



EAST BRANDYWINE
Township

Pollutant Reduction Plan

Culbertson Run and Unnamed Tributaries to Beaver Creek

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1.0 Purpose and Scope

East Brandywine Township is required to develop and implement a Pollutant Reduction Plan (PRP) for Municipal Separate Storm Sewer System (MS4) discharges to Culbertson Run and unnamed tributaries (UNT) to Beaver Creek as part of the 2018 National Pollutant Discharge Elimination System (NPDES) MS4 Individual Permit application to the Pennsylvania Department of Environmental Protection (PA DEP). This plan has been prepared based on the best and most current guidance made available by PA DEP. Definitions of relevant regulatory terms have been provided in Section 6.0 of this report.

2.0 Permit Requirements

In order to develop a PRP, it is important to have an understanding of the Township’s requirements. East Brandywine Township is required by the PA DEP and Environmental Protection Agency (EPA) to reduce sediment pollution from stormwater discharges to surface waters impaired by sediment by ten (10) percent within five (5) years of the PA DEP approval date of this Pollutant Reduction Plan (PRP), by implementing projects or Best Management Practices (BMPs).

East Brandywine has MS4 discharges or “outfalls” to Culbertson Run and unnamed tributaries (UNT) to Beaver Creek, which are both listed by the 2014 Pennsylvania Integrated Water Quality Monitoring and Assessment Report (Integrated Report) as impaired for siltation (i.e. sediment) and highlighted in Table 1 below.

Table 1: MS4 Requirements Table (Municipal) Excerpt

MS4 Name	NPDES ID	Individual Permit Required?	Reason	Impaired Downstream Waters or Applicable TMDL Name	Requirement(s)	Other Cause(s) of Impairment
East Brandywine Twp, Chester County	PAI130524	Yes	Special Protection	Culbertson Run	Appendix E-Siltation (4a)	Other Habitat Alterations (4c)
				UNT to Beaver Creek	Appendix D-Siltation (4a)	
				Beaver Creek		Cause Unknown (4a), Other Habitat Alterations, Water/Flow Variability (4c)
				East Branch Brandywine Creek		Cause Unknown (4a), Other Habitat Alterations, Water/Flow Variability (4c)

East Brandywine Township is required to reduce the sediment loading to Culbertson Run and UNTs to Beaver Creek by ten (10) percent within five (5) years of the PA DEP approval date of this Pollutant Reduction Plan (PRP).

3.0 Background/Setting

East Brandywine Township comprises approximately 11.4 square miles located near the center of Chester County, in southeast Pennsylvania (Figure 1). The 2010 Urbanized Area (U.S. Census Bureau) covers 88 percent of the land area of the Township, with only a small portion in the southwestern portion located outside of it.

Figure 1: East Brandywine Township Location Map

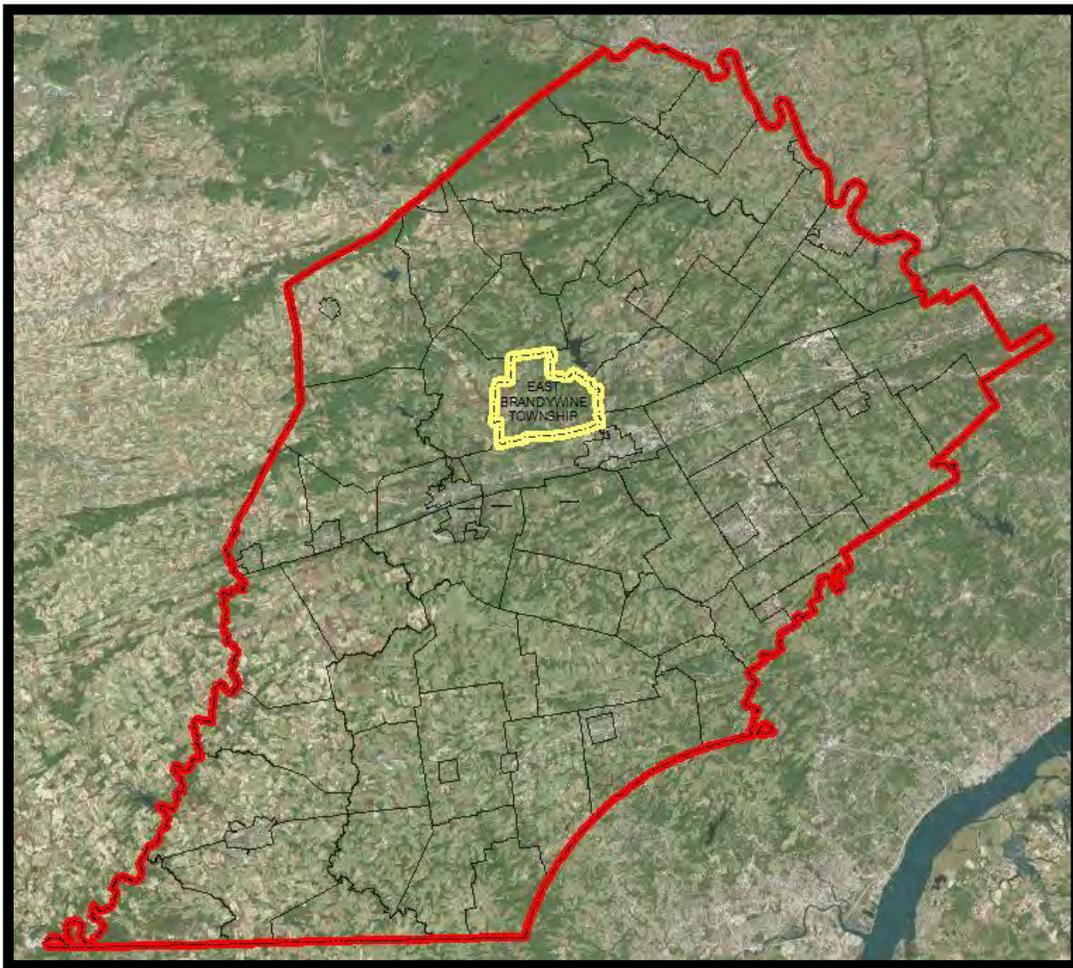
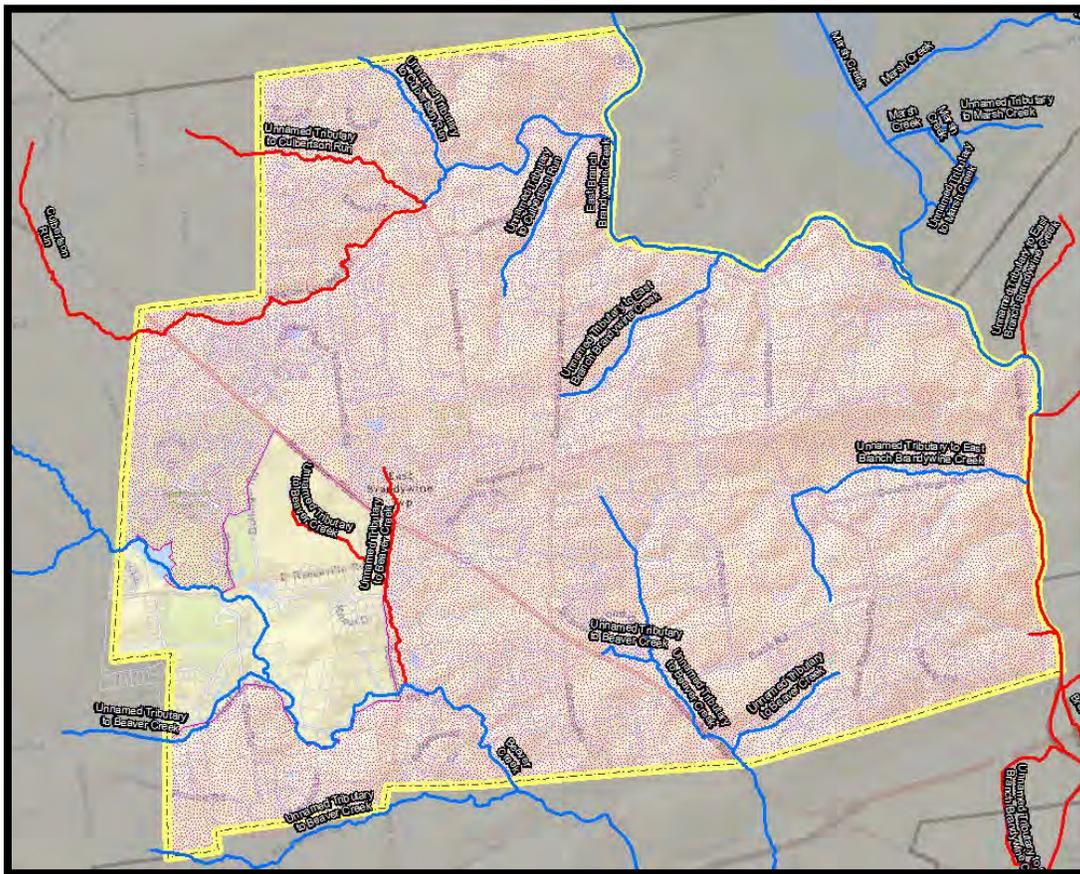


Figure 2 below displays a map of the streams that cross East Brandywine Township along with the 2010 Urbanized Area (hatched). Stream segments colored red indicate impaired portions of streams. A total of thirty-eight (38) MS4 outfalls discharge to the impaired portions of Culbertson Run and UNTs to Beaver Creek.

Figure 2: East Brandywine Township 2010 Urbanized Area (Hatched) and Impaired Streams (Red)



3.1 Culbertson Run

Culbertson Run flows across the northern portion of the Township in an east-northerly direction and into the East Branch Brandywine Creek at the eastern Township boundary. The upper reaches of Culbertson Run from the western Township boundary to Dilworth Road are listed as impaired for sediment. These sections of Culbertson Run and an unnamed tributary were listed as impaired for other habitat modifications in 2010. The portion of Culbertson Run from Dilworth Road to its mouth is not listed as impaired. Table 2 below lists the impairment information for the upper reaches from the 2014 Integrated Report.

There are twenty-seven (27) MS4 outfalls that discharge to the section of Culbertson Run listed as impaired for sediment. Refer to Appendices for MS4 mapping.

Table 2: 2014 Integrated Report – Culbertson Run

Impairment Cause	Impairment Source	Category	Assessed Use	Date Listed
Other Habitat Alterations	Habitat Modification	4c	Aquatic Life	2010
Siltation (sediment)	Agriculture	4a	Aquatic Life	2010

3.2 Unnamed Tributaries to Beaver Creek

Beaver Creek enters the Township at the western boundary and flows through the southwest corner in a southwesterly direction to where it exits at the southern Township boundary. One (1) UNT to Beaver Creek and its tributaries are listed as impaired for sediment. These UNTs originate in the west-central portion of the Township in the vicinity of Horseshoe Pike (Route 322). Table 2 below lists the impairment information for the UNTs from the 2014 Integrated Report.

There are eleven (11) MS4 outfalls that discharge to the UNTs to Beaver Creek listed as impaired for sediment. Refer to Appendices for MS4 mapping.

Table 3: 2014 Integrated Report – UNTs to Beaver Creek

Impairment Cause	Impairment Source	Category	Assessed Use	Date Listed
Siltation (sediment)	Urban Runoff/Storm Sewers	4a	Aquatic Life	2010
Other Habitat Alterations	Urban Runoff/Storm Sewers	4c	Aquatic Life	2010

4.0 Pollutant Reduction

Per the MS4 permit and PRP Instructions document (3800-PM-BCW0100k Rev. 3/2017), the following sections are addressed and described below: Public Participation, Storm Sewersheds, Pollutants of Concern, Existing Sediment Loading, Proposed Best Management Practices (BMPs), Funding Mechanisms, and Operations and Maintenance.

4.1 Public Participation

The PRP was updated in April 2018 to address comments received from the PA DEP in a letter dated February 9, 2018. The proposed BMPs changed as a result of addressing these comments. The Township has made the updated PRP available to review and provide comment for thirty (30) days, initiated by a public notice published in the Daily Local News on April 18, 2018. The updated PRP was presented for comment at the Board of Supervisors Work Session on May 3, 2018. Comments were accepted at this meeting from any interested members of the public. One (1) comment was received via email from the Hideaway Farms Homeowners Association Board via email on April 30, 2018 requesting to consider the removal of a hatchery as part of the proposed Culbertson Stream Restoration BMP. The Township will consider this request during the feasibility study phase of this project.

A copy of the public notice, minutes of the public meeting, all timely comments received and a record of consideration of these comments will be forwarded to PA DEP upon closure of the comment period.

4.2 Storm Sewersheds

Storm sewersheds that drain to each of the thirty-eight (38) outfalls were manually delineated in ArcMap 10.5 using two (2) foot topographic contours from the 2006-2008 PAMAP Program data published by the Pennsylvania Department of Conservation and Natural Resources (DCNR), while referencing Google Street View and multiple sources of aerial imagery. The terms “Storm Sewershed” and “Planning Area” will be used interchangeably throughout this report.

“Parsing” is defined by the PRP Instructions Attachment A, entitled “Parsing Guidelines for MS4s in Pollutant Reduction Plans”, as a “process in which land area is removed from a Planning Area in order to calculate the actual or target pollutant loads that are applicable to an MS4.” The examples cited include:

- 1) The land area associated with non-municipal stormwater NPDES permit coverage that exists within the urbanized area of a municipality;
- 2) Land area associated with PennDOT roadways and the Pennsylvania Turnpike (roads and right of ways);
- 3) Lands associated with the production area of a Concentrated Animal Feeding Operation that is covered by an NPDES permit;
- 4) Land areas in which stormwater runoff does not enter the MS4. If an accurate storm sewershed map is developed, these lands may be parsed or excluded as part of that process.

Land areas that have been parsed from the Planning Area during the development of this PRP fall under category #4 as describe above. These parsed areas have been further categorized as the following and identified on the Storm Sewershed Map in Appendix E: Land area consisting either of entirely privately-owned land or infrastructure that drains directly to a surface water (labeled as “Land areas in which stormwater runoff does not enter the MS4”);

Conversely, for proposed BMPs located outside of the Planning Area, the drainage areas were added to the Planning Area (i.e. Culbertson Run Stream Restoration).

The following table (Table 4) includes a list of outfalls and the associated storm sewershed acreage that drain to each outfall. Also listed is the receiving water for each outfall and United States Geological Survey (USGS) National Hydrography Dataset (NHD) Hydrologic Unit Code (HUC) 12 watershed. The outfall numbers beginning with the letter “A” are assumed outfall locations. Per DEP guidance, where no discernible and discrete conveyance is visible discharging from municipal roads and/or municipal storm sewer system to surface waters, an assumed outfall location must be designated and the storm sewershed delineated to that point.

Table 4: Storm Sewershed Acreage by Outfall

Receiving Water	HUC 12	Outfall Number	Storm Sewershed (acres)
Culbertson Run Upper East Branch Brandywine Creek		A1	65.13
		A2	31.49
		A3	6.59
		5	9.76
		6	3.65
		7	15.87
		14	7.12
		16	2.98
		18	4.35
		19	45.53
		20	1.82
		21	4.04
		22	14.30
		23	3.34
		24	18.64
		25	20.84
		26	34.45
		28	7.74
		82	4.83
		86	21.15
		87	0.17
		88	2.55
		89	0.23
90	0.10		
91	5.64		
92	4.89		
94	1.78		
	Culbertson Run Stream Restoration	393.09	
UNTs to Beaver Creek Beaver Creek		38	7.64
		39	6.66
		40	11.75
		41	5.68
		42	16.95
		43	20.25
		83	4.40
		84	0.39
		93	0.23
		95	23.63
	96	18.71	
TOTAL:		848.37	

4.3 Pollutants of Concern

There is one (1) pollutant of concern that East Brandywine Township is required to address: sediment. To meet the permit requirements, a minimum ten (10) percent sediment reduction has been demonstrated in this plan. Though not required, existing loading and BMP reduction calculations were also provided for phosphorous and nitrogen (Appendix C).

4.4 Existing Sediment Loading

To determine existing sediment loading to Culbertson Run and Beaver Creek, the general methodology described in the DEP guidance document entitled “Pollution Reduction Plan: A Methodology” was utilized.

Per the “Pollutant Aggregation Suggestions for MS4 Requirements Table Instructions” (dated April 4, 2017) and the “Pollutant Aggregation Suggestions for MS4 Requirements Table (Municipal)” (revised April 25, 2017), East Brandywine Township may achieve the ten (10) percent sediment pollutant reduction across the entire Planning Area (i.e. storm sewersheds), as opposed to a 10 percent reduction in the Planning Areas for each receiving impaired surface water. This is due to the UNTs to Beaver Creek and Culbertson Run both sharing a common pollutant with the downstream HUC 10.

Utilizing ArcGIS 10.5, 2011 National Land Cover Dataset (NLCD) data, the acreage of each land cover classification type within the storm sewersheds was calculated. The aggregate NLCD statistics within the storm sewersheds for each impaired receiving water is compiled below with a breakdown of the area by land cover classification type. Refer to Appendix F for the Land Cover Map.

Table 5: NLCD 2011 Land Cover to Impervious/Pervious Conversion

Receiving Waters Impaired by Sediment	HUC 12	HUC 10	Number of Storm Sewersheds	NLCD 2011 Land Cover within Storm Sewersheds	Area (acres)	Percent Impervious	Impervious Area (acres)	Pervious Area (acres)
Culbertson Run/UNTs to Beaver Creek	Upper East Branch Brandywine Creek/Beaver Creek	East Branch Brandywine Creek	39	Cultivated Crops	100.29	0	0.00	100.29
				Deciduous Forest	131.54	0	0.00	131.54
				Developed, Open Space	227.12	19	43.15	183.97
				Developed, Low Intensity	99.59	49	44.99	46.83
				Developed, Medium Intensity	4.00	79	3.16	0.84
				Developed, High Intensity	0.22	100	0.22	0.00
				Evergreen Forest	6.03	0	0.00	6.03
				Grassland/Herbaceous	4.74	0	0.00	4.74
				Hay/Pasture	196.23	0	0.00	196.23
				Mixed Forest	1.37	0	0.00	1.37
				Shrub/Scrub	74.02	0	0.00	74.02
Woody Wetlands	3.22	0	0.00	3.22				
TOTAL:				848.37		95.33	753.04	

“Developed” land cover classifications were then converted to percent impervious coverage based on the NLCD 2011 definitions. The impervious percentages used are as follows:

- Developed, Open Space – 19% impervious

- Developed, Low Intensity – 49% impervious
- Developed, Medium Intensity – 79% impervious
- Developed, High Intensity – 100% impervious

All other land cover classifications were assumed to be 100 percent pervious. The “Developed Land Loading Rates for PA Counties” (Attachment B of the PRP Instructions) for Chester County were then applied for impervious developed and pervious developed land categories. This table is attached as Appendix B.

The existing sediment loading quantified from the entire Planning Area was 282,853.44 lbs./yr. A more detailed breakdown is located in Table 6 below. Please refer to Appendix D for supporting calculations.

Table 6: Existing Sediment Loading for Stormwater Outfalls to Sediment Impaired Streams

Receiving Waters Impaired by Sediment	Category	Area (ac)	TSS [Sediment] (lbs/yr)
Culbertson Run	Impervious, Developed	95.33	143,450.68
	Pervious, Developed	753.04	139,402.76
SUBTOTAL:		848.37	282,853.44
Existing BMP Reduction:			28,957.91
TOTAL:		848.37	253,895.53
Required 10% Reduction			25,389.55

Eight (8) existing BMPs were credited to reduce the existing sediment loading. Each BMP is described below and summarized in Table 7. Please refer to Appendix D for supporting calculations and the Storm Sewershed Map in Appendix E for BMP locations.

Brookhaven Lane Basin

This extended detention basin is located in the Hopewell development (NPDES Permit No. PAR10-G444, issued 7/19/2001), south of Brookhaven Lane and east of Grovehill Court. The basin is associated with Outfall #38, is functioning, and is operated and maintained by the Hopewell Homeowners Association. Refer to the photograph below as documentation.



Figure 3- Brookhaven Lane Basin

Ferndale Lane Basin

This extended detention basin is located in the Hopewell development (NPDES Permit No. PAR10-G444, issued 7/19/2001), on the west side of Grovehill Court. The basin is associated with Outfall #40, is functioning, and is operated and maintained by the Hopewell Homeowners Association. Refer to the photograph below as documentation.



Figure 4- Ferndale Lane Basin

Grovehill Court Basin

This extended detention basin is located in the Hopewell development (NPDES Permit No. PAR10-G444, issued 7/19/2001), south of Grovehill Court. The basin is associated with Outfall #39, is

functioning, and is operated and maintained by the Hopewell Homeowners Association. Refer to the photograph below as documentation.



Figure 5- Grovehill Court Basin

Cherry Grove Lane Basin

This extended detention basin is located in the Hopewell development (NPDES Permit No. PAR10-G444, issued 7/19/2001), south of Cherry Grove Lane. The basin is associated with Outfall #42, is functioning, and is operated and maintained by the Hopewell Homeowners Association. Refer to the photograph below as documentation.



Figure 6- Cherry Grove Lane Basin

Wellesley Lane Basin

This extended detention basin is located in the Hopewell development (NPDES Permit No. PAR10-G444, issued 7/19/2001), north of Hopewell Road and west of Ferndale Lane. The basin is

associated with Outfall #41, is functioning, and is operated and maintained by the Hopewell Homeowners Association. Refer to the photograph below as documentation.



Figure 7- Wellesley Lane Basin

Tarrytown Lane Basin

This extended detention basin is located in the Hopewell development (NPDES Permit No. PAR10-G444, issued 7/19/2001), west of Tarrