gently sloping land. Runoff entering the filter strip must be in the form of sheet-flow and must enter at a non-erosive rate for the site-specific soil conditions. A 0.2 design ratio of filter strip length to impervious flow length is recommended for stormwater treatment urban filter strips.
Bioretention – Raingarden (C/D soils w/ underdrain)	25%	45%	55%	An excavated pit backfilled with engineered media, topsoil, mulch, and vegetation. These are planting areas installed in shallow basins in which the storm water runoff is temporarily ponded and then treated by filtering through the bed components, and through biological and biochemical reactions within the soil matrix and around the root zones of the plants. This BMP has an underdrain and is in C or D soil.
Bioretention / Raingarden (A/B soils w/ underdrain)	70%	75%	80%	An excavated pit backfilled with engineered media, topsoil, mulch, and vegetation. These are planting areas installed in shallow basins in which the storm water runoff is temporarily ponded and then treated by filtering through the bed components, and through biological and biochemical reactions within the soil matrix and around the root zones of the plants. This BMP has an underdrain and is in A or B soil.

BMP Name	BMP Effectiveness Values			BMP Description
	TN	**TP**	**Sediment**	
Bioretention / Raingarden (A/B soils w/o underdrain)	80%	85%	90%	An excavated pit backfilled with engineered media, topsoil, mulch, and vegetation. These are planting areas installed in shallow basins in which the storm water runoff is temporarily ponded and then treated by filtering through the bed components, and through biological and biochemical reactions within the soil matrix and around the root zones of the plants. This BMP has no underdrain and is in A or B soil.
Vegetated Open Channels (C/D Soils)	10%	10%	50%	Open channels are practices that convey stormwater runoff and provide treatment as the water is conveyed, includes bioswales. Runoff passes through either vegetation in the channel, subsoil matrix, and/or is infiltrated into the underlying soils. This BMP has no underdrain and is in C or D soil.
Vegetated Open Channels (A/B Soils)	45%	45%	70%	Open channels are practices that convey stormwater runoff and provide treatment as the water is conveyed, includes bioswales. Runoff passes through either vegetation in the channel, subsoil matrix, and/or is infiltrated into the underlying soils. This BMP has no underdrain and is in A or B soil.
Bioswale	70%	75%	80%	With a bioswale, the load is reduced because, unlike other open channel designs, there is now treatment through the soil. A bioswale is designed to function as a bioretention area.
Permeable Pavement w/o Sand or Veg. (C/D Soils w/ underdrain)	10%	20%	55%	Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has an underdrain, no sand or vegetation and is in C or D soil.
Permeable Pavement w/o Sand or Veg. (A/B Soils w/ underdrain)	45%	50%	70%	Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has an underdrain, no sand or vegetation and is in A or B soil.
Permeable Pavement w/o Sand or Veg. (A/B Soils w/o underdrain)	75%	80%	85%	Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has no underdrain, no sand or vegetation and is in A or B soil.
Permeable Pavement w/ Sand or Veg. (A/B Soils w/ underdrain)	50%	50%	70%	Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has an underdrain, has sand and/or vegetation and is in A or B soil.

BMP Name	BMP Effectiveness Values			BMP Description
	TN	TP	Sediment	
Permeable Pavement w/ Sand or Veg. (A/B Soils w/o underdrain)	80%	80%	85%	Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has no underdrain, has sand and/or vegetation and is in A or B soil.
Permeable Pavement w/ Sand or Veg. (C/D Soils w/ underdrain)	20%	20%	55%	Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has an underdrain, has sand and/or vegetation and is in C or D soil.
Stream Restoration	0.075 lbs/ft/yr	0.068 lbs/ft/yr	44.88 lbs/ft/yr	An annual mass nutrient and sediment reduction credit for qualifying stream restoration practices that prevent channel or bank erosion that otherwise would be delivered downstream from an actively enlarging or incising urban stream. Applies to 0 to 3rd order streams that are not tidally influenced. If one of the protocols is cited and pounds are reported, then the mass reduction is received for the protocol.
Forest Buffers	25%	50%	50%	An area of trees at least 35 feet wide on one side of a stream, usually accompanied by trees, shrubs and other vegetation that is adjacent to a body of water. The riparian area is managed to maintain the integrity of stream channels and shorelines, to reduce the impacts of upland sources of pollution by trapping, filtering, and converting sediments, nutrients, and other chemicals. (Note – the values represent pollutant load reductions from stormwater draining through buffers).
Tree Planting	10%	15%	20%	The BMP effectiveness values for tree planting are estimated by DEP. DEP estimates that 100 fully mature trees of mixed species (both deciduous and non-deciduous) provide pollutant load reductions for the equivalent of one acre (i.e., one mature tree = 0.01 acre). The BMP effectiveness values given are based on immature trees (seedlings or saplings); the effectiveness values are expected to increase as the trees mature. To determine the amount of pollutant load reduction that can credited for tree planting efforts: 1) multiply the number of trees planted by 0.01; 2) multiply the acreage determined in step 1 by the pollutant loading rate for the land prior to planting the trees (in lbs/acre/year); and 3) multiply the result of step 2 by the BMP effectiveness values given.
Street Sweeping	3%	3%	9%	Street sweeping must be conducted 25 times annually. Only count those streets that have been swept at least 25 times in a year. The acres associated with all streets that have been swept at least 25 times in a year would be eligible for pollutant reductions consistent with the given BMP effectiveness values.

BMP Name	BMP Effectiveness Values			BMP Description
	TN	TP	Sediment	
Storm Sewer System Solids Removal	0.0027 for sediment, 0.0111 for organic matter	0.0006 for sediment, 0.0012 for organic matter	1 – TN and TP concentrations	This BMP (also referred to as "Storm Drain Cleaning") involves the collection or capture and proper disposal of solid material within the storm system to prevent discharge to surface waters. Examples include catch basins, stormwater inlet filter bags, end of pipe or outlet solids removal systems and related practices. Credit is authorized for this BMP only when proper maintenance practices are observed (i.e., inspection and removal of solids as recommended by the system manufacturer or other available guidelines). The entity using this BMP for pollutant removal credits must demonstrate that they have developed and are implementing a standard operating procedure for tracking the material removed from the sewer system. Locating such BMPs should consider the potential for backups onto roadways or other areas that can produce safety hazards. To determine pollutant reductions for this BMP, these steps must be taken: 1) Measure the weight of solid/organic material collected (lbs). Sum the total weight of material collected for an annual period. Note – do not include refuse, debris and floatables in the determination of total mass collected. 2) Convert the annual wet weight captured into annual dry weight (lbs) by using site-specific measurements (i.e., dry a sample of the wet material to find its weight) or by using default factors of 0.7 (material that is predominantly wet sediment) or 0.2 (material that is predominantly wet organic matter, e.g., leaf litter). 3) Multiply the annual dry weight of material collected by default or site-specific pollutant concentration factors. The default concentrations are shown in the BMP Effectiveness Values columns. Alternatively, the material may be sampled (at least annually) to determine site-specific pollutant concentrations. DEP will allow up to 50% of total pollutant reduction requirements to be met through this BMP. The drainage area treated by this BMP may be no greater than 0.5 acre unless it can be demonstrated that the specific system proposed is capable of treating stormwater from larger drainage areas. For planning purposes, the sediment removal efficiency specified by the manufacturer may be assumed, but no higher than 80%.

APPENDIX J

Proof of Publication