

C. ROBERT WYNN ASSOCIATES, INC.

MUNICIPAL ENGINEERING SERVICES

211 West Broad Street • Quakertown • PA • 18951
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EMAIL TRANSMITTAL

ATTENTION: Legal Advertisements

DATE: November 12, 2019

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TIME:

FROM: C. Robert Wynn Associates

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(INCLUDING TRANSMITTAL)

EMAILED BY: Michele

MESSAGE: Please place the following Public Notice in your legal advertisements on November 14, 2019. Forward Proof of Publication and Invoice to Lorraine Leslie, Township Manager, Hilltown Township, 13 West Creamery Road, PO Box 260, Hilltown, PA 18927.

PUBLIC NOTICE

Hilltown Township MS4 Stormwater Plan

Hilltown Township is preparing an application for a Stormwater Permit to be submitted in December of 2019 to the PA Department of Environmental Protection (PADEP) per the Federal Clean Water National Pollutant Discharge Elimination System (NPDES), PA Clean Streams Law and the PADEP-issued Municipal Separate Stormwater Sewer System (MS4) Permit for municipalities in watersheds with Pollution Reduction Plan (PRP/TMDL) requirements.

Township residents will have an opportunity to review and provide written comment on the Pollution Reduction Plan (PRP/TMDL). There will be a 30-day public comment period from November 14, 2019 thru December 13, 2019 in order to allow members of the public to read and submit written comments on the draft PRP. A copy of the PRP/TMDL and MS4 Plan will be available on or before November 14, 2019 and can be reviewed at the Township Municipal Building during normal business hours or on the Township website. Written comments can be submitted to Hilltown Township, 13 West Creamery Road, PO Box 260, Hilltown, PA 18927. All comments on the plan must be received by close of business, December 13, 2019.

The draft plan will be discussed and considered for adoption at the December 16, 2019 Board of Supervisors meeting at 7:00 PM during which public comments on the PRP are invited.

Lorraine Leslie,
Township Manager

11/12/19

POLLUTION REDUCTION & TMDL PLAN

HILLTOWN TOWNSHIP

BUCKS COUNTY, PA

Prepared by:

C. ROBERT WYNN ASSOCIATES, INC.

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September 2019

Introduction

Hilltown Township located in Bucks County consists of 26.9 square miles of land area tributary to the East Branch Perkiomen Creek, West Branch Neshaminy Creek and unnamed tributaries, Tohickon Creek, and Skippack Creek. Both East Branch Perkiomen Creek and Skippack Creek have a PA Code Chapter 93 use designation of TSF (trout stocked fishery). West Branch Neshaminy Creek has a WWF (warm water fishery) designation, while Tohickon Creek has a CWF (cold water fishery) designation. 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 East Branch Perkiomen Creek and West Branch Neshaminy Creek watershed. West Branch Neshaminy Creek also has a Total Maximum Daily Load (TMDL) Waste Load Allocation (WLA). (Refer Section E) The Township owns and maintains MS4s permitted pursuant to NPDES Permit #PAI130044 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 BMPs to determine net sediment loading, and providing options for Best Management Practices (BMPs) to reduce the sediment load by 10% and meet the West Branch Neshaminy Creek TMDL WLA within five years following PADEP approval of coverage under the individual permit.

**POLLUTANT REDUCTION & TMDL PLAN
HILLTOWN TOWNSHIP**

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A. Public Participation

- A copy of the draft PRP & TMDL Plan was made available for review on _____. A copy of the public notice will be included as Appendix J.
- The public will be given 30 days to provide written comments on the contents of the PRP & TMDL Plan.
- The Township held a public meeting on _____ to review the NPDES permit renewal and PRP; and receive verbal comments on the contents of the PRP.
- The Township used the public comments to update the draft PRP/TMDL in the following ways:
- The Township adopted PRP/TMDL at a public meeting held on _____.

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 East Branch Perkiomen Creek and West 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
HILLTOWN TOWNSHIP	PAG 130040	Yes	TMDL PLAN	Neshaminy Creek TMDL	TMDL Plan-Siltation, Suspended Solids (4a)	
				West Branch Neshaminy Creek	Appendix E-Excessive Algal Growth, Nutrients, Organic Enrichment/Low D.O. (5)	Water/Flow Variability (4c)
				Neshaminy Creek	Appendix B-Pathogens (5), Appendix E-Nutrients, Organic Enrichment/Low D.O. (5)	
				Unnamed Tributaries to East Branch Perkiomen Creek	Appendix E-Siltation (5)	Water/Flow Variability (4c)
				Pleasant Spring Creek	Appendix E-Siltation (5)	Flow Alterations, Water/Flow Variability (4c)
				North Branch Neshaminy Creek		Water/Flow Variability (4c)
				Skippack Creek Watershed TMDL	TMDL Plan-Siltation (4a)	
				Reading Creek	Appendix E-Excessive Algal Growth (5)	
				Skippack Creek	Appendix E-Excessive Algal Growth, Nutrients (5)	
				Mill Creek	Appendix E-Siltation (5)	Water/Flow Variability (4c)

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 Hilltown 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 Hilltown 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 132,344 lbs./yr. (refer sediment loading spreadsheets, Appendix E). (102,005 lbs./yr. within East Branch Perkiomen Creek (EBPC) and 30,339 lbs./yr. within the West Branch Neshaminy Creek (WBNC))

PRP Parsing Procedures/Calculations for East Branch Perkiomen Creek

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 West Branch Neshaminy Creek planning area with those pollution reduction amounts used to satisfy reductions required in the East Branch Perkiomen 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.

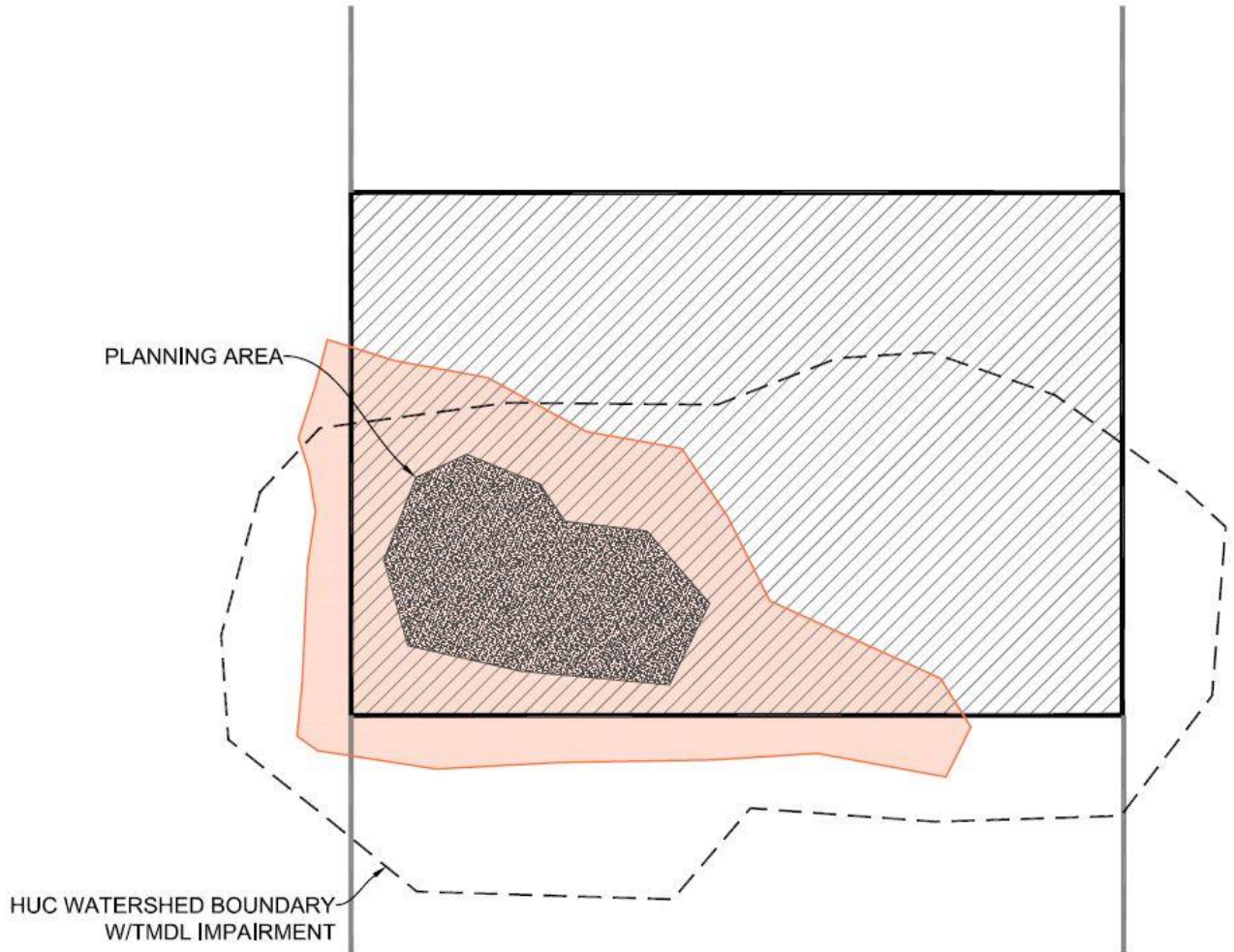
TMDL

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 Hilltown Township TMDL calculations are based on baseline loading established in the West Branch Neshaminy Creek TMDL.

E. Wasteload Allocation(s) (WLA(s)) for TMDL West Branch Neshaminy Creek.

Figure 1: Planning Area Analysis

The following figure schematically identifies the overall West Branch Neshaminy Creek- sub-basin #3 watershed, municipality boundaries, urbanized area, and planning areas which have been parsed pursuant to PADEP Attachment A of PRP/TMDL Instruction forms. Refer to [Appendix H](#) for actual Hilltown Township TMDL Planning Area Map.



LEGEND:




-  MUNICIPALITY OF INTEREST
-  ADJACENT MUNICIPALITY
-  URBANIZED AREA

Table 1: Load Allocation by Each Land Use/Source in West Branch Sub-basin #3

*The existing (baseline) loads and loading rates for West Branch Sub-basin #3 are shown consistent with the Existing Loading Table in the TMDL.

Land Use Category	Class	Area (AC)	Phosphorus				Sediment			
			Unit Area P Load (lbs/AC/yr)	Annual average load (lbs/yr)	LA (annual average) (lbs/yr)	Reduction (%)	Unit Area Sediment Load (lbs/AC/yr)	Annual average load (lbs/yr)	WLA (annual average) (lbs/yr)	Reduction (%)
Hay/Past	81	200	0.22	44	34	23	35.54	7,108	3,415	52
Cropland	82	1,089	0.76	827	528	36	648.49	706,203	339,271	52
Coniferous Forest	42	27	0	0	0	0	1.63	44	21	52
Mixed Forest	43	237	0	1	1	0	3.35	795	382	52
Deciduous Forest	41	881	0	6	6	0	4.69	4,128	1,983	52
Transitional	33	7	0.86	6	6	0	791.57	5,541	2,662	52
Low Intensity Development	21	64	0	0	0	0	20.34	1,302	625	52
High Intensity Development	22	123	0	0	0	0	18.41	221	106	52
Stream Bank				68	52	23		205,077	98,523	52
Groundwater				476	476	0				
Point Source				0	0	0				
Septic Systems				9	9	0				
Total		2,517	0.57	1,437	1,110	23	369.65	930,419	446,989	52

Table 2: Existing Loading Table Developed for Hilltown Township

*The land use distribution and existing loading rates for Hilltown 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 Hilltown Township.

Land Use Category	Class	Area (AC)	Unit Area Sediment Load (lbs/AC/yr)	LA (annual average) (lbs/yr)
Hay/Past	81	76	35.54	2,701
Cropland	82	595	648.49	385,852
Coniferous Forest	42	15	1.63	24
Mixed Forest	43	160	3.35	536
Deciduous Forest	41	577	4.69	2,706
Transitional	33	0	791.57	0
Low Intensity Development	21	64	20.34	1,302
High Intensity Development	22	37	18.41	681
Stream Bank				87,978* (refer below)
Groundwater				
Point Source				
Septic Systems				
Total		1,524		436,068

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

Stream bank load applicable to Hilltown Township	TMDL Shed (AC)	Hilltown Township (AC)	Hilltown Imp AC	Other (AC)	Other Impervious (AC)
Low Intensity Development (34% Impervious)	64	64	22	0	0
High Intensity Development (70% Impervious)	123	37	26	86	60
Transition (50% Impervious)	7	0	0	7	4
Total			48		64

Hilltown Township has 42.9% of the total impervious area (48/(48+64)). Therefore, 42.9% of streambank sediment goes to Hilltown Township.

$(0.429 * 205,077 = 87,978 \text{ lbs/yr})$

Table 3: Allowable Loading (WLA) for Hilltown Township

The following waste load allocation (WLA) table was prepared to identify load allocation for West Branch Neshaminy Creek sub-basin #3 specifically within Hilltown Township. This will be further reduced by 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	76	52	1,296	17.05
Cropland	82	595	52	185,209	311.28
Coniferous Forest	42	15	52	12	0.80
Mixed Forest	43	160	52	257	1.61
Deciduous Forest	41	577	52	1,299	2.25
Transitional	33	0	52	0	
Low Intensity Development	21	64	52	625	9.77
High Intensity Development	22	37	52	327	8.84
Stream Bank			52	42,229	
Groundwater					
Point Source					
Septic Systems					
Totals		1,524		209,313	

Table 4: Recalculated MS4 Existing Load for Hilltown Township based on Planning Area

The existing loads were calculated based on the Hilltown 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	76	35.54	2,701
Cropland	82	27	648.49	17,509
Coniferous Forest	42	6	1.63	10
Mixed Forest	43	89	3.35	298
Deciduous Forest	41	510	4.69	2,392
Transitional	33	0	791.57	0
Low Intensity Development	21	19	20.34	386
High Intensity Development	22	9	18.41	166
Stream Bank				6,828* (refer below)
Groundwater				
Point Source				
Septic Systems				
Total		736		30,290

* See Table 5 and following calculations below for streambank load allocation

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

Refer to Appendix D, Impervious Surface mapping, for amount 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 the TMDL planning area. The percentage of impervious area was utilized to allocate the portion of streambank load which is contributed to the TMDL planning area.

Planning Area #	Area (AC)	Impervious (AC)
053, 055, 057-060	318	58.5
076-078	11	2.5
093-113	143	15.2
116-135	260	41.3
137,138, 250	4	1.5
	736	119

% Impervious= 119.0(AC impervious) /736.0 (AC Planning Areas) x 100 = 16.17%.

Therefore 16.17% of Hilltown Township streambank sediment load goes to Planning Areas. (0.1617 * 42,229 = 6,828 lbs/yr)

Table 6: Recalculated MS4 WLA for Hilltown Township Based on Planning Area

Land Use Category	Class	Area (AC)	WLA (annual average) (lbs/yr)	Allowable Unit Area Sediment Load (lbs/AC/yr)	Reduction (%)
Hay/Past	81	76	1,296	17.05	52
Cropland	82	27	8,405	311.28	52
Coniferous Forest	42	6	5	0.80	52
Mixed Forest	43	89	143	1.61	52
Deciduous Forest	41	510	1,148	2.25	52
Transitional	33	0	0	0	52
Low Intensity Development	21	19	186	9.77	52
High Intensity Development	22	9	50	8.84	52
Stream Bank			6,828		52
Groundwater					
Point Source					
Septic Systems					
Total		736	18,061		

As a result of the weighted land use/imperviousness parsing approach, Hilltown Township’s planning area WLA for sediment was reduced from 30,290 lbs/yr (Table 4) to 18,061 lbs/yr (Table 6). Therefore, a reduction of sediment in the amount of 12,229 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 **132,344 lbs./yr.** (102,005 lbs./yr. within East Branch Perkiomen Creek (EBPC) Subwatershed and 30,339 lbs./yr. within the West Branch Neshaminy Creek (WBNC) Subwatershed) as calculated in Appendix E spreadsheet.

Item 1 – EBPC (Requires permission/easement on private property)

Install outlet orifice control on Basin 004-01 to increase basin TSS removal efficiency from 10% to 60% (Additional 50% TSS Removal Efficiency).

Sediment Reduction Calculation

Based on a drainage area of 12.46 AC (23.15% Impervious and 76.85% 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.

$(.2315 \times 12.46(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .7685 \times 12.46(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.50 \text{ TSS efficiency} = \mathbf{3,921 \text{ lbs./yr. removal.}}$

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

Item 2 – EBPC (Requires permission/easement on private property)

Install outlet orifice control on Basin 013-01 to increase basin TSS removal efficiency from 10% to 60% (Additional 50% TSS Removal Efficiency).

Sediment Reduction Calculation

Based on a drainage area of 19.73 AC (9.6% Impervious and 90.4% 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.

$(.096 \times 19.73(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .904 \times 19.73(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.50 \text{ TSS efficiency} = \mathbf{4,105 \text{ lbs./yr. removal}}$

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

Item 3 – EBPC (Requires permission/easement on private property)

Install outlet orifice control on Basin 014-01 to increase basin TSS removal efficiency from 10% to 60% (Additional 50% TSS Removal Efficiency).

Sediment Reduction Calculation

Based on a drainage area of 10.29 AC (18.06% Impervious and 81.94% 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.

$(.1806 \times 10.29(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .8194 \times 10.29(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.50 \text{ TSS efficiency} = \mathbf{2,826 \text{ lbs./yr. removal}}$

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

Item 4 – EBPC (Requires permission/easement on private property)

Install outlet orifice control on Basin 015-01 to increase basin TSS removal efficiency from 10% to 60% (Additional 50% TSS Removal Efficiency).

Sediment Reduction Calculation

Based on a drainage area of 8.48 AC (14.58% Impervious and 85.42% 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.

$(.1458 \times 8.48(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .8542 \times 8.48(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.50 \text{ TSS efficiency} = \mathbf{2,097 \text{ lbs./yr. removal}}$

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

Item 5 – EBPC (Requires permission/easement on private property)

Install a level spreader and vegetated filter strip for runoff reduction (22.4% TSS Removal Increase) downgradient of Basin 020-01 outlet structure. The basin has a 60% efficiency rating; therefore, the level spreader and vegetated filter strip could only improve the remaining 40% of the basin by 56%. 56% of 40% equates to a 22.4% decrease in sediment.

Sediment Reduction Calculation

Based on a drainage area of 20.75 AC (42.65% Impervious and 57.25% Pervious Urbanized Land) and a 22.4% 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.

$(.4265 \times 20.75(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .5725 \times 20.75(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.224 \text{ TSS efficiency} = \mathbf{4,273 \text{ lbs./yr. removal}}$

Estimated Construction Cost: \$36,000 to \$42,000.

Item 6 – EBPC (Requires permission/easement on private property)

Remove concrete low flow channel from Basin 023-01 and install outlet orifice control to increase basin TSS removal efficiency from 0% to 60% (Additional 60% TSS Removal Efficiency).

Sediment Reduction Calculation

Based on a drainage area of 9.92 AC (34.64% Impervious and 65.36% 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.

$(.3464 \times 9.92(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .6536 \times 9.92(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.60 \text{ TSS efficiency} = \mathbf{4,822 \text{ lbs./yr. removal}}$

Estimated Construction Cost: \$24,000 to \$30,000.

Item 7 – EBPC (Requires permission/easement on private property)

Install outlet orifice control on Basin 025-01 to increase basin TSS removal efficiency from 10% to 60% (Additional 50% TSS Removal Efficiency).

Sediment Reduction Calculation

Based on a drainage area of 11.87 AC (32.76% Impervious and 67.24% 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.

$(.3276 \times 11.87(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .6724 \times 11.87(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.60 \text{ TSS efficiency} = \mathbf{5,559 \text{ lbs./yr. removal}}$

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

Item 8 – EBPC

Install outlet orifice control on Basin 026-01 to increase basin TSS removal efficiency from 10% to 60% (Additional 50% TSS Removal Efficiency).

Sediment Reduction Calculation

Based on a drainage area of 30.67 AC (28.48% Impervious and 71.52% 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.

$(.2848 \times 30.67(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .7152 \times 30.67(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.60 \text{ TSS efficiency} = \mathbf{13,125 \text{ lbs./yr. removal}}$

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

Item 9 – EBPC

Install outlet orifice control on Basin 027-01 to increase basin TSS removal efficiency from 10% to 60% (Additional 50% TSS Removal Efficiency).

Sediment Reduction Calculation

Based on a drainage area of 41.41 AC (25.59% Impervious and 74.41% 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.

$(.2559 \times 41.41(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .7441 \times 41.41(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.50 \text{ TSS efficiency} = \mathbf{13,829 \text{ lbs./yr. removal}}$

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

Item 10 – EBPC (Requires permission/easement on private property)

Install a level spreader and vegetated filter strip for runoff reduction (from 0% to 56% TSS Removal) downgradient of Basin 031-01 outlet structure.

Sediment Reduction Calculation

Based on a drainage area of 4.69 AC (24.17% Impervious and 75.83% Pervious Urbanized Land) and a 56% 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.

$(.2417 \times 4.69(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .7583 \times 4.69(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.56 \text{ TSS efficiency} = \mathbf{1,695 \text{ lbs./yr. removal}}$

Estimated Construction Cost: \$36,000 to \$42,000.

Item 11 – EBPC (Requires permission/easement on private property)

Remove concrete low flow channel from Basin 032-01 and install outlet orifice control to increase basin TSS removal efficiency from 0% to 60% (Additional 60% TSS Removal Efficiency).

Sediment Reduction Calculation

Based on a drainage area of 15.73 AC (46.64% Impervious and 53.36% 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.

$(.4664 \times 15.73(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .5336 \times 15.73(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.60 \text{ TSS efficiency} = \mathbf{9,430 \text{ lbs./yr. removal}}$

Estimated Construction Cost: \$28,000 to \$34,000.

Item 12 – EBPC (Requires permission/easement on private property)

Install outlet orifice control on Basin 036-01 to increase basin TSS removal efficiency from 10% to 60% (Additional 50% TSS Removal Efficiency).

Sediment Reduction Calculation

Based on a drainage area of 8.62 AC (21.05% Impervious and 78.95% 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.

$(.2105 \times 8.62(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .7895 \times 8.62(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.50 \text{ TSS efficiency} = \mathbf{2,570 \text{ lbs./yr. removal}}$

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

Item 13 – EBPC (Requires permission/easement on private property)

Install outlet orifice control on Basin 038-01 to increase basin TSS removal efficiency from 10% to 60% (Additional 50% TSS Removal Efficiency).

Sediment Reduction Calculation

Based on a drainage area of 4.35 AC (25.92% Impervious and 74.08% 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.

$(.2592 \times 4.35(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .7408 \times 4.35(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.50 \text{ TSS efficiency} = \mathbf{1,464 \text{ lbs./yr. removal}}$

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

Item 14 – EBPC (Requires permission/easement on private property)

Install outlet orifice control on Basin 039-01 to increase basin TSS removal efficiency from 10% to 60% (Additional 50% TSS Removal Efficiency).

Sediment Reduction Calculation

Based on a drainage area of 1.32 AC (34.79% Impervious and 65.21% 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.

$(.3479 \times 1.32(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .6521 \times 1.32(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.50 \text{ TSS efficiency} = \mathbf{536 \text{ lbs./yr. removal}}$

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

Item 15 – EBPC (Requires permission/easement on private property)

Install outlet orifice control on Basin 040-01 to increase basin TSS removal efficiency from 10% to 60% (Additional 50% TSS Removal Efficiency).

Sediment Reduction Calculation

Based on a drainage area of 6.83 AC (20.7% Impervious and 79.3% 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.

$(.207 \times 6.83(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .793 \times 6.83(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.50 \text{ TSS efficiency} = \mathbf{2,018 \text{ lbs./yr. removal}}$

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

Item 16 – EBPC (Requires permission/easement on private property)

Install outlet orifice control on Basin 042-01 to increase basin TSS removal efficiency from 10% to 60% (Additional 50% TSS Removal Efficiency).

Sediment Reduction Calculation

Based on a drainage area of 60.68 AC (19.08% Impervious and 80.92% 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.

$(.1908 \times 60.68(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .8092 \times 60.68(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.50 \text{ TSS efficiency} = \mathbf{17,154 \text{ lbs./yr. removal}}$

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

Item 17 – EBPC

Install outlet orifice control on Basin 043-01 to increase basin TSS removal efficiency from 10% to 60% (Additional 50% TSS Removal Efficiency).

Sediment Reduction Calculation

Based on a drainage area of 39.75 AC (25.53% Impervious and 74.47% 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.

$(.2553 \times 39.75(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .7447 \times 39.75(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.50 \text{ TSS efficiency} = \mathbf{13,253 \text{ lbs./yr. removal}}$

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

Item 18 – EBPC (Requires permission/easement on private property)

Install outlet orifice control on Basin 048-01 to increase basin TSS removal efficiency from 10% to 60% (Additional 50% TSS Removal Efficiency).

Sediment Reduction Calculation

Based on a drainage area of 10.93 AC (20.94% Impervious and 79.06% 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.

$(.2094 \times 10.93(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .7906 \times 10.93(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.50 \text{ TSS efficiency} = \mathbf{3,249 \text{ lbs./yr. removal}}$

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

Item 19 – EBPC (Requires permission/easement on private property)

Install outlet orifice control on Basin 051-01 to increase basin TSS removal efficiency from 10% to 60% (Additional 50% TSS Removal Efficiency).

Sediment Reduction Calculation

Based on a drainage area of 5.25 AC (24.32% Impervious and 75.68% 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.

$(.2432 \times 5.25(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .7568 \times 5.25(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.50 \text{ TSS efficiency} = \mathbf{1,700 \text{ lbs./yr. removal}}$

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

Item 20 – WBNC

Install a Bioswale for sediment runoff reduction (80% TSS Removal) leading to Basin 058-01.

Sediment Reduction Calculation

Based on a drainage area of 53.74 AC (10.33% Impervious and 89.67% Pervious Urbanized Land) and a 80% TSS Removal Efficiency. Sediment Loading Rate is 1,839 lbs./AC/yr. for Impervious Urbanized Area and is 264.96 lbs./AC/yr. for Pervious Urbanized Area.

$(.1033 \times 53.74(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .8967 \times 53.74(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.80 \text{ TSS efficiency} = \mathbf{18,382 \text{ lbs./yr. removal}}$

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

*Estimated costs are construction only and do not include survey, engineering, plan preparation, bid specifications, permitting, inspection or legal costs.

Item 21 – WBNC

Install a riparian forest buffer (minimum 200 feet wide) for sediment runoff reduction (50% TSS Removal) along unnamed tributary to Neshaminy Creek upstream from a culvert under Township Line Road approximately 1000' southwest of Observation Point 058.

Sediment Reduction Calculation

Based on a drainage area of 27.16 AC (2.00% Impervious and 98% Pervious Urbanized Land) and a 50% TSS Removal Efficiency. Sediment Loading Rate is 1,839 lbs./AC/yr. for Impervious Urbanized Area and is 264.96 lbs./AC/yr. for Pervious Urbanized Area.

$(.02 \times 27.16(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .98 \times 27.16(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.50 \text{ TSS efficiency} = \mathbf{4,026 \text{ lbs./yr. removal}}$

This item was planned in the previously submitted PRP/TMDL plan which was adopted by the Township. However, the PRP/TMDL Plan required revisions pursuant to PADEP. Due to Growing Greener Grant Deadline (PADEP Grant #4100070418), this project was completed in Spring 2019.

Item 22 – WBNC

Install a level spreader and vegetated filter strip for runoff reduction (22.4% TSS Removal Increase) downgradient of Basin 055-02 outlet structure. The basin has a 60% efficiency rating; therefore, the level spreader and vegetated filter strip could only improve the remaining 40% of the basin by 56%. 56% of 40% equates to a 22.4% decrease in sediment.

Sediment Reduction Calculation

Based on a drainage area of 25.73 AC (26.15% Impervious and 73.85% Pervious Urbanized Land) and a 22.4% 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.

$(.2615 \times 25.73(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .7385 \times 25.73(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.224 \text{ TSS efficiency} =$
3,899 lbs./yr. removal

Estimated Construction Cost: \$36,000 to \$42,000.

Item 23 – WBNC

Install a level spreader and vegetated filter strip for runoff reduction (22.4% TSS Removal Increase) downgradient of Basin 058-01 outlet structure. The basin has a 60% efficiency rating; therefore, the level spreader and vegetated filter strip could only improve the remaining 40% of the basin by 56%. 56% of 40% equates to a 22.4% decrease in sediment.

Sediment Reduction Calculation

Based on a drainage area of 65.14 AC (8.93% Impervious and 91.07% Pervious Urbanized Land) and a 22.4% 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.

$(.0893 \times 65.14(\text{AC}) \times 1,839 \text{ lbs./AC/yr.} + .9107 \times 65.14(\text{AC}) \times 264.96 \text{ lbs./AC/yr.}) \times 0.224 \text{ TSS efficiency} =$
5,917 lbs./yr. removal

Estimated Construction Cost: \$36,000 to \$42,000.

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 may choose to complete items 1 thru 9, 11, 12, & 15-18 (e.g. 102,231 lb./yr. reduction) or alternately choose to complete items 1-4, 5-11, 13, & 16-19 (e.g. 102,502 lb./yr. reduction) or alternately choose to complete items 1-2, 5-13, & 15-19 (e.g. 102,167 lb./yr. reduction) to satisfy the sediment loading reduction requirement (e.g. 102,005 lb./yr.) within the East Branch Perkiomen Creek Watershed (HUC 12 020402030807). Other combinations of items is possible/acceptable; provided that the total sediment loading reduction is equal to or greater than 102,005 lb./yr. within the East Branch Perkiomen Creek Watershed.

The municipality shall complete items 20, 21, 22, 23 (e.g. 32,224 lb./yr. reduction) to satisfy the PRP sediment load reduction requirement (e.g. 30,339 lb./yr.) within the West Branch Neshaminy Creek Watershed (HUC 12 020402010202).

Hilltown Township will comply with the total PRP reduction requirement upon satisfying the PRP sediment load reduction requirement in each HUC12 subwatershed.

TMDL Sediment Reduction Options and TMDL Compliance Summary

Objective: Reduce Sediment Load by 12,229 lb./yr. within the West Branch Neshaminy Creek (WBNC) 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 20 thru 23 (e.g. 32,224 lb./yr. reduction) to satisfy the PRP sediment loading reduction requirement (e.g. 30,339 lb./yr.) within the West Branch Neshaminy Creek Watershed (HUC 12 020402010202). In completing these items, the municipality will additionally satisfy the Long Term TMDL Objective, since the proposed sediment reduction (32,224 lbs./yr.) exceeds the TMDL required sediment reduction (12,229 lb./yr.).

H. Identify Funding Mechanism(s).

Funding

Proposed projects will be paid for by Hilltown Township. It is anticipated that the municipality will use general funds which is funded by the taxpayers thru property tax and earned income tax.

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. There will not be a separate stormwater tax.

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.

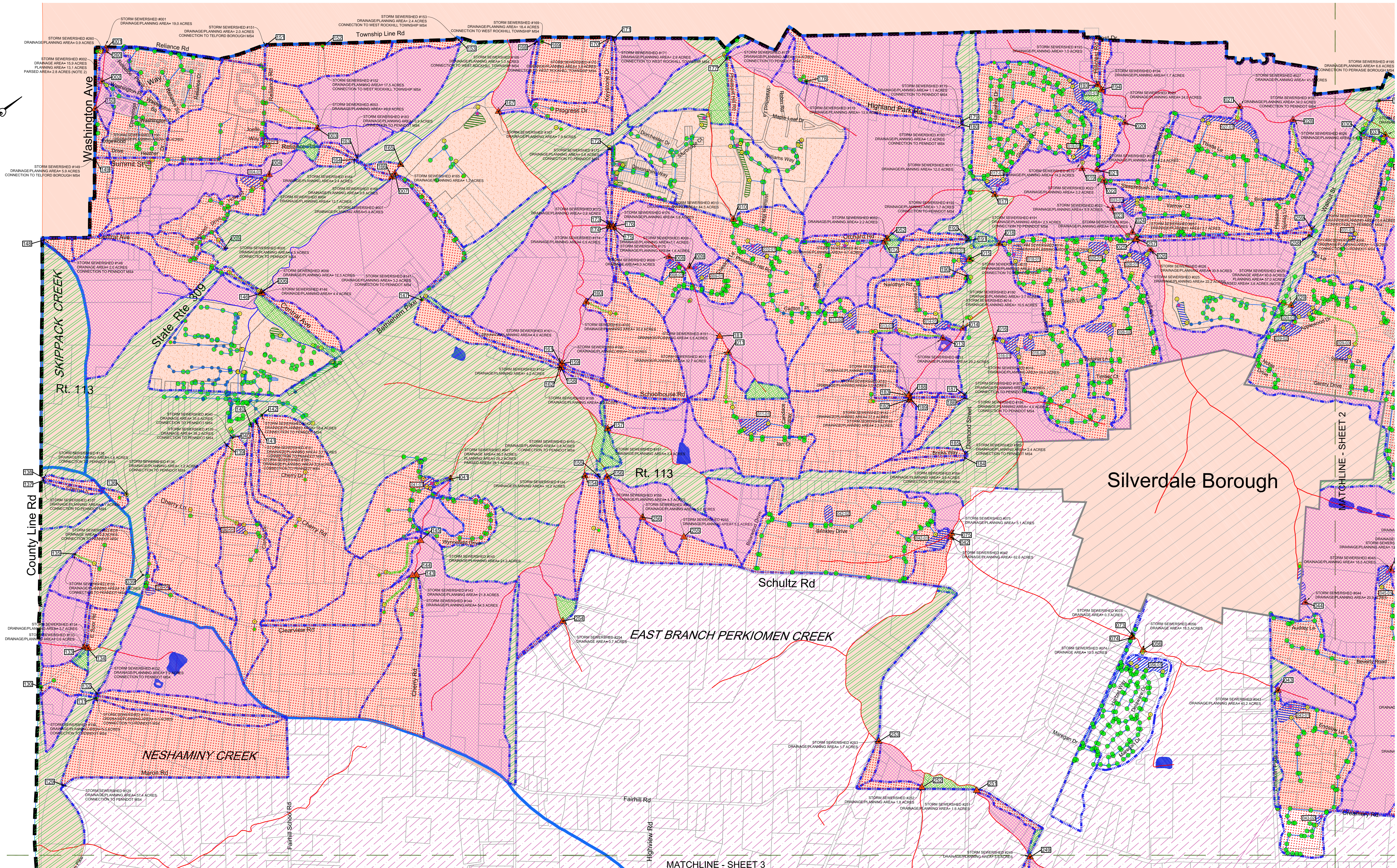
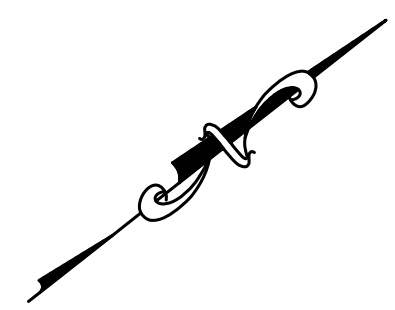
The Township Stormwater Basin Database identifies 66 facilities: 18 are owned and maintained by the Township, 48 are owned and maintained privately (either by Homeowners Association or individual lot owner). Thirty-two (32) of the basins were constructed after 2003 and pursuant to an NPDES Permit.

Homeowner Association and individual owned and maintained basins are inspected annually by the Township and any required maintenance is communicated to the responsible party. Maintenance items typically 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 the Individual Permit. Hilltown Township will own and maintain all selected BMP options located on Township property.

APPENDIX A

Storm Sewer Map



LEGEND:

- BMPs
- Parcels with Private Stormwater Facilities
- Urbanized Area
- Water Bodies
- Parcels
- Matchline
- Watershed Designation
- Unimpaired Streams
- Impaired Streams
- HT Boundary
- SILVERDALE Boundary
- Storm Sewershed Swale
- Watersheds
- Planning Area

PARSING LEGEND:

- Non-Urbanized Drainage Area
- Parsed Area - 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
- Outfall to Impaired Waters or Waters Within 5 Miles of Impaired Waters (PRP MS4)
- Outfall to Unimpaired Waters (Other MS4)
- Observation Point
- Stormwater BMP/Basin (Typ)
- Drainage Pipes

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 SEWERED AREAS ARE PARSED TO EXCLUDE AREA THAT BYPASSES HTMS4 SYSTEM.
3. AREAS PARSED DRAINING TO PENNDOT MS4 OR OTHER MUNICIPALITIES CONTAIN NO TOWNSHIP STREETS OR FACILITIES.

**HILLTOWN TOWNSHIP
STORM SEWER MAP**

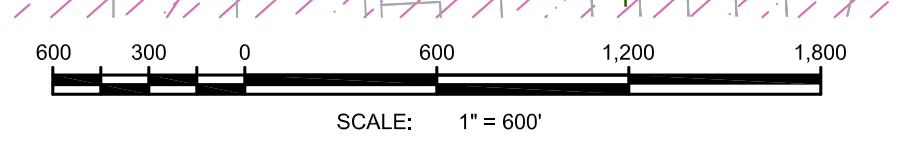
C. ROBERT WYNN ASSOCIATES, INC.
MUNICIPAL & CIVIL ENGINEERING
211 W. Broad Street, Quakertown, PA 18951 Phone 215-536-7336 Fax 215-536-5361

NO.	DATE	REVISIONS	REVISED PER DEP COMMENTS
2	2-13-19		REVISE PER DEP COMMENTS
1	7-6-18		REVISE PER DEP COMMENTS

DWN BY: KAD CKD BY: CUG DATE: JUN 29, 2017 SCALE: 1" = 600' JOB NO: 03-099

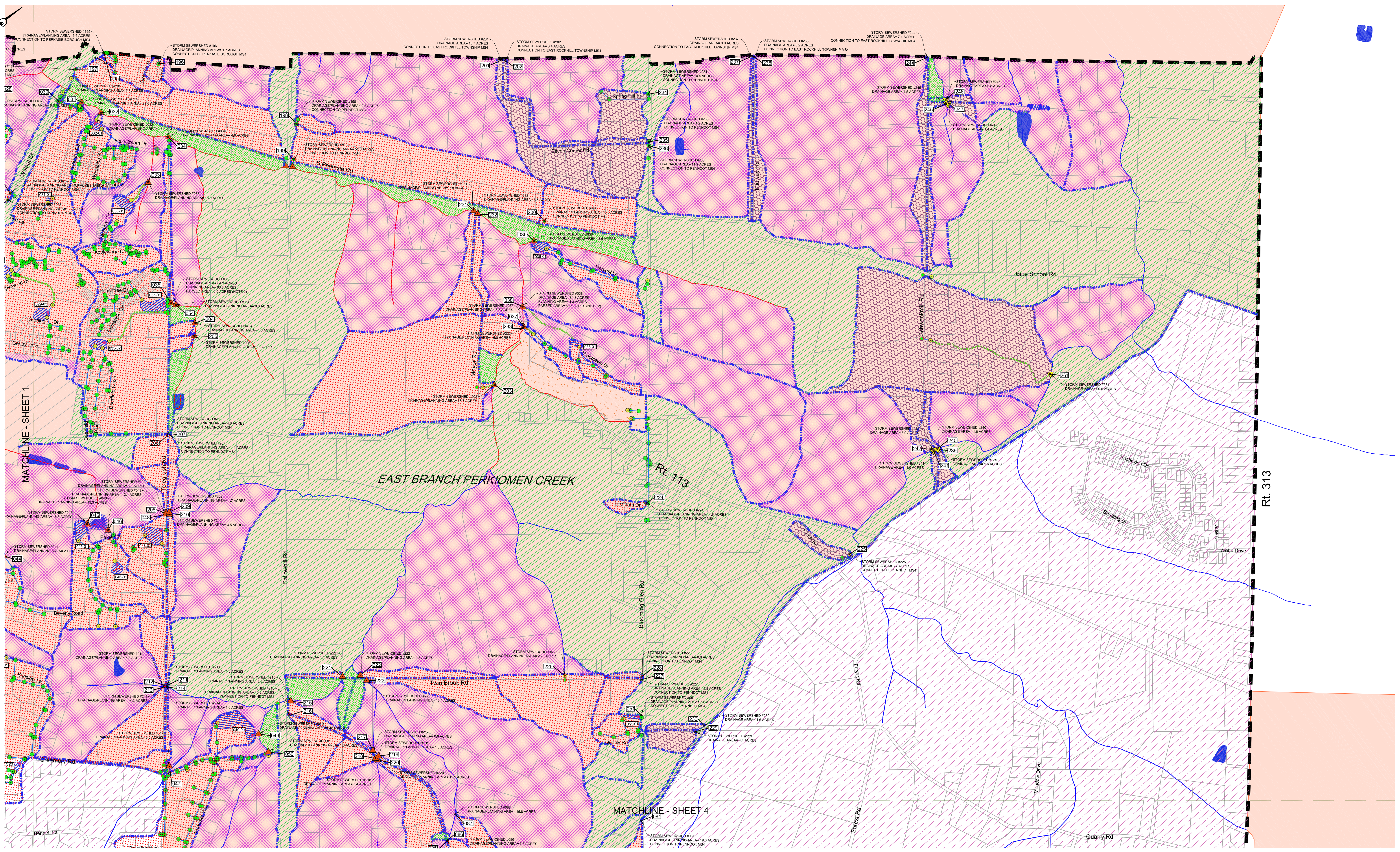
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OF 4



MATCHLINE - SHEET 3

MATCHLINE - SHEET 2



LEGEND:

- BMPs
- Parcels with Private Stormwater Facilities
- Urbanized Area
- Water Bodies
- Parcels
- Matchline
- Watershed Designation
- Unimpaired Streams
- Impaired Streams
- HT Boundary
- SILVERDALE Boundary
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- Watersheds
- Planning Area

PARSING LEGEND:

- Non-Urbanized Drainage Area
- Parsed Area (See Note #2)
- Parsed Area/PennDot MS4 (Note #3)
- Parsed Area - Private Areas not containing Township MS4 Facilities
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- Parsed Area - Urbanized Area Flowing to Unimpaired Stream and Not Within 5 Miles of Impaired Stream

STORM STRUCTURES:

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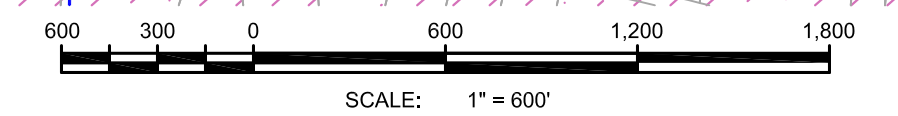
NO.	DATE	REVISIONS
2	2-13-19	REVISE PER DEP COMMENTS
1	7-6-18	REVISE PER DEP COMMENTS

**HILLTOWN TOWNSHIP
STORM SEWER MAP**

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

DATE: JUN 29, 2017 SCALE: 1" = 600' JOB NO: 03-099

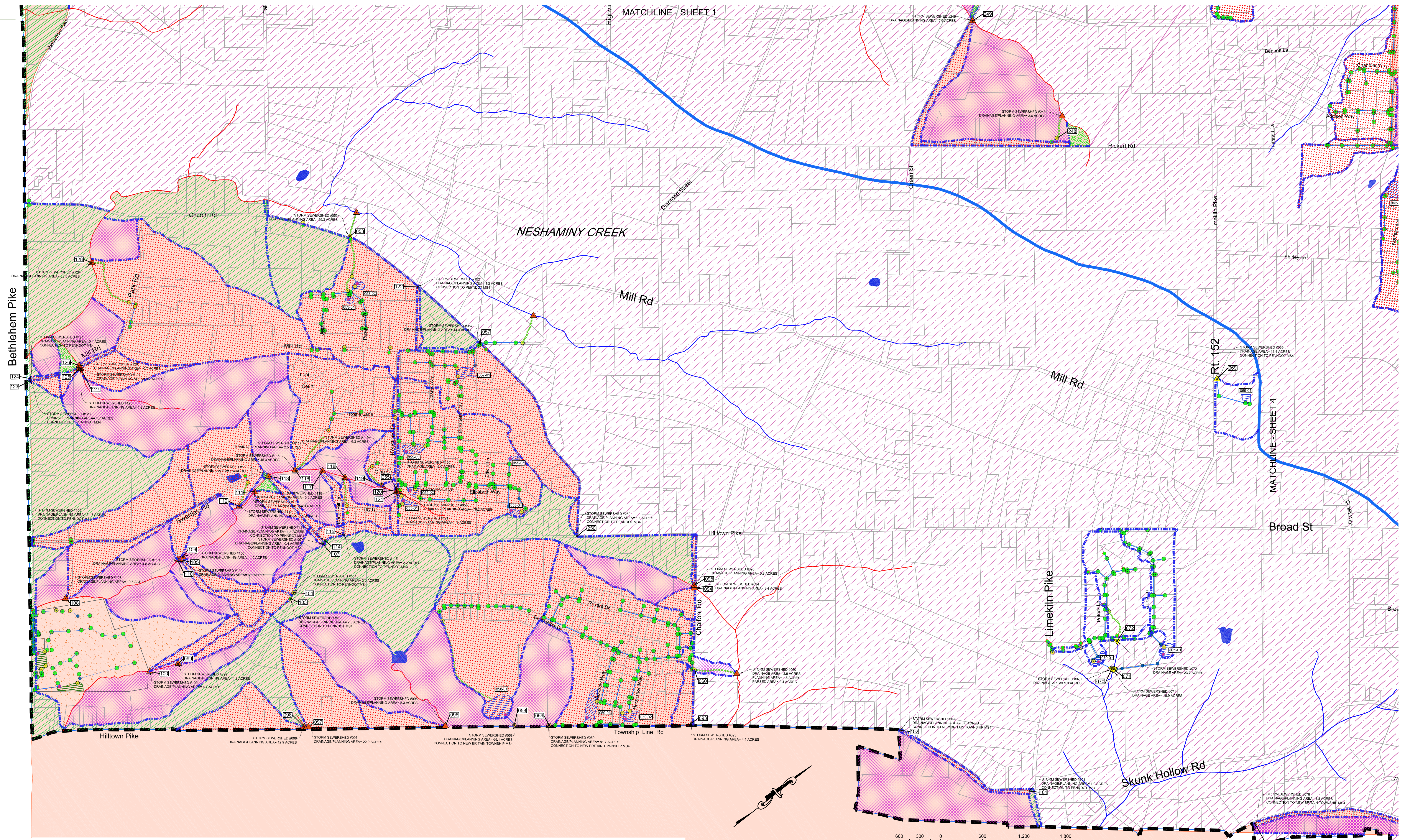
DRAWING NO. **2** OF 4



MATCHLINE - SHEET 1

MATCHLINE - SHEET 4

NESHAMINY CREEK



LEGEND:

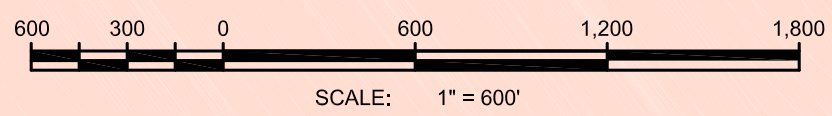
- BMPs
- Parcels with Private Stormwater Facilities
- Urbanized Area
- Water Bodies
- Parcels
- Matchline
- SKIPPACK CREEK Watershed Designation
- Unimpaired Streams
- Impaired Streams
- HT Boundary
- SILVERDALE Boundary
- Storm Sewer Swale
- Watersheds
- Planning Area

PARSING LEGEND:

- Non-Urbanized Drainage Area
- Parsed Area (See Note #2)
- Parsed Area/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
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- Manhole
- Outlet Control Structure
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- Stormwater BMP/Basin (Typ)
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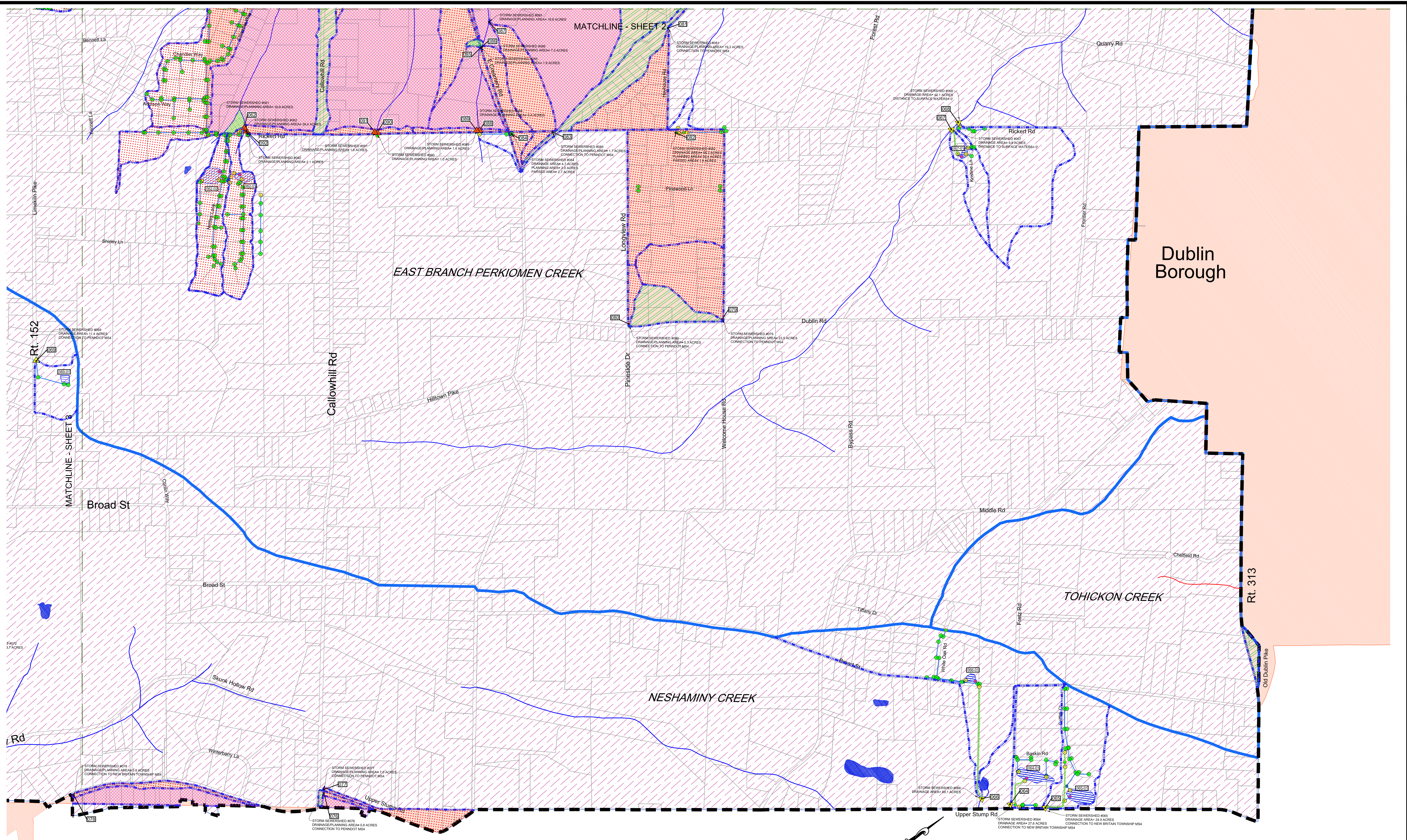
NO.	DATE	REVISIONS
2	2-13-19	REVISE PER DEP COMMENTS
1	7-6-18	REVISE PER DEP COMMENTS
1		

**HILLTOWN TOWNSHIP
STORM SEWER MAP**

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

DATE: JUN 29, 2017 SCALE: 1" = 600' JOB NO.: 03-099

DRAWING NO. **3** OF 4



LEGEND:

- BMPs
- Parcels with Private Stormwater Facilities
- Urbanized Area
- Water Bodies
- Parcels
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- Unimpaired Streams
- Impaired Streams
- HT Boundary
- Boundary
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- Watersheds
- Planning Area

PARSING LEGEND:

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- Parsed Area/PennDot MS4 (Note #3)
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- Areas not containing Township MS4 Facilities
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- STORM SEWERSHED AREAS ARE PARSED TO EXCLUDE AREA THAT BYPASSES HTMS4 SYSTEM.
- AREAS PARSED DRAINING TO PENNDOT MS4 OR OTHER MUNICIPALITIES CONTAIN NO TOWNSHIP STREETS OR FACILITIES.

NO.	DATE	REVISIONS
2	2-13-19	REVISE PER DEP COMMENTS
1	7-6-18	REVISE PER DEP COMMENTS
NO.	DATE	REVISIONS

**HILLTOWN TOWNSHIP
STORM SEWER MAP**

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

DATE: JUN 29, 2017 SCALE: 1" = 600' JOB NO.: 03-099 OF 4

DWN BY: DAD CKD BY: CUG

DRAWING NO. **4**

APPENDIX B

HUC 12 Stream Classification Spreadsheet

MUNICIPALITY	WATERSHED	HUC12 #	PLANNING AREA ID
Hilltown Township	East Branch Perkiomen Creek	020402030807	001
Hilltown Township	East Branch Perkiomen Creek	020402030807	002
Hilltown Township	East Branch Perkiomen Creek	020402030807	003
Hilltown Township	East Branch Perkiomen Creek	020402030807	004
Hilltown Township	East Branch Perkiomen Creek	020402030807	005
Hilltown Township	East Branch Perkiomen Creek	020402030807	006
Hilltown Township	East Branch Perkiomen Creek	020402030807	007
Hilltown Township	East Branch Perkiomen Creek	020402030807	008
Hilltown Township	East Branch Perkiomen Creek	020402030807	009
Hilltown Township	East Branch Perkiomen Creek	020402030807	010
Hilltown Township	East Branch Perkiomen Creek	020402030807	011
Hilltown Township	East Branch Perkiomen Creek	020402030807	012
Hilltown Township	East Branch Perkiomen Creek	020402030807	013
Hilltown Township	East Branch Perkiomen Creek	020402030807	014
Hilltown Township	East Branch Perkiomen Creek	020402030807	015
Hilltown Township	East Branch Perkiomen Creek	020402030807	016
Hilltown Township	East Branch Perkiomen Creek	020402030807	017
Hilltown Township	East Branch Perkiomen Creek	020402030807	018
Hilltown Township	East Branch Perkiomen Creek	020402030807	019
Hilltown Township	East Branch Perkiomen Creek	020402030807	020
Hilltown Township	East Branch Perkiomen Creek	020402030807	021
Hilltown Township	East Branch Perkiomen Creek	020402030807	022
Hilltown Township	East Branch Perkiomen Creek	020402030807	023
Hilltown Township	East Branch Perkiomen Creek	020402030807	024
Hilltown Township	East Branch Perkiomen Creek	020402030807	025
Hilltown Township	East Branch Perkiomen Creek	020402030807	026
Hilltown Township	East Branch Perkiomen Creek	020402030807	027
Hilltown Township	East Branch Perkiomen Creek	020402030807	028
Hilltown Township	East Branch Perkiomen Creek	020402030807	029
Hilltown Township	East Branch Perkiomen Creek	020402030807	030
Hilltown Township	East Branch Perkiomen Creek	020402030807	031
Hilltown Township	East Branch Perkiomen Creek	020402030807	032
Hilltown Township	East Branch Perkiomen Creek	020402030807	033
Hilltown Township	East Branch Perkiomen Creek	020402030807	034
Hilltown Township	East Branch Perkiomen Creek	020402030807	035
Hilltown Township	East Branch Perkiomen Creek	020402030807	036
Hilltown Township	East Branch Perkiomen Creek	020402030807	037
Hilltown Township	East Branch Perkiomen Creek	020402030807	038
Hilltown Township	East Branch Perkiomen Creek	020402030807	039
Hilltown Township	East Branch Perkiomen Creek	020402030807	040
Hilltown Township	East Branch Perkiomen Creek	020402030807	041
Hilltown Township	East Branch Perkiomen Creek	020402030807	042
Hilltown Township	East Branch Perkiomen Creek	020402030807	043
Hilltown Township	East Branch Perkiomen Creek	020402030807	044
Hilltown Township	East Branch Perkiomen Creek	020402030807	045
Hilltown Township	East Branch Perkiomen Creek	020402030807	046

MUNICIPALITY	WATERSHED	HUC12 #	PLANNING AREA ID
Hilltown Township	East Branch Perkiomen Creek	020402030807	047
Hilltown Township	East Branch Perkiomen Creek	020402030807	048
Hilltown Township	East Branch Perkiomen Creek	020402030807	049
Hilltown Township	East Branch Perkiomen Creek	020402030807	050
Hilltown Township	East Branch Perkiomen Creek	020402030807	051
Hilltown Township	East Branch Perkiomen Creek	020402030807	052
Hilltown Township	West Branch Neshaminy Creek	020402010202	053
Hilltown Township	East Branch Perkiomen Creek	020402030807	054
Hilltown Township	West Branch Neshaminy Creek	020402010202	055
Hilltown Township	West Branch Neshaminy Creek	020402010202	057
Hilltown Township	West Branch Neshaminy Creek	020402010202	058
Hilltown Township	West Branch Neshaminy Creek	020402010202	059
Hilltown Township	West Branch Neshaminy Creek	020402010202	060
Hilltown Township	East Branch Perkiomen Creek	020402030807	061
Hilltown Township	East Branch Perkiomen Creek	020402030807	062
Hilltown Township	East Branch Perkiomen Creek	020402030807	075
Hilltown Township	West Branch Neshaminy Creek	020402010202	076
Hilltown Township	West Branch Neshaminy Creek	020402010202	077
Hilltown Township	West Branch Neshaminy Creek	020402010202	078
Hilltown Township	East Branch Perkiomen Creek	020402030807	079
Hilltown Township	East Branch Perkiomen Creek	020402030807	080
Hilltown Township	East Branch Perkiomen Creek	020402030807	081
Hilltown Township	East Branch Perkiomen Creek	020402030807	082
Hilltown Township	East Branch Perkiomen Creek	020402030807	083
Hilltown Township	East Branch Perkiomen Creek	020402030807	084
Hilltown Township	East Branch Perkiomen Creek	020402030807	085
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Hilltown Township	East Branch Perkiomen Creek	020402030807	087
Hilltown Township	East Branch Perkiomen Creek	020402030807	088
Hilltown Township	East Branch Perkiomen Creek	020402030807	089
Hilltown Township	East Branch Perkiomen Creek	020402030807	090
Hilltown Township	East Branch Perkiomen Creek	020402030807	091
Hilltown Township	East Branch Perkiomen Creek	020402030807	092
Hilltown Township	West Branch Neshaminy Creek	020402010202	093
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Hilltown Township	West Branch Neshaminy Creek	020402010202	095
Hilltown Township	West Branch Neshaminy Creek	020402010202	096
Hilltown Township	West Branch Neshaminy Creek	020402010202	097
Hilltown Township	West Branch Neshaminy Creek	020402010202	098
Hilltown Township	West Branch Neshaminy Creek	020402010202	099
Hilltown Township	West Branch Neshaminy Creek	020402010202	100
Hilltown Township	West Branch Neshaminy Creek	020402010202	101
Hilltown Township	West Branch Neshaminy Creek	020402010202	102
Hilltown Township	West Branch Neshaminy Creek	020402010202	103
Hilltown Township	West Branch Neshaminy Creek	020402010202	104
Hilltown Township	West Branch Neshaminy Creek	020402010202	105

MUNICIPALITY	WATERSHED	HUC12 #	PLANNING AREA ID
Hilltown Township	West Branch Neshaminy Creek	020402010202	106
Hilltown Township	West Branch Neshaminy Creek	020402010202	107
Hilltown Township	West Branch Neshaminy Creek	020402010202	108
Hilltown Township	West Branch Neshaminy Creek	020402010202	109
Hilltown Township	West Branch Neshaminy Creek	020402010202	110
Hilltown Township	West Branch Neshaminy Creek	020402010202	111
Hilltown Township	West Branch Neshaminy Creek	020402010202	112
Hilltown Township	West Branch Neshaminy Creek	020402010202	113
Hilltown Township	East Branch Perkiomen Creek	020402030807	114
Hilltown Township	East Branch Perkiomen Creek	020402030807	115
Hilltown Township	West Branch Neshaminy Creek	020402010202	116
Hilltown Township	West Branch Neshaminy Creek	020402010202	117
Hilltown Township	West Branch Neshaminy Creek	020402010202	118
Hilltown Township	West Branch Neshaminy Creek	020402010202	119
Hilltown Township	West Branch Neshaminy Creek	020402010202	120
Hilltown Township	West Branch Neshaminy Creek	020402010202	121
Hilltown Township	West Branch Neshaminy Creek	020402010202	122
Hilltown Township	West Branch Neshaminy Creek	020402010202	123
Hilltown Township	West Branch Neshaminy Creek	020402010202	124
Hilltown Township	West Branch Neshaminy Creek	020402010202	125
Hilltown Township	West Branch Neshaminy Creek	020402010202	126
Hilltown Township	West Branch Neshaminy Creek	020402010202	127
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Hilltown Township	West Branch Neshaminy Creek	020402010202	129
Hilltown Township	West Branch Neshaminy Creek	020402010202	130
Hilltown Township	West Branch Neshaminy Creek	020402010202	131
Hilltown Township	West Branch Neshaminy Creek	020402010202	132
Hilltown Township	West Branch Neshaminy Creek	020402010202	133
Hilltown Township	West Branch Neshaminy Creek	020402010202	134
Hilltown Township	West Branch Neshaminy Creek	020402010202	135
Hilltown Township	East Branch Perkiomen Creek	020402030807	136
Hilltown Township	West Branch Neshaminy Creek	020402010202	137
Hilltown Township	West Branch Neshaminy Creek	020402010202	138
Hilltown Township	East Branch Perkiomen Creek	020402030807	139
Hilltown Township	East Branch Perkiomen Creek	020402030807	140
Hilltown Township	East Branch Perkiomen Creek	020402030807	141
Hilltown Township	East Branch Perkiomen Creek	020402030807	142
Hilltown Township	East Branch Perkiomen Creek	020402030807	143
Hilltown Township	East Branch Perkiomen Creek	020402030807	144
Hilltown Township	East Branch Perkiomen Creek	020402030807	145
Hilltown Township	East Branch Perkiomen Creek	020402030807	146
Hilltown Township	East Branch Perkiomen Creek	020402030807	147
Hilltown Township	East Branch Perkiomen Creek	020402030807	148
Hilltown Township	East Branch Perkiomen Creek	020402030807	149
Hilltown Township	East Branch Perkiomen Creek	020402030807	150
Hilltown Township	East Branch Perkiomen Creek	020402030807	151

MUNICIPALITY	WATERSHED	HUC12 #	PLANNING AREA ID
Hilltown Township	East Branch Perkiomen Creek	020402030807	152
Hilltown Township	East Branch Perkiomen Creek	020402030807	153
Hilltown Township	East Branch Perkiomen Creek	020402030807	154
Hilltown Township	East Branch Perkiomen Creek	020402030807	155
Hilltown Township	East Branch Perkiomen Creek	020402030807	156
Hilltown Township	East Branch Perkiomen Creek	020402030807	157
Hilltown Township	East Branch Perkiomen Creek	020402030807	158
Hilltown Township	East Branch Perkiomen Creek	020402030807	159
Hilltown Township	East Branch Perkiomen Creek	020402030807	160
Hilltown Township	East Branch Perkiomen Creek	020402030807	161
Hilltown Township	East Branch Perkiomen Creek	020402030807	162
Hilltown Township	East Branch Perkiomen Creek	020402030807	163
Hilltown Township	East Branch Perkiomen Creek	020402030807	164
Hilltown Township	East Branch Perkiomen Creek	020402030807	165
Hilltown Township	East Branch Perkiomen Creek	020402030807	166
Hilltown Township	East Branch Perkiomen Creek	020402030807	167
Hilltown Township	East Branch Perkiomen Creek	020402030807	168
Hilltown Township	East Branch Perkiomen Creek	020402030807	169
Hilltown Township	East Branch Perkiomen Creek	020402030807	170
Hilltown Township	East Branch Perkiomen Creek	020402030807	171
Hilltown Township	East Branch Perkiomen Creek	020402030807	172
Hilltown Township	East Branch Perkiomen Creek	020402030807	173
Hilltown Township	East Branch Perkiomen Creek	020402030807	174
Hilltown Township	East Branch Perkiomen Creek	020402030807	175
Hilltown Township	East Branch Perkiomen Creek	020402030807	176
Hilltown Township	East Branch Perkiomen Creek	020402030807	177
Hilltown Township	East Branch Perkiomen Creek	020402030807	178
Hilltown Township	East Branch Perkiomen Creek	020402030807	179
Hilltown Township	East Branch Perkiomen Creek	020402030807	180
Hilltown Township	East Branch Perkiomen Creek	020402030807	181
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Hilltown Township	East Branch Perkiomen Creek	020402030807	183
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Hilltown Township	East Branch Perkiomen Creek	020402030807	188
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Hilltown Township	East Branch Perkiomen Creek	020402030807	190
Hilltown Township	East Branch Perkiomen Creek	020402030807	191
Hilltown Township	East Branch Perkiomen Creek	020402030807	192
Hilltown Township	East Branch Perkiomen Creek	020402030807	193
Hilltown Township	East Branch Perkiomen Creek	020402030807	194
Hilltown Township	East Branch Perkiomen Creek	020402030807	195
Hilltown Township	East Branch Perkiomen Creek	020402030807	196
Hilltown Township	East Branch Perkiomen Creek	020402030807	197

MUNICIPALITY	WATERSHED	HUC12 #	PLANNING AREA ID
Hilltown Township	East Branch Perkiomen Creek	020402030807	198
Hilltown Township	East Branch Perkiomen Creek	020402030807	199
Hilltown Township	East Branch Perkiomen Creek	020402030807	200
Hilltown Township	East Branch Perkiomen Creek	020402030807	203
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Hilltown Township	East Branch Perkiomen Creek	020402030807	207
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Hilltown Township	East Branch Perkiomen Creek	020402030807	217
Hilltown Township	East Branch Perkiomen Creek	020402030807	218
Hilltown Township	East Branch Perkiomen Creek	020402030807	219
Hilltown Township	East Branch Perkiomen Creek	020402030807	220
Hilltown Township	East Branch Perkiomen Creek	020402030807	221
Hilltown Township	East Branch Perkiomen Creek	020402030807	222
Hilltown Township	East Branch Perkiomen Creek	020402030807	223
Hilltown Township	East Branch Perkiomen Creek	020402030807	224
Hilltown Township	East Branch Perkiomen Creek	020402030807	226
Hilltown Township	East Branch Perkiomen Creek	020402030807	227
Hilltown Township	East Branch Perkiomen Creek	020402030807	228
Hilltown Township	East Branch Perkiomen Creek	020402030807	231
Hilltown Township	East Branch Perkiomen Creek	020402030807	232
Hilltown Township	East Branch Perkiomen Creek	020402030807	233
Hilltown Township	East Branch Perkiomen Creek	020402030807	248
Hilltown Township	East Branch Perkiomen Creek	020402030807	249
Hilltown Township	West Branch Neshaminy Creek	020402010202	250
Hilltown Township	East Branch Perkiomen Creek	020402030807	251
Hilltown Township	East Branch Perkiomen Creek	020402030807	252
Hilltown Township	East Branch Perkiomen Creek	020402030807	253
Hilltown Township	East Branch Perkiomen Creek	020402030807	254
Hilltown Township	East Branch Perkiomen Creek	020402030807	255
Hilltown Township	East Branch Perkiomen Creek	020402030807	256
Hilltown Township	East Branch Perkiomen Creek	020402030807	257
Hilltown Township	East Branch Perkiomen Creek	020402030807	258
Hilltown Township	East Branch Perkiomen Creek	020402030807	259
Hilltown Township	East Branch Perkiomen Creek	020402030807	260

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

- $$\text{Load} = \frac{\text{Land Use/ Cover Based Loading Rate}}{\text{Rate}} \times \text{Land Area}$$
- 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

$$3,233 \text{ acres} * .21 = 679 \text{ acres}$$

impervious developed

$$3,233 \text{ acres} - 679 \text{ acres} = 2,554 \text{ acres}$$

pervious developed

Option 1: DEP Simplified Method

Impervious developed

$$679 \text{ acres} \times 1,398.77 \text{ lbs sediment/ac/yr} = 949,242 \text{ lbs sediment/yr}$$

Pervious developed

$$2,554 \text{ acres} \times 207.67 \text{ lbs sediment/ac/yr} = 530,389 \text{ lbs sediment/yr}$$

$$\text{Total Developed Load} = 1,479,631 \text{ lbs sediment/yr}$$

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:
 $4.284 \text{ ac} \times 1,614.15 \text{ lb/ac/yr} = 6,914.929 \text{ lb/yr}$
- Pervious sediment load:
 $10.781 \text{ ac} \times 220.4 \text{ lb/ac/yr} = 2,376.112 \text{ lb/yr}$
- Total sediment load:
 $6,914.929 \text{ lb/yr} + 2,376.112 = \mathbf{9,291 \text{ lb/yr}}$

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

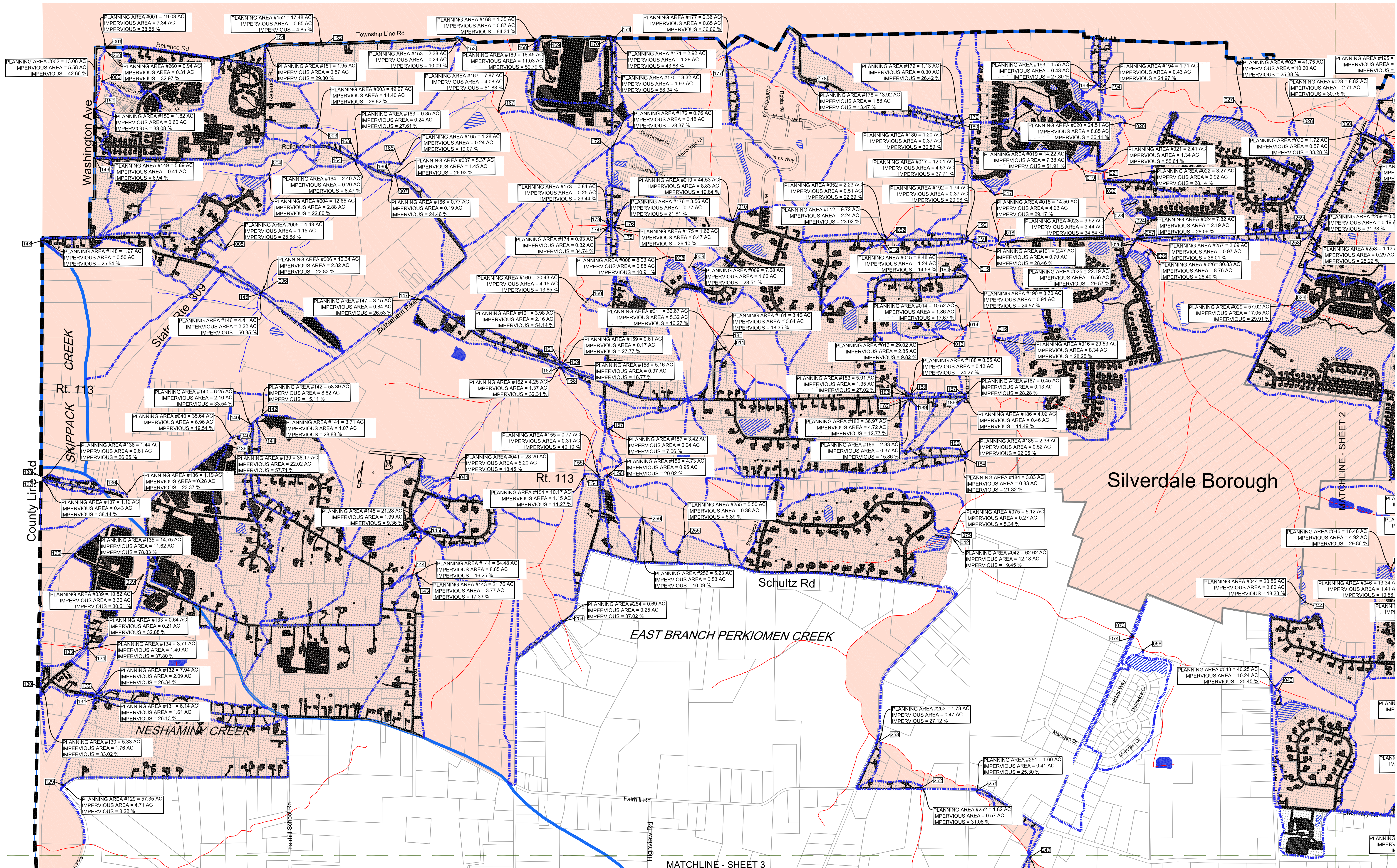
- Overall existing load for “Model Municipality”
 $362,118 \text{ lb/yr} - 115,419 = \mathbf{246,699 \text{ lb/yr}}$

Required Reductions

1. Existing load to locally impaired sewershed areas is 126,698 lb/yr
 - Required reduction from locally impaired waters
 $126,698 \text{ lb/yr} * .10 = \mathbf{12,670 \text{ lb/yr}}$
2. Existing load to Bay sewershed areas is 120,001 lb/yr
 - Required reduction from Bay sewersheds are
 $120,001 \text{ lb/yr} * .10 = \mathbf{12,000 \text{ lb/yr}}$

APPENDIX D

Impervious Surface Map



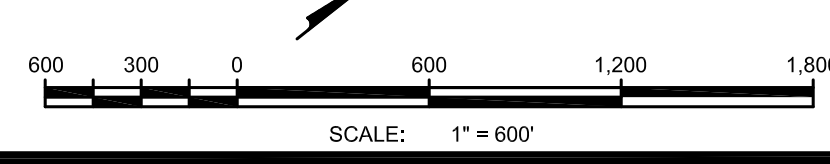
LEGEND:

- BMPs
- Water Bodies
- Impervious Area
- Parcels
- Planning Area
- Unimpaired Streams
- Impaired Streams
- HT Boundary
- Storm Sewershed
- Watersheds
- Watershed Designation
- SILVERDALE Boundary
- Matchline
- Parsed Area (See Note #2)

IMPERVIOUS AREA FROM 2015 DVRPC LAND USE DATA.

STORM STRUCTURES:

- Observation Point for Impaired Streams Within Planning Area



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 HTMS4 SYSTEM.

NO.	DATE	REVISIONS
2	9-12-19	REVISE TO ADD IMPERVIOUS AREAS
1	7-6-18	REVISE PER DEP COMMENTS

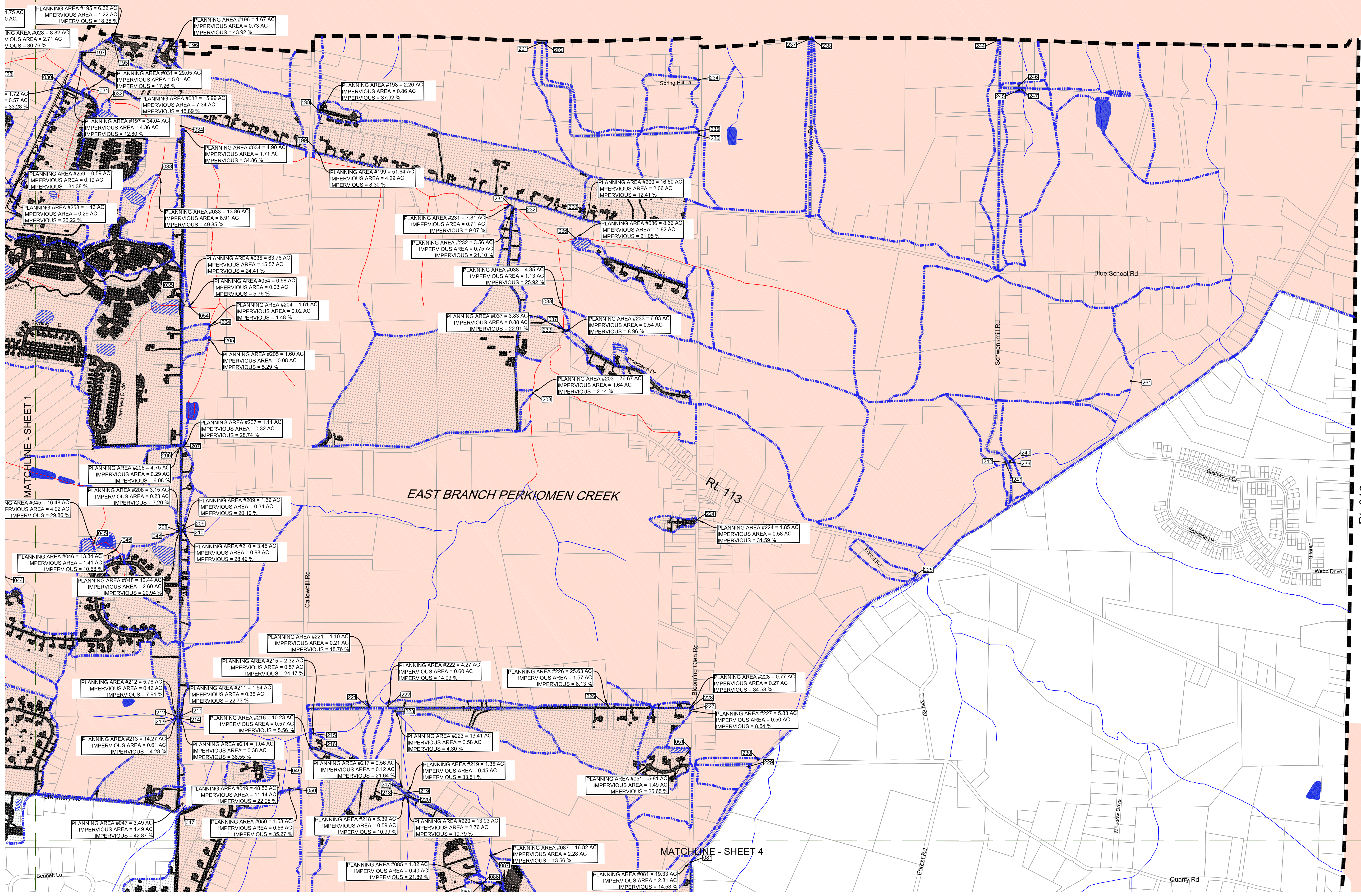
Silverdale Borough

**HILLTOWN TOWNSHIP
IMPERVIOUS SURFACES MODELED
WITHIN PLANNING AREAS**

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 DAD CKD BY CUG DATE: JUNE 29, 2018 SCALE: 1" = 600' JOB NO: 03-099

DRAWING NO. **1**
OF 4



LEGEND:

	BMPs		Parcels		HT Boundary		SILVERDALE Boundary
	Water Bodies		Planning Area		Storm Sewershed		Matchline
	Impervious Area		Unimpaired Streams		Watersheds		Parse Area (See Note #2)
	IMPERVIOUS AREA FROM 2015 DVRPC LAND USE DATA.		Impaired Streams		SKIPPACK CREEK Watershed Designation		

STORM STRUCTURES:

	Observation Point for Impaired Streams Within Planning Area
--	---

Scale: 1" = 600'

NOTES:

- 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.
- STORM SEWERSHED AREAS ARE PARSED TO EXCLUDE AREA THAT BYPASSES HTMS4 SYSTEM.

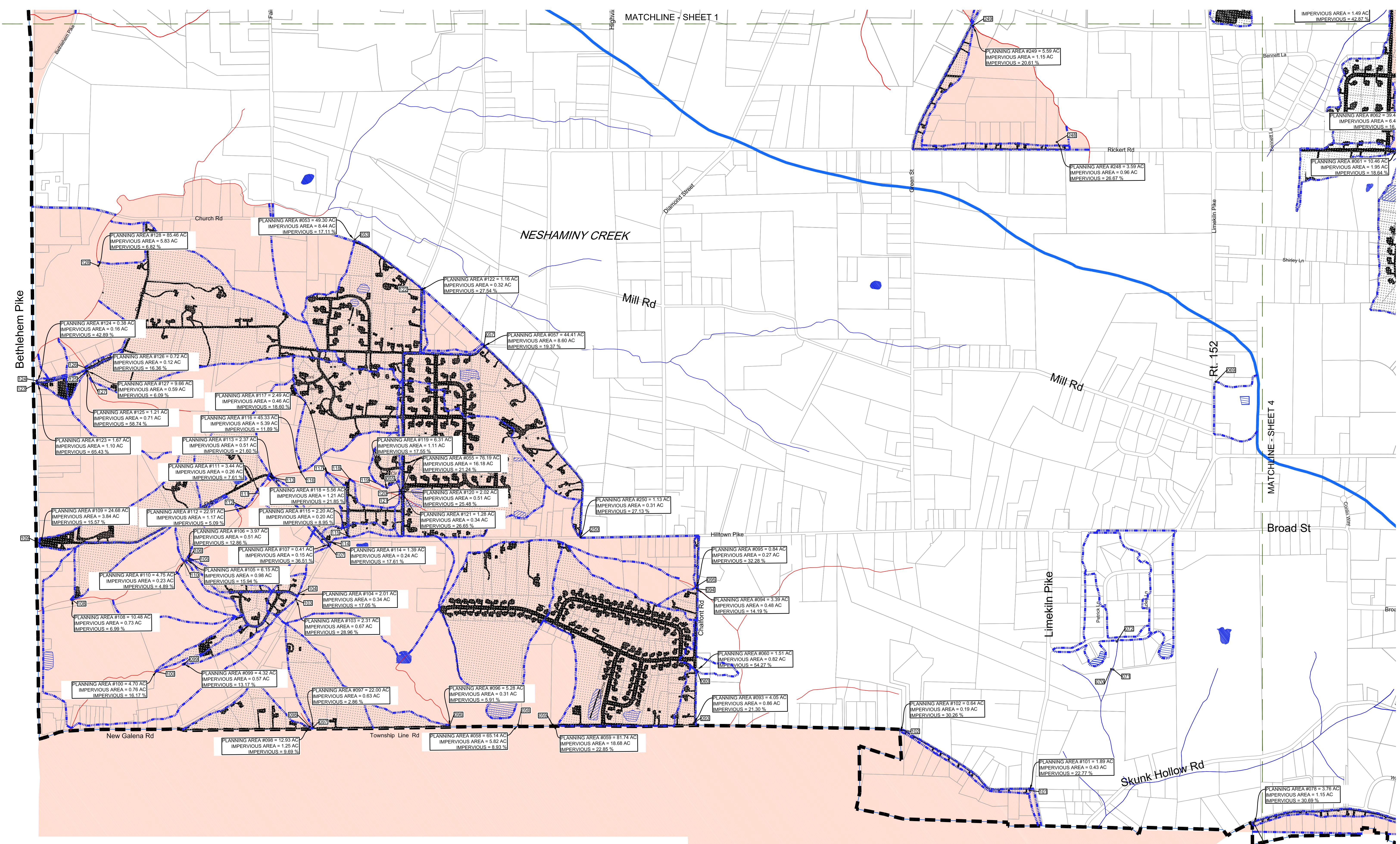
NO.	DATE	REVISIONS
2	9-12-19	REVISE TO ADD IMPERVIOUS AREAS
1	7-6-18	REVISE PER DEP COMMENTS

HILLTOWN TOWNSHIP
IMPERVIOUS SURFACES MODELED
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DWN BY DAD CKD BY CUG DATE: JUNE 29, 2018 SCALE: 1" = 600' JOB NO: 03-099 OF 4

DRAWING NO. **2**



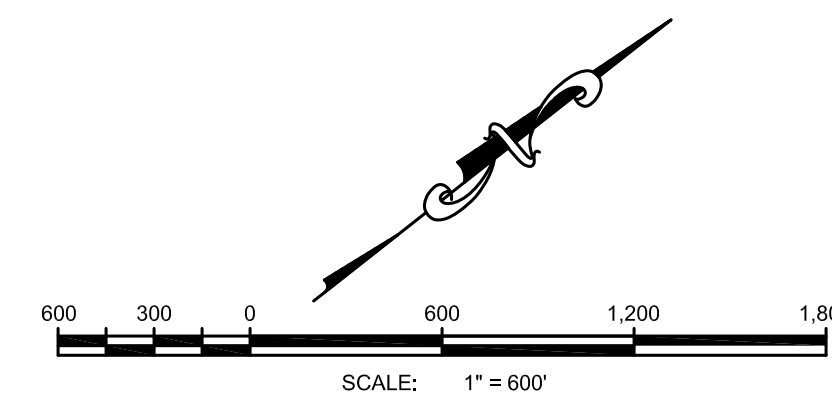
LEGEND:

- BMPs
- Water Bodies
- Impervious Area
- Parcels
- Planning Area
- Unimpaired Streams
- Impaired Streams
- HT Boundary
- Storm Sewershed
- Watersheds
- Watershed Designation
- SILVERDALE Boundary
- Matchline
- Parsed Area (See Note #2)
- Observation Point for Impaired Streams Within Planning Area

STORM STRUCTURES:

- Observation Point for Impaired Streams Within Planning Area

IMPERVIOUS AREA FROM 2015 DVRPC LAND USE DATA.



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 HTMS4 SYSTEM.

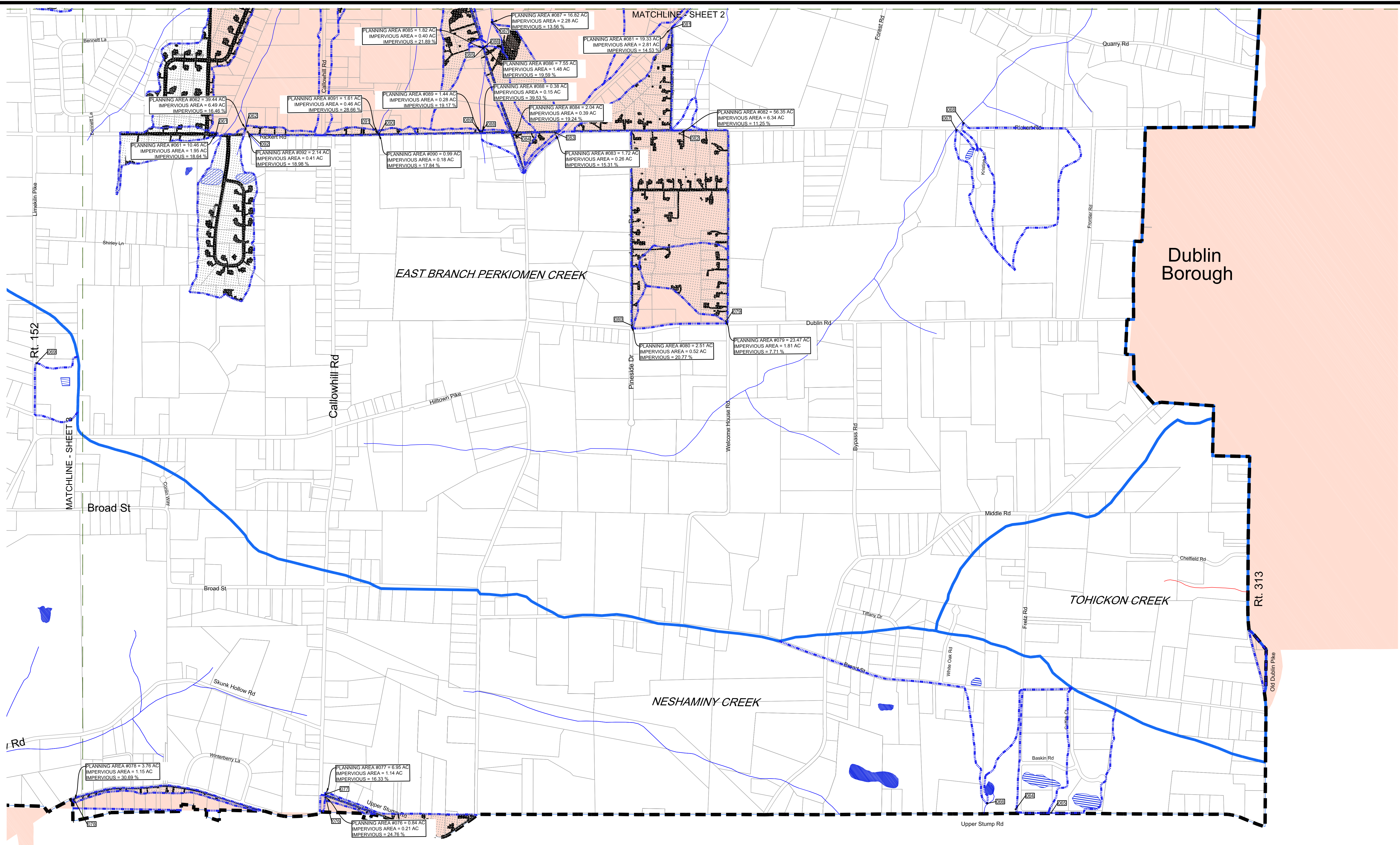
NO.	DATE	REVISIONS
2	9-12-19	REVISE TO ADD IMPERVIOUS AREAS
1	7-6-18	REVISE PER DEP COMMENTS

**HILLTOWN TOWNSHIP
IMPERVIOUS SURFACES MODELED
WITHIN PLANNING AREAS**

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 DAD CKD BY CUG DATE: JUNE 29, 2018 SCALE: 1" = 600' JOB NO.: 03-099 OF 4

DRAWING NO. **3**



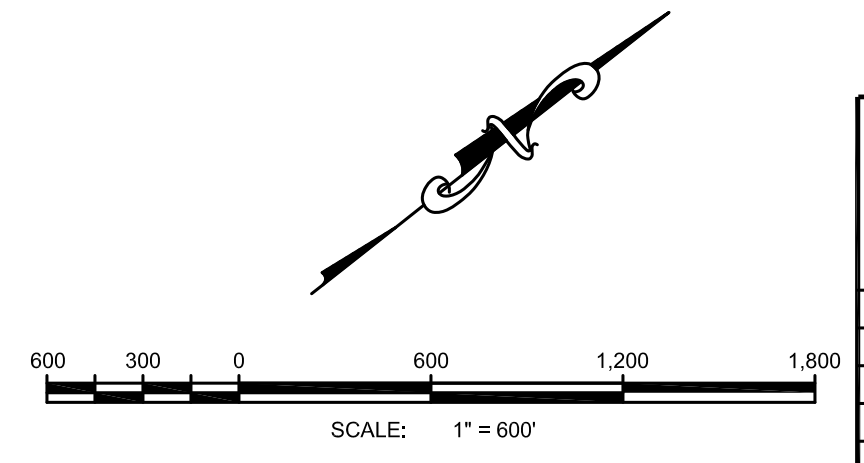
LEGEND:

- BMPs
- Water Bodies
- Impervious Area
- HT Boundary
- Storm Sewershed
- Watersheds
- Watershed Designation
- SKIPPACK CREEK
- SILVERDALE Boundary
- Matchline
- Parsed Area (See Note #2)
- Parcels
- Planning Area
- Unimpaired Streams
- Impaired Streams

IMPERVIOUS AREA FROM 2015 DVRPC LAND USE DATA.

STORM STRUCTURES:

- Observation Point for Impaired Streams Within Planning Area



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 HTMS4 SYSTEM.

NO.	DATE	REVISIONS
2	9-12-19	REVISE TO ADD IMPERVIOUS AREAS
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HILLTOWN TOWNSHIP
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DWN BY DAD	CKD BY C/JG	DATE: JUNE 29, 2018	SCALE: 1" = 600'	JOB NO.: 03-099	OF 4
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DRAWING NO.
4

APPENDIX E

Sediment Loading Spreadsheet within Planning Areas

MUNICIPALITY	ACRES	PLShpArea (SF)	ImpShpArea(SF)	%Impervious	%Pervious	Sediment Loading (lbs/yr)*	Obs#
Hilltown	17,310.63	828,892	319,530	38.55	61.45	16,588	HT-001
Hilltown	17,310.63	569,819	243,064	42.66	57.34	12,250	HT-002
Hilltown	17,310.63	2,176,636	627,313	28.82	71.18	35,907	HT-003
Hilltown	17,310.63	551,179	125,650	22.80	77.20	7,894	HT-004
Hilltown	17,310.63	195,778	50,274	25.68	74.32	3,008	HT-005
Hilltown	17,310.63	537,674	122,748	22.83	77.17	7,706	HT-006
Hilltown	17,310.63	234,069	63,044	26.93	73.07	3,702	HT-007
Hilltown	17,310.63	349,969	38,181	10.91	89.09	3,508	HT-008
Hilltown	17,310.63	308,219	72,458	23.51	76.49	4,493	HT-009
Hilltown	17,310.63	1,939,702	384,758	19.84	80.16	25,705	HT-010
Hilltown	17,310.63	1,423,117	231,541	16.27	83.73	17,023	HT-011
Hilltown	17,310.63	423,486	97,491	23.02	76.98	6,099	HT-012
Hilltown	17,310.63	1,264,009	124,108	9.82	90.18	12,174	HT-013
Hilltown	17,310.63	458,270	80,969	17.67	82.33	5,714	HT-014
Hilltown	17,310.63	369,236	53,824	14.58	85.42	4,191	HT-015
Hilltown	17,310.63	1,286,459	363,397	28.25	71.75	20,957	HT-016
Hilltown	17,310.63	523,104	197,255	37.71	62.29	10,310	HT-017
Hilltown	17,310.63	631,406	184,159	29.17	70.83	10,496	HT-018
Hilltown	17,310.63	619,256	321,434	51.91	48.09	15,383	HT-019
Hilltown	17,310.63	1,067,555	385,499	36.11	63.89	20,423	HT-020
Hilltown	17,310.63	105,161	58,506	55.64	44.36	2,754	HT-021
Hilltown	17,310.63	142,520	40,108	28.14	71.86	2,316	HT-022
Hilltown	17,310.63	432,187	149,700	34.64	65.36	8,039	HT-023
Hilltown	17,310.63	340,642	95,589	28.06	71.94	5,526	HT-024
Hilltown	17,310.63	966,517	285,814	29.57	70.43	16,206	HT-025
Hilltown	17,310.63	1,343,055	381,394	28.40	71.60	21,952	HT-026
Hilltown	17,310.63	1,818,634	461,627	25.38	74.62	27,741	HT-027
Hilltown	17,310.63	384,343	118,207	30.76	69.24	6,610	HT-028
Hilltown	17,310.63	2,483,861	742,848	29.91	70.09	41,954	HT-029
Hilltown	17,310.63	74,987	24,956	33.28	66.72	1,358	HT-030
Hilltown	17,310.63	1,265,234	218,327	17.26	82.74	15,587	HT-031
Hilltown	17,310.63	696,310	319,560	45.89	54.11	15,782	HT-032
Hilltown	17,310.63	603,801	300,991	49.85	50.15	14,549	HT-033
Hilltown	17,310.63	213,471	74,414	34.86	65.14	3,987	HT-034
Hilltown	17,310.63	2,777,603	678,030	24.41	75.59	41,395	HT-035
Hilltown	17,310.63	375,651	79,066	21.05	78.95	5,142	HT-036
Hilltown	17,310.63	166,776	38,202	22.91	77.09	2,395	HT-037
Hilltown	17,310.63	189,319	49,078	25.92	74.08	2,925	HT-038
Hilltown	17,310.63	471,199	143,776	30.51	69.49	8,061	HT-039
Hilltown	17,310.63	1,552,694	303,346	19.54	80.46	20,408	HT-040
Hilltown	17,310.63	1,228,357	226,652	18.45	81.55	15,661	HT-041
Hilltown	17,310.63	2,727,520	530,481	19.45	80.55	35,760	HT-042
Hilltown	17,310.63	1,753,261	446,202	25.45	74.55	26,788	HT-043
Hilltown	17,310.63	908,784	165,648	18.23	81.77	11,514	HT-044
Hilltown	17,310.63	151,890	65,114	42.87	57.13	3,277	HT-047
Hilltown	17,310.63	541,764	113,467	20.94	79.06	7,395	HT-048
Hilltown	17,310.63	2,115,164	485,457	22.95	77.05	30,407	HT-049
Hilltown	17,310.63	68,697	24,232	35.27	64.73	1,293	HT-050
Hilltown	17,310.63	252,913	64,870	25.65	74.35	3,883	HT-051
Hilltown	17,310.63	96,999	22,010	22.69	77.31	1,385	HT-052
Hilltown	17,310.63	2,147,558	367,537	17.11	82.89	26,341	HT-053
Hilltown	17,310.63	25,161	1,450	5.76	94.24	205	HT-054
Hilltown	17,310.63	3,318,997	704,887	21.24	78.76	45,662	HT-055
Hilltown	17,310.63	1,934,652	374,769	19.37	80.63	25,309	HT-057
Hilltown	17,310.63	2,837,292	253,445	8.93	91.07	26,414	HT-058
Hilltown	17,310.63	3,560,515	813,679	22.85	77.15	51,056	HT-059
Hilltown	17,310.63	65,682	35,642	54.26	45.74	1,687	HT-060
Hilltown	17,310.63	455,804	84,951	18.64	81.36	5,843	HT-061
Hilltown	17,310.63	1,718,068	282,774	16.46	83.54	20,669	HT-062
Hilltown	17,310.63	223,061	11,921	5.34	94.66	1,787	HT-075
Hilltown	17,310.63	36,422	9,019	24.76	75.24	547	HT-076
Hilltown	17,310.63	302,952	49,483	16.33	83.67	3,630	HT-077
Hilltown	17,310.63	163,917	50,299	30.69	69.31	2,815	HT-078
Hilltown	17,310.63	1,022,536	78,885	7.71	92.29	9,069	HT-079
Hilltown	17,310.63	109,208	22,687	20.77	79.23	1,484	HT-080
Hilltown	17,310.63	842,230	122,406	14.53	85.47	9,545	HT-081
Hilltown	17,310.63	2,454,743	276,168	11.25	88.75	24,910	HT-082
Hilltown	17,310.63	74,947	11,473	15.31	84.69	871	HT-083
Hilltown	17,310.63	88,729	17,073	19.24	80.76	1,157	HT-084
Hilltown	17,310.63	79,070	17,308	21.89	78.11	1,106	HT-085
Hilltown	17,310.63	328,763	64,414	19.59	80.41	4,327	HT-086

MUNICIPALITY	ACRES	PLShpArea (SF)	ImpShpArea(SF)	%Impervious	%Pervious	Sediment Loading (lbs/yr)*	Obs#
Hilltown	17,310.63	732,621	99,379	13.56	86.44	8,046	HT-087
Hilltown	17,310.63	16,706	6,604	39.53	60.47	340	HT-088
Hilltown	17,310.63	62,935	12,066	19.17	80.83	819	HT-089
Hilltown	17,310.63	43,240	7,716	17.84	82.16	542	HT-090
Hilltown	17,310.63	70,266	20,137	28.66	71.34	1,155	HT-091
Hilltown	17,310.63	93,394	17,727	18.98	81.02	1,209	HT-092
Hilltown	17,310.63	176,546	37,597	21.30	78.70	2,433	HT-093
Hilltown	17,310.63	147,715	20,963	14.19	85.81	1,656	HT-094
Hilltown	17,310.63	36,391	11,746	32.28	67.72	646	HT-095
Hilltown	17,310.63	229,996	13,583	5.91	94.09	1,890	HT-096
Hilltown	17,310.63	958,175	27,363	2.86	97.14	6,818	HT-097
Hilltown	17,310.63	563,115	54,583	9.69	90.31	5,397	HT-098
Hilltown	17,310.63	187,966	24,755	13.17	86.83	2,038	HT-099
Hilltown	17,310.63	204,567	33,070	16.17	83.83	2,440	HT-100
Hilltown	17,310.63	82,192	18,719	22.77	77.23	1,176	HT-101
Hilltown	17,310.63	27,774	8,404	30.26	69.74	473	HT-102
Hilltown	17,310.63	100,725	29,175	28.96	71.04	1,667	HT-103
Hilltown	17,310.63	87,729	14,955	17.05	82.95	1,074	HT-104
Hilltown	17,310.63	267,841	42,704	15.94	84.06	3,172	HT-105
Hilltown	17,310.63	172,965	22,248	12.86	87.14	1,856	HT-106
Hilltown	17,310.63	18,018	6,578	36.51	63.49	347	HT-107
Hilltown	17,310.63	456,629	31,935	6.99	93.01	3,931	HT-108
Hilltown	17,310.63	1,075,085	167,428	15.57	84.43	12,588	HT-109
Hilltown	17,310.63	207,077	10,135	4.89	95.11	1,625	HT-110
Hilltown	17,310.63	150,041	11,424	7.61	92.39	1,325	HT-111
Hilltown	17,310.63	998,090	50,765	5.09	94.91	7,907	HT-112
Hilltown	17,310.63	103,164	22,282	21.60	78.40	1,433	HT-113
Hilltown	17,310.63	60,603	10,671	17.61	82.39	754	HT-114
Hilltown	17,310.63	95,641	8,560	8.95	91.05	891	HT-115
Hilltown	17,310.63	1,974,403	234,745	11.89	88.11	20,493	HT-116
Hilltown	17,310.63	108,669	20,215	18.60	81.40	1,391	HT-117
Hilltown	17,310.63	241,990	52,875	21.85	78.15	3,383	HT-118
Hilltown	17,310.63	274,950	48,266	17.55	82.45	3,416	HT-119
Hilltown	17,310.63	87,964	22,409	25.48	74.52	1,345	HT-120
Hilltown	17,310.63	55,959	14,910	26.65	73.35	879	HT-121
Hilltown	17,310.63	50,702	13,961	27.54	72.46	813	HT-122
Hilltown	17,310.63	72,962	47,740	65.43	34.57	2,169	HT-123
Hilltown	17,310.63	16,522	7,086	42.89	57.11	357	HT-124
Hilltown	17,310.63	52,788	31,008	58.74	41.26	1,442	HT-125
Hilltown	17,310.63	31,275	5,117	16.36	83.64	375	HT-126
Hilltown	17,310.63	420,798	25,618	6.09	93.91	3,486	HT-127
Hilltown	17,310.63	3,722,589	254,045	6.82	93.18	31,817	HT-128
Hilltown	17,310.63	2,498,351	205,277	8.22	91.78	22,617	HT-129
Hilltown	17,310.63	232,018	76,615	33.02	66.98	4,180	HT-130
Hilltown	17,310.63	267,640	69,944	26.13	73.87	4,155	HT-131
Hilltown	17,310.63	345,924	91,120	26.34	73.66	5,397	HT-132
Hilltown	17,310.63	27,698	9,107	32.88	67.12	498	HT-133
Hilltown	17,310.63	161,797	61,161	37.80	62.20	3,194	HT-134
Hilltown	17,310.63	642,358	506,377	78.83	21.17	22,205	HT-135
Hilltown	17,310.63	51,887	12,125	23.37	76.63	754	HT-136
Hilltown	17,310.63	48,844	18,629	38.14	61.86	970	HT-137
Hilltown	17,310.63	62,847	35,353	56.25	43.75	1,660	HT-138
Hilltown	17,310.63	1,662,506	959,384	57.71	42.29	44,781	HT-139
Hilltown	17,310.63	272,434	91,365	33.54	66.46	4,959	HT-140
Hilltown	17,310.63	161,525	46,645	28.88	71.12	2,668	HT-141
Hilltown	17,310.63	2,543,374	384,230	15.11	84.89	29,357	HT-142
Hilltown	17,310.63	947,901	164,248	17.33	82.67	11,702	HT-143
Hilltown	17,310.63	2,373,176	385,554	16.25	83.75	28,370	HT-144
Hilltown	17,310.63	927,121	86,780	9.36	90.64	8,775	HT-145
Hilltown	17,310.63	192,150	96,752	50.35	49.65	4,665	HT-146
Hilltown	17,310.63	137,345	36,438	26.53	73.47	2,152	HT-147
Hilltown	17,310.63	85,610	21,866	25.54	74.46	1,311	HT-148
Hilltown	17,310.63	256,726	17,826	6.94	93.06	2,205	HT-149
Hilltown	17,310.63	79,340	26,245	33.08	66.92	1,431	HT-150
Hilltown	17,310.63	85,145	24,951	29.30	70.70	1,419	HT-151
Hilltown	17,310.63	761,450	36,906	4.85	95.15	5,966	HT-152
Hilltown	17,310.63	103,792	10,476	10.09	89.91	1,010	HT-153
Hilltown	17,310.63	442,948	49,909	11.27	88.73	4,498	HT-154
Hilltown	17,310.63	33,473	13,421	40.10	59.90	689	HT-155
Hilltown	17,310.63	205,961	41,234	20.02	79.98	2,743	HT-156
Hilltown	17,310.63	149,146	10,535	7.06	92.94	1,288	HT-157

MUNICIPALITY	ACRES	PLShpArea (SF)	ImpShpArea(SF)	%Impervious	%Pervious	Sediment Loading (lbs/yr)*	Obs#
Hilltown	17,310.63	224,630	42,169	18.77	81.23	2,890	HT-158
Hilltown	17,310.63	26,754	7,431	27.77	72.23	431	HT-159
Hilltown	17,310.63	1,325,444	180,972	13.65	86.35	14,600	HT-160
Hilltown	17,310.63	173,473	93,924	54.14	45.86	4,449	HT-161
Hilltown	17,310.63	185,121	59,821	32.31	67.69	3,287	HT-162
Hilltown	17,310.63	37,385	10,323	27.61	72.39	600	HT-163
Hilltown	17,310.63	104,598	8,861	8.47	91.53	956	HT-164
Hilltown	17,310.63	55,856	10,653	19.07	80.93	725	HT-165
Hilltown	17,310.63	33,578	8,212	24.46	75.54	501	HT-166
Hilltown	17,310.63	342,813	177,671	51.83	48.17	8,506	HT-167
Hilltown	17,310.63	58,723	37,781	64.34	35.66	1,722	HT-168
Hilltown	17,310.63	803,664	480,503	59.79	40.21	22,252	HT-169
Hilltown	17,310.63	144,464	84,276	58.34	41.66	3,924	HT-170
Hilltown	17,310.63	127,404	55,645	43.68	56.32	2,786	HT-171
Hilltown	17,310.63	32,897	7,687	23.37	76.63	478	HT-172
Hilltown	17,310.63	36,583	10,770	29.44	70.56	612	HT-173
Hilltown	17,310.63	40,493	14,067	34.74	65.26	755	HT-174
Hilltown	17,310.63	70,748	20,584	29.10	70.90	1,174	HT-175
Hilltown	17,310.63	154,976	33,496	21.61	78.39	2,153	HT-176
Hilltown	17,310.63	102,802	37,073	36.06	63.94	1,965	HT-177
Hilltown	17,310.63	606,482	81,688	13.47	86.53	6,641	HT-178
Hilltown	17,310.63	49,399	13,050	26.42	73.58	772	HT-179
Hilltown	17,310.63	52,078	16,086	30.89	69.11	898	HT-180
Hilltown	17,310.63	150,757	27,662	18.35	81.65	1,917	HT-181
Hilltown	17,310.63	1,610,422	205,723	12.77	87.23	17,227	HT-182
Hilltown	17,310.63	218,334	58,993	27.02	72.98	3,460	HT-183
Hilltown	17,310.63	166,638	36,365	21.82	78.18	2,327	HT-184
Hilltown	17,310.63	102,647	22,634	22.05	77.95	1,442	HT-185
Hilltown	17,310.63	175,270	20,136	11.49	88.51	1,794	HT-186
Hilltown	17,310.63	19,424	5,494	28.28	71.72	317	HT-187
Hilltown	17,310.63	24,131	5,857	24.27	75.73	358	HT-188
Hilltown	17,310.63	101,461	16,088	15.86	84.14	1,199	HT-189
Hilltown	17,310.63	160,997	39,565	24.57	75.43	2,409	HT-190
Hilltown	17,310.63	107,391	30,564	28.46	71.54	1,758	HT-191
Hilltown	17,310.63	75,867	15,914	20.98	79.02	1,037	HT-192
Hilltown	17,310.63	67,453	18,749	27.80	72.20	1,088	HT-193
Hilltown	17,310.63	74,636	18,638	24.97	75.03	1,127	HT-194
Hilltown	17,310.63	288,580	52,983	18.36	81.64	3,670	HT-195
Hilltown	17,310.63	72,592	31,879	43.92	56.08	1,594	HT-196
Hilltown	17,310.63	1,482,970	189,814	12.80	87.20	15,880	HT-197
Hilltown	17,310.63	98,457	37,331	37.92	62.08	1,948	HT-198
Hilltown	17,310.63	2,249,330	186,771	8.30	91.70	20,428	HT-199
Hilltown	17,310.63	723,309	89,741	12.41	87.59	7,643	HT-200
Hilltown	17,310.63	3,339,802	71,447	2.14	97.86	22,897	HT-203
Hilltown	17,310.63	70,118	1,039	1.48	98.52	464	HT-204
Hilltown	17,310.63	69,644	3,686	5.29	94.71	557	HT-205
Hilltown	17,310.63	207,123	12,587	6.08	93.92	1,715	HT-206
Hilltown	17,310.63	48,191	13,852	28.74	71.26	794	HT-207
Hilltown	17,310.63	137,114	9,869	7.20	92.80	1,191	HT-208
Hilltown	17,310.63	73,509	14,769	20.09	79.91	981	HT-209
Hilltown	17,310.63	150,437	42,754	28.42	71.58	2,460	HT-210
Hilltown	17,310.63	67,129	15,257	22.73	77.27	960	HT-211
Hilltown	17,310.63	250,993	19,853	7.91	92.09	2,244	HT-212
Hilltown	17,310.63	621,581	26,589	4.28	95.72	4,742	HT-213
Hilltown	17,310.63	45,431	16,607	36.55	63.45	876	HT-214
Hilltown	17,310.63	101,239	24,772	24.47	75.53	1,511	HT-215
Hilltown	17,310.63	445,799	24,777	5.56	94.44	3,607	HT-216
Hilltown	17,310.63	24,576	5,319	21.64	78.36	342	HT-217
Hilltown	17,310.63	234,859	25,804	10.99	89.01	2,361	HT-218
Hilltown	17,310.63	58,629	19,646	33.51	66.49	1,067	HT-219
Hilltown	17,310.63	606,753	120,047	19.79	80.21	8,030	HT-220
Hilltown	17,310.63	47,706	8,948	18.76	81.24	614	HT-221
Hilltown	17,310.63	186,134	26,109	14.03	85.97	2,076	HT-222
Hilltown	17,310.63	584,184	25,138	4.30	95.70	4,461	HT-223
Hilltown	17,310.63	80,389	25,396	31.59	68.41	1,407	HT-224
Hilltown	17,310.63	1,116,361	68,402	6.13	93.87	9,263	HT-226
Hilltown	17,310.63	254,097	21,695	8.54	91.46	2,330	HT-227
Hilltown	17,310.63	33,746	11,670	34.58	65.42	627	HT-228
Hilltown	17,310.63	339,991	30,833	9.07	90.93	3,182	HT-231
Hilltown	17,310.63	154,913	32,684	21.10	78.90	2,123	HT-232
Hilltown	17,310.63	262,702	23,537	8.96	91.04	2,448	HT-233

MUNICIPALITY	ACRES	PLShpArea (SF)	ImpShpArea(SF)	%Impervious	%Pervious	Sediment Loading (lbs/yr)*	Obs#
Hilltown	17,310.63	156,317	41,688	26.67	73.33	2,457	HT-248
Hilltown	17,310.63	243,581	50,213	20.61	79.39	3,296	HT-249
Hilltown	17,310.63	49,216	13,352	27.13	72.87	782	HT-250
Hilltown	17,310.63	69,760	17,647	25.30	74.70	1,062	HT-251
Hilltown	17,310.63	79,273	24,640	31.08	68.92	1,372	HT-252
Hilltown	17,310.63	75,570	20,493	27.12	72.88	1,200	HT-253
Hilltown	17,310.63	29,896	11,067	37.02	62.98	582	HT-254
Hilltown	17,310.63	239,794	16,521	6.89	93.11	2,056	HT-255
Hilltown	17,310.63	227,690	22,984	10.09	89.91	2,215	HT-256
Hilltown	17,310.63	117,389	42,270	36.01	63.99	2,242	HT-257
Hilltown	17,310.63	49,243	12,417	25.22	74.78	748	HT-258
Hilltown	17,310.63	25,903	8,129	31.38	68.62	451	HT-259
Hilltown	17,310.63	40,962	13,506	32.97	67.03	737	HT-260

Total Sediment Loading=	1,576,739 (lbs/yr)	
within HUC12 020402010202 (West Branch Neshaminy Creek)=	382,374 (lbs/yr)	24.25%
within HUC12 020402030807 (East Branch Perkiomen Creek)=	1,194,365 (lbs/yr)	75.75%

* 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 Sediment Loading w/o accounting for BMPs = 1,576,739 lbs/yr (788.37 tons/yr)

Sediment Loading Removed by Existing BMPs= 253,301 lbs/yr (126.65 tons/yr)

(Refer to sediment removal calculations on Stormwater Basin Database)

Removed within HUC12 020402030807 (East Branch Perkiomen Creek)= 174,318 (lbs/yr)

Removed within HUC12 020402010202 (West Branch Neshaminy Creek)= 78,983 (lbs/yr)

Overall Existing Sediment Load for Hilltown Township = 1,576,739 lbs/yr - 253,301 lbs/yr = 1,323,438 lbs/yr (661.71 tons/yr)

Within HUC12 020402030807 (East Branch Perkiomen Creek)= 1,194,365 lbs/yr - 174,318 lbs/yr = 1,020,047 lbs/yr

Within HUC12 020402010202 (West Branch Neshaminy Creek)= 382,374 lbs/yr - 78,983 lbs/yr = 303,391 lbs/yr

Total PRP Requirement Reduction (10%) = 1,323,438 * .10 = 132,344 lbs/yr (66.17 tons/yr)

Within HUC12 020402030807 (East Branch Perkiomen Creek)= 1,020,047 * .10 = 102,005 lbs/yr

Within HUC12 020402010202 (West Branch Neshaminy Creek)= 303,391 * .10 = 30,339 lbs/yr

APPENDIX F

Stormwater Basin Database

Stormwater Basin Database

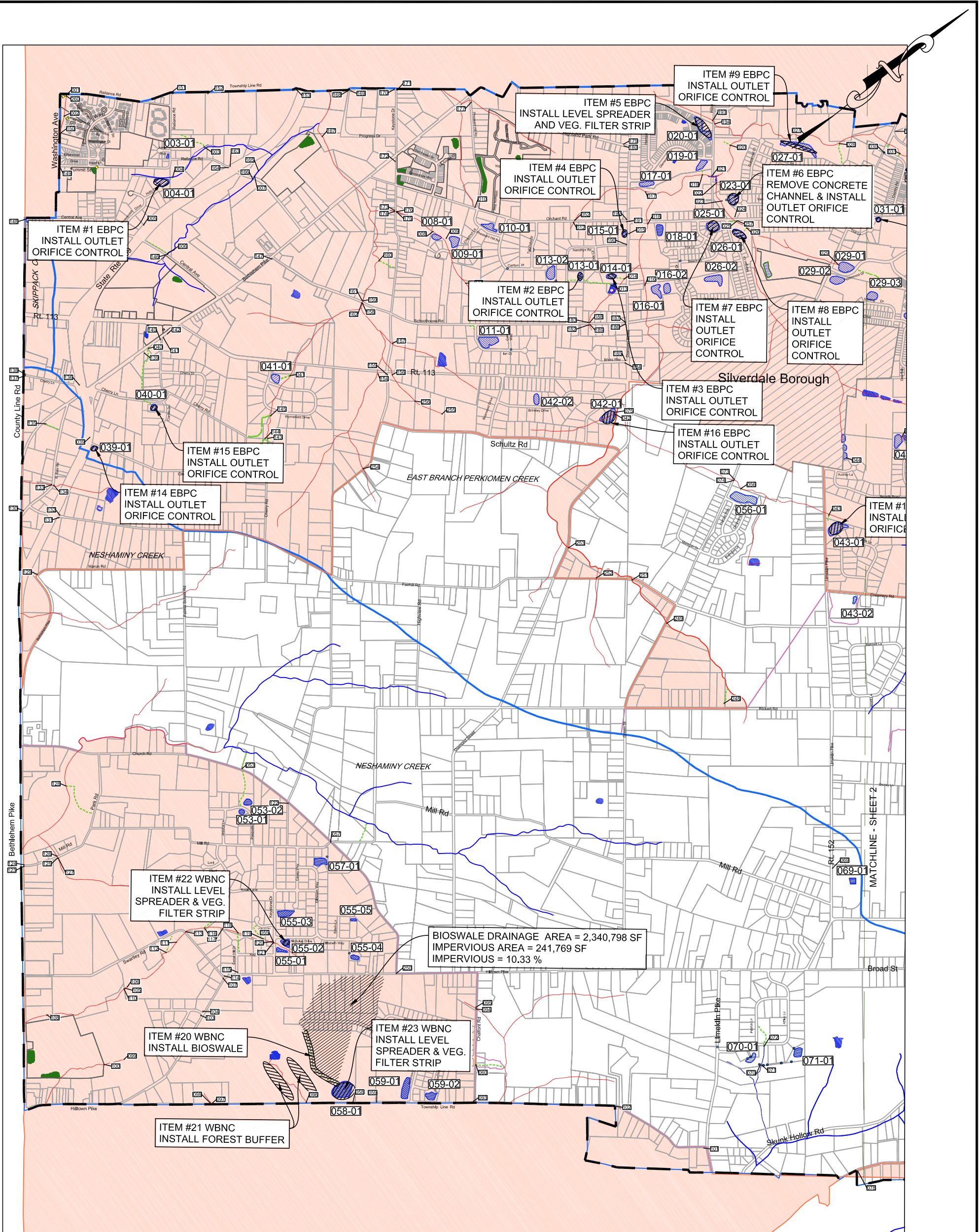
Basin ID	Maintained By	Description	Street/Access	Year (Appx.)	BMP Type	DWF*	Improvements/Comments	TSS %	Basin Drainage Area (AC)	Adj Factor	% Impervious	% Pervious	Sed Removal (lbs/yr)	Latitude	Longitude
003-01		Summit Court	Joelle Way	pre 2003	Dry Detention Basin	N	Dry basin, mowed	10%	0.48	1	32.44	67.56	37	40°19'37.62"N	75°18'50.61"W
004-01	Private	Bridle Run	Holly Court	1994	Dry Detention Basin	N	Dry basin, mowed	10%	12.46	1	23.15	76.85	784	40°19'33.01"N	75°18'45.77"W
008-01	HOA	Coventry Meadows II	Chesnut Lane	2014	Wet Pond	Y	Wet pond with wetland plants	60%	8.03	1	10.91	89.09	2,104	40°20'11.05"N	75°17'48.30"W
009-01	HOA	Coventry Meadows II	Chesnut Lane	2014	Wet Pond	Y	Wet pond with wetland plants	60%	7.08	1	23.51	76.49	2,698	40°20'13.57"N	75°17'44.36"W
010-01	HOA	Coventry Meadows	Pheasant Hill Road	2010	Wet Pond	Y	Wet pond with wetland plants	60%	22.92	1	19.7	80.3	7,908	40°20'21.29"N	75°17'41.27"W
011-01	Private	Holly Farm	Ian Court	2011	Dry Extended Detention Basin	N	Naturalized with Wet Tolerant Vegetation	60%	13.42	1	18.61	81.39	4,492	40°20'5.70"N	75°17'16.84"W
013-01	Private	Hickory Hamlet	Narothyn Road	1995	Dry Detention Basin	N	Dry basin, mowed	10%	19.73	1	9.6	90.4	821	40°20'29.69"N	75°17'15.34"W
013-02	HOA	Coventry Meadows	Carlton Place	2010	Wet Pond	N	Wet pond with Wet Tolerant Vegetation	60%	7.27	0	13.99	86.01	0	40°20'25.43"N	75°17'20.87"W
014-01	Private	Hickory Hamlet II	Florence Circle	1998	Dry Detention Basin	N	Dry basin, mowed	10%	10.29	1	18.06	81.94	565	40°20'34.95"N	75°17'10.22"W
015-01	Private	Hickory Hamlet	Diamond and Narothyn	1995	Dry Detention Basin	N	Dry basin	10%	8.48	1	14.58	85.42	419	40°20'43.76"N	75°17'18.12"W
016-01	Township	Longleaf II	Longleaf Drive	2001	Wet Pond	Y	Basins in series, Basin 016-01 is 12" +- wet pond with wetland perimeter	60%	27.2	1	29.67	70.33	11,946	40°20'40.59"N	75°16'59.87"W
016-02	Township	Longleaf II	Longleaf Drive	2001	Wetlands	Y	Basins in series, Basin 016-02 wetland vegetated	60%	6.62	0	32.13	67.87	0	40°20'42.47"N	75°16'58.19"W
017-01	HOA	Summer Lea	Glenwood Drive	2008	Dry Extended Detention Basin	N	Dry basin, partially mowed, partially naturalized with Wet Tolerant Vegetation	60%	12.44	1	39.23	60.77	6,587	40°20'52.69"N	75°17'24.24"W
018-01	Township	Longleaf I	Orchard Road	1998	Dry Extended Detention Basin	N	Dry basin, mowed	60%	11.5	1	29.12	70.88	4,991	40°20'48.96"N	75°17'12.12"W
019-01	HOA	Summer Lea	Glenwood Drive	2008	Dry Extended Detention Basin	N	Dry basin, partially mowed, partially naturalized with Wet Tolerant Vegetation	60%	14.22	1	51.91	48.09	9,232	40°21'4.38"N	75°17'18.98"W
020-01	HOA	Summer Lea	Hampshire Drive	2008	Dry Extended Detention Basin	N	Dry basin, partially mowed, partially naturalized with Wet Tolerant Vegetation	60%	20.75	1	42.65	57.35	11,657	40°21'8.65"N	75°17'27.23"W
023-01	Private	Orchard Glen	Yarrow Court	1996	Dry Detention Basin	N	Dry basin, mowed - remove conc. flow channels, above ground pool, children's playset, trash	0%	9.92	1	34.64	65.36	0	40°21'4.91"N	75°17'6.05"W
025-01	Private	Longleaf I	Orchard Road	1998	Dry Detention Basin	N	Dry basin, mowed	10%	11.87	1	32.76	67.24	927	40°20'58.21"N	75°17'3.92"W
026-01	Township	Orchard Station	Morgan Lane	1990	Dry Detention Basin	N	Dry basin, mowed	10%	30.67	1	28.48	71.52	2,188	40°21'1.70"N	75°16'57.43"W
026-02	Township	Longleaf II	Victoria Lane	2001	Dry Detention Basin	N	Dry basin, mowed	10%	12.42	0	26.65	73.35	0	40°20'51.97"N	75°16'51.92"W
027-01	Township	Pleasant Meadows	Thistle Lane	1986	Dry Detention Basin	N	Dry basin, mowed	10%	41.41	1	25.59	74.41	2,765	40°21'20.24"N	75°17'8.59"W
029-01	HOA	Orchard Hill	Applewood Drive	2007	Wet pond	Y	Wet pond, mowed embankments	60%	60.61	1	28.14	71.86	25,743	40°21'14.58"N	75°16'33.25"W
029-02	HOA	Orchard Hill	Peachtree Drive	2007	Dry Extended Detention Basin	N	Dry basin, partially mowed, partially naturalized with Wet Tolerant Vegetation	60%	15.79	0	22.64	77.36	0	40°21'11.83"N	75°16'31.79"W
029-03	Township	Sterling Knoll	E. Walnut Street	1989	Dry Detention Basin	N	Dry basin, partially mowed, partially naturalized with Wet Tolerant Vegetation	10%	9.79	0	40.98	59.02	0	40°21'15.28"N	75°16'22.12"W
031-01	Private	Phinney	Tice Lane		Dry Extended Detention Basin	N	Dry Basin, mowed, eroded flow channel	0%	4.69	1	24.17	75.83	0	40°21'26.33"N	75°16'37.56"W
032-01	HOA	Country Roads	Country Road	1993	Dry Detention Basin	N	Dry basin, mowed, remove concrete flow channels	0%	15.73	1	46.64	53.36	0	40°21'37.79"N	75°16'43.06"W
033-01	HOA	Orchard Hill	Cranberry Circle	2007	Dry Extended Detention Basin	N	Naturalized with wet tolerant vegetation	60%	13.04	1	52.98	47.02	8,598	40°21'34.08"N	75°16'28.79"W
035-01	Township	Sterling Knoll	Sterling Drive	1989	Dry Detention Basin	N	Dry basin, partially mowed, partially naturalized with Wet Tolerant Vegetation	60%	15.67	1	37.49	62.51	8,039	40°21'28.60"N	75°16'10.71"W
035-02	Township	Deerfield	Deerfield Circle	1988	Dry Detention Basin	N	Dry basin, mowed	10%	12.35	0	24.41	75.59	0	40°21'18.91"N	75°16'11.41"W
036-01	Private	Repogle Subdivision	Harvest lane	1988	Dry Detention Basin	N	Dry basin, mowed	10%	8.62	1	21.05	78.95	514	40°22'16.48"N	75°15'35.66"W
038-01	Private	Woodlawn Meadows	Woodlawn Drive		Dry Detention Basin	N	Dry basin, mowed	10%	4.35	1	25.92	74.08	293	40°22'12.24"N	75°15'17.46"W
039-01	Private	St. Phillips Church	Clearview Road	1992	Dry Detention Basin	N	Dry Basin, mowed	10%	1.32	1	34.79	65.21	107	40°18'47.59"N	75°18'0.01"W
040-01	Private	Telvil S/D	Clarion Drive	1992	Dry Detention Basin	N	Dry Basin, mowed	10%	6.83	1	20.7	79.3	404	40°19'2.85"N	75°17'58.92"W
041-01	Private	Wynnefield	Wynnefield Drive	2008	Dry Extended Detention Basin	N	Dry basin, partially mowed, partially naturalized with Wet Tolerant Vegetation	60%	41.79	1	17.57	82.43	13,578	40°19'26.41"N	75°17'44.72"W
042-01	Private	Bricks Villa	Brinkley Drive	1998	Dry Detention Basin	N	Dry basin, partially mowed, partially naturalized with Wet Tolerant Vegetation	10%	60.68	1	19.08	80.92	3,430	40°20'16.54"N	75°16'40.41"W
042-02	Private	Bricks Villa	Brinkley Drive	1998	Dry Detention Basin	N	Naturalized with wet tolerant vegetation	10%	3.72	0	7.14	92.86	0	40°20'6.73"N	75°16'55.89"W
043-01	Township	Bergen Tract	Endslow Lane	1986	Dry Detention Basin	N	Dry basin, partially mowed, partially naturalized with Wet Tolerant Vegetation	10%	39.75	1	25.53	74.47	2,651	40°20'39.22"N	75°15'37.92"W
043-02	Township	Municipal Building	West Creamery Road	1989	Dry Detention Basin	N	Dry basin, partially mowed, partially naturalized with Wet Tolerant Vegetation	10%	5.75	0	47.37	52.63	0	40°20'33.32"N	75°15'19.74"W
045-01	HOA	Hilltown Chase	Paige Trail	2002	Wetlands	Y	Wet pond, converted to Wetland	60%	16.48	1	29.86	70.14	7,267	40°21'0.99"N	75°15'46.76"W
046-01	HOA	Hilltown Chase	Paige Trail	2002	Wet pond	Y	Wet pond	60%	9.03	1	6.48	93.52	1,988	40°21'1.75"N	75°15'37.26"W
048-01	HOA	Hilltown Chase	Paige Trail	2002	Dry Detention Basin	N	Naturalized with wet tolerant vegetation	10%	10.93	1	20.94	79.06	650	40°21'8.88"N	75°15'37.25"W
049-01	HOA	Ashland Meadows	West Creamery Road	2007	Wet pond	N	Wet pond	60%	48.55	1	22.93	77.07	18,232	40°21'1.66"N	75°15'1.93"W

Stormwater Basin Database

Basin ID	Maintained By	Description	Street/Access	Year (Appx.)	BMP Type	DWF*	Improvements/Comments	TSS %	Basin Drainage Area (AC)	Adj Factor	% Impervious	% Pervious	Sed Removal (lbs/yr)	Latitude	Longitude	
051-01	Private	Broderick Tract	Quarry Rd. cul-de-sac	1988	Dry Detention Basin	N	Dry basin, mowed	10%	5.25	1	24.32	75.68	340	40°21'45.54"N	75°14'17.29"W	
053-01	Private	Lynrose Estates	Pasquale Way	2005	Dry Extended Detention Basin	N	Dry basin, mowed	60%	9.65	1	20.12	79.88	3,368	40°18'25.34"N	75°16'16.90"W	
053-02	Private	Lynrose Estates	Pasquale Way	2005	Dry Extended Detention Basin	N	Naturalized with Wet tolerant Vegetation	60%	21.14	1	25.41	74.59	8,434	40°18'27.59"N	75°16'18.24"W	
055-01	Township	Reserve at Hilltown	Keystone Drive	2013	Dry Extended Detention Basin	N	Naturalized with Wet Tolerant Vegetation	60%	4.36	1	19.46	80.54	1,494	40°18'13.73"N	75°15'41.00"W	
055-02	Township	Reserve at Hilltown	Nicholas Drive	2013	Dry Extended Detention Basin	N	Naturalized with Wet Tolerant Vegetation	60%	25.73	1	26.15	73.85	10,445	40°18'15.72"N	75°15'41.52"W	
055-03	Private	Reserve at Hilltown	Casey Way	2013	Dry Extended Detention Basin	N	Naturalized with Wet tolerant Vegetation	60%	21.1	1	30.56	69.44	9,444	40°18'19.44"N	75°15'48.09"W	
055-04	Private	Reserve at Hilltown II	Elizabeth Way	2016	Dry Extended Detention Basin	N	Dry basin with infiltration bed	60%	4.96	1	15.07	84.93	1,494	40°18'25.34"N	75°15'26.78"W	
055-05	Private	Reserve at Hilltown II	Elizabeth Way	2016	Dry Extended Detention Basin	N	Dry basin with infiltration bed	60%	2.43	1	1.65	98.35	424	40°18'30.03"N	75°15'35.05"W	
057-01	Township	Reserve at Hilltown	Elizabeth Way	2013	Dry Extended Detention Basin	N	Naturalized with Wet tolerant Vegetation	60%	10.03	1	17.72	82.28	3,273	40°18'31.62"N	75°15'53.43"W	
058-01	Township	Hilltown Ridge	Township Line Road	2005	Dry Extended Detention Basin	N	Naturalized with Wet Tolerant Vegetation	60%	65.14	1	8.93	91.07	15,849	40°18'5.58"N	75°15'0.17"W	
059-01	Township	Hilltown Ridge	Sparrow Way	2005	Dry Detention Basin	N	Dry basin, partially mowed, partially naturalized with Wet Tolerant Vegetation remove concrete	60%	47.06	1	26.95	73.05	19,459	40°18'16.71"N	75°14'50.59"W	
059-02	Township	Hilltown Ridge	Horseshoe Way	2005	Dry Extended Detention Basin	N	Naturalized with Wet Tolerant Vegetation	60%	11.91	1	30.26	69.74	5,297	40°18'19.46"N	75°14'44.67"W	
062-01	HOA	The Preserves	Nettles Lane	2014	Wetlands	Y	Constructed Wetland	60%	19.19	1	16.36	83.64	6,016	40°20'35.68"N	75°14'28.67"W	
062-02	HOA	The Preserves	Nettles Lane	2014	Wetlands	Y	Constructed Wetland	60%	20.25	1	16.36	83.64	6,348	40°20'32.29"N	75°14'32.73"W	
Sediment Removal for BMP's (lbs/yr)=													253,301			
* DWF - Dry Weather Flow								Removed within HUC12 020402010202 (West Branch Neshaminy Creek)=						78,983	31.18%	
*Note: Basins with concrete flow channels are modeled as 0% TSS, since they promote downstream sediment conveyance.								Removed within HUC12 020402030807 (East Branch Perkiomen Creek)=						174,318	68.82%	

APPENDIX G

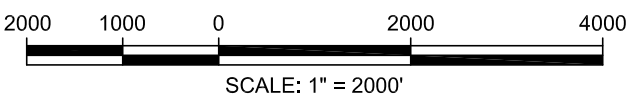
Pollution Reduction Plan Location Map



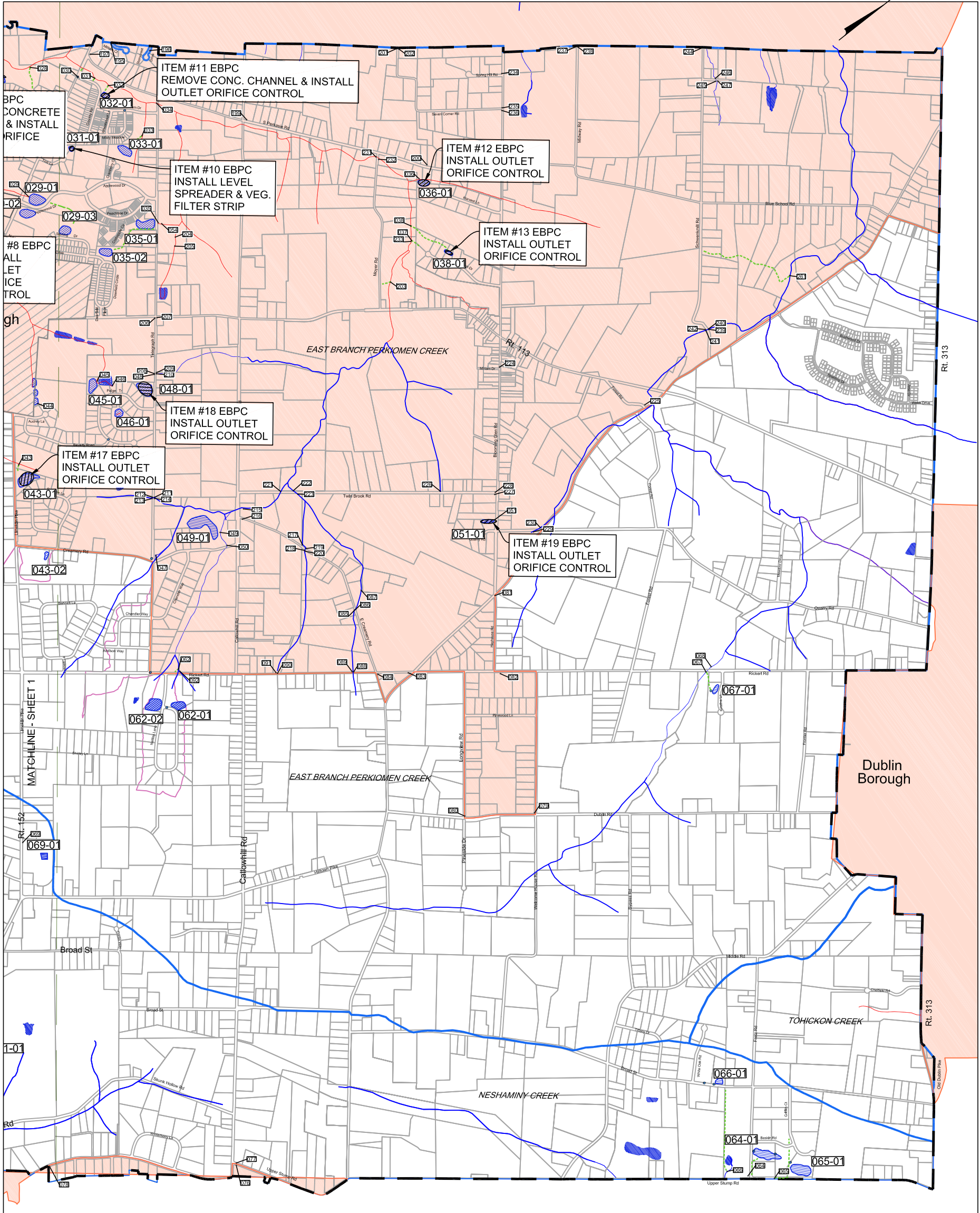
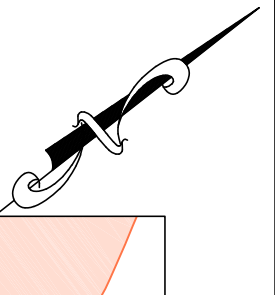
NOTE:
 STREAM LOCATIONS AND IMPAIRMENT DESIGNATIONS ARE SHOWN BASED ON DATA PROVIDED BY PADEP AND HOSTED ON THE PASDA WEBSITE. STREAM LOCATIONS MAY NOT ACCURATELY REPRESENT PHYSICAL/FIELD CONDITIONS. THIS OFFICE HAS MODIFIED STREAM AND WATERSHED LOCATIONS TO THE MOST ACCURATE CONTOURS AVAILABLE.

LEGEND:

- PRP Locations
- Observation Point for Impaired Streams Within Planning Area
- Unimpaired Streams
- Impaired Streams
- Urbanized Area
- Watersheds
- SKIPPACK CREEK Watershed Designation



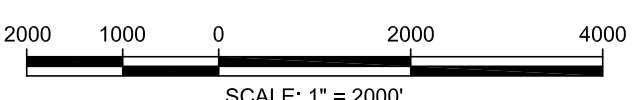
POLLUTION REDUCTION PLAN LOCATIONS		DRAWING NO. 1 OF 2	
HILLTOWN TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA			
C. ROBERT WYNN ASSOCIATES, INC.			
<i>MUNICIPAL ENGINEERING SERVICES</i>			
211 W. Broad Street, Quakertown, PA 18951 Phone 215-536-7336 Fax 215-536-5361			
DWN BY EAS	CHK BY CRW	DATE SEPT. 19, 2019	SCALE 1" = 2000'
		JOB NUMBER 03-099	



NOTE:
 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.

LEGEND:

- PRP Locations
- Observation Point for Impaired Streams Within Planning Area
- Unimpaired Streams
- Impaired Streams
- Urbanized Area
- Watersheds
- Watershed Designation



**POLLUTION REDUCTION PLAN
 LOCATIONS**
 HILLTOWN TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

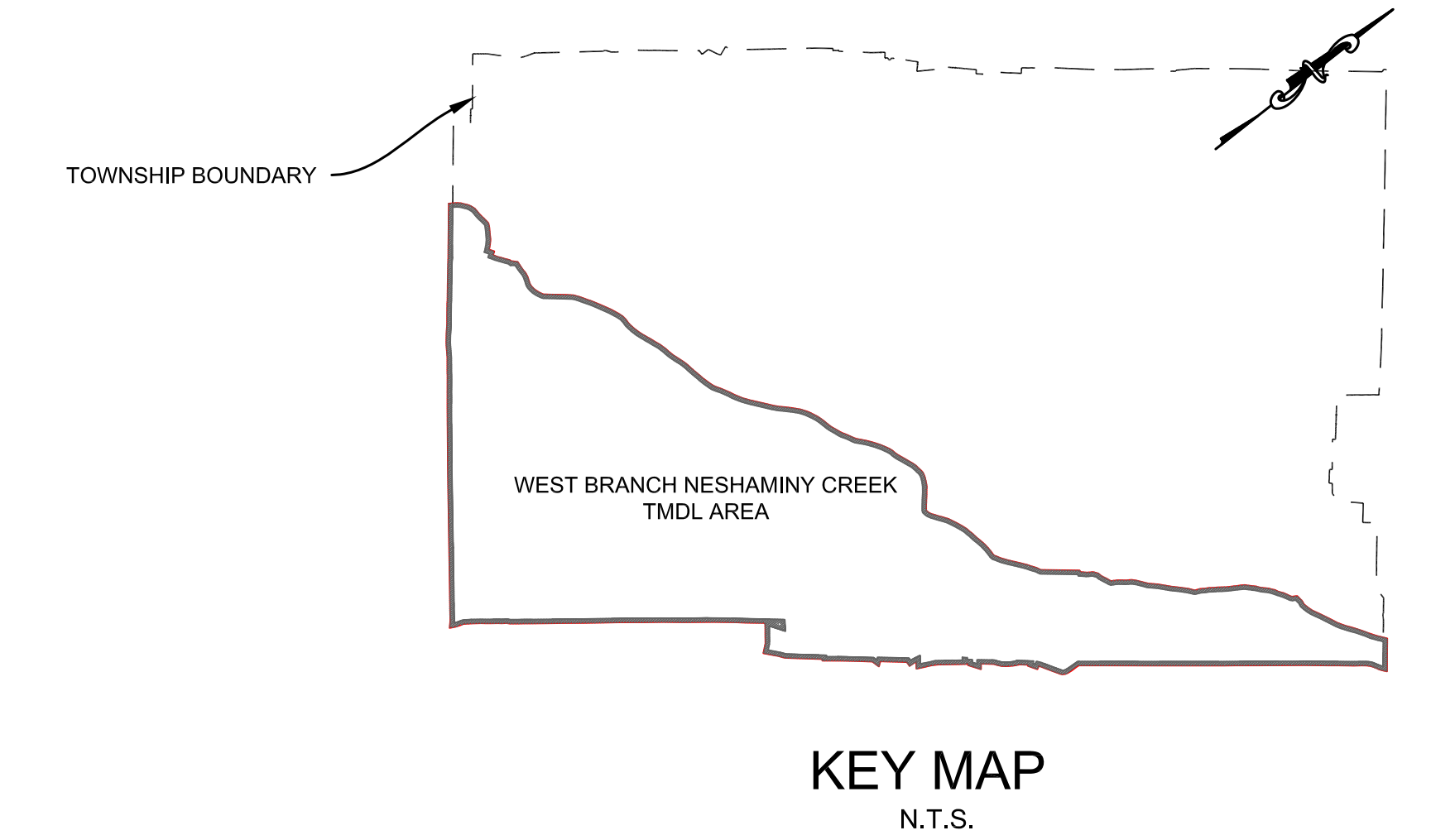
DRAWING NO.
2
 OF 2

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

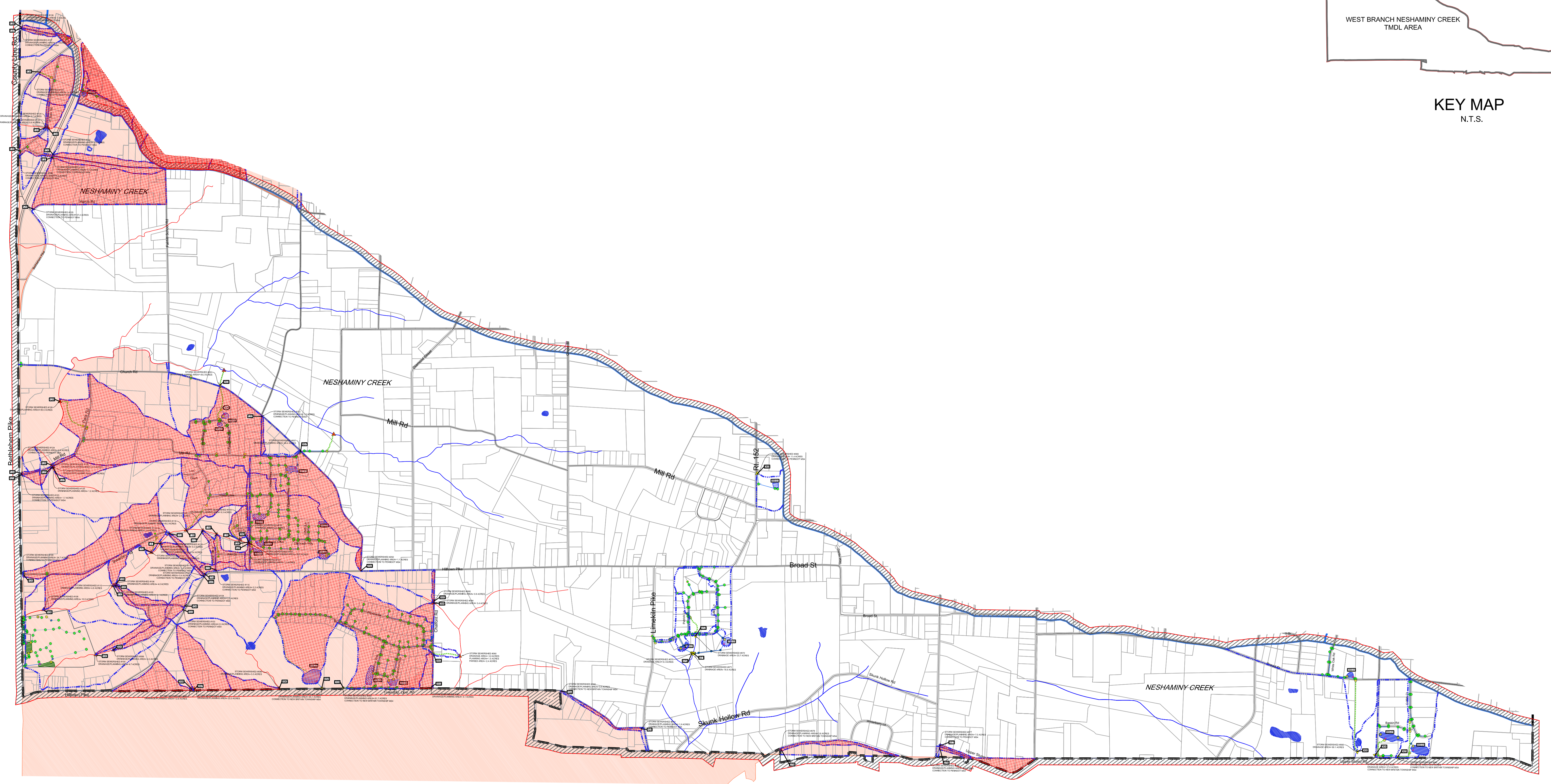
DWN BY EAS	CHK BY CRW	DATE SEPT. 19, 2019	SCALE 1" = 2000'	JOB NUMBER 03-099
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APPENDIX H

TMDL Planning Area Map



KEY MAP
N.T.S.

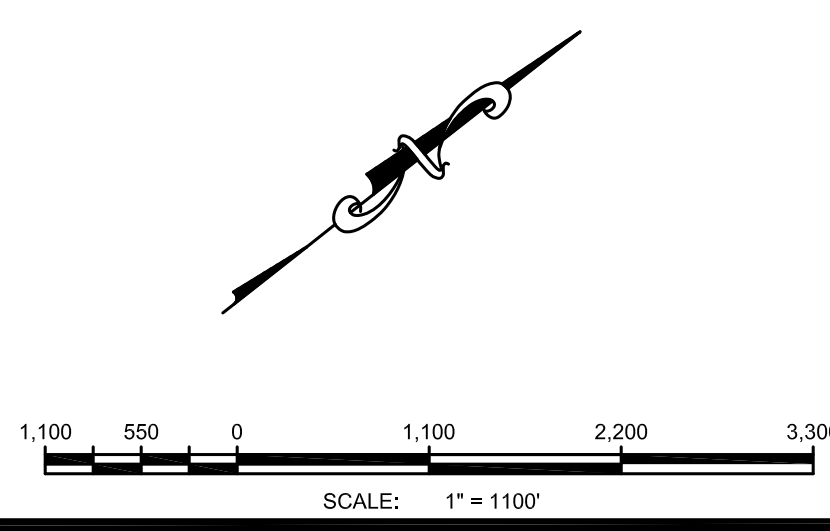


LEGEND:

- BMPs
- Parcels with Private Stormwater Facilities
- Urbanized Area
- Water Bodies
- Parcels
- SKIPPACK CREEK Watershed Designation
- Unimpaired Streams
- Impaired Streams
- HT Boundary
- SILVERDALE Boundary
- Planning Area
- Neshaminy Creek TMDL Impairment
- Storm Sewershed Swale
- Watersheds

STORM STRUCTURES:

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



NOTES:

- 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.
- THIS MAP IDENTIFIES ALL MS4 PLANNING AREAS THAT ARE IN THE WEST BRANCH NESHAMINY CREEK WATERSHED.

NO.	DATE	REVISIONS

**HILLTOWN 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: KAD	CKD BY: C/JG	DATE: SEPTEMBER 12, 2019	SCALE: 1" = 1100'	JOB NO.: 03-099
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DRAWING NO. **1** OF 1

APPENDIX I

PADEP BMP Effectiveness Values Table

**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.

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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
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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 be 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.

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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	<p>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.</p> <p>To determine pollutant reductions for this BMP, these steps must be taken:</p> <ol style="list-style-type: none"> 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. <p>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%.</p>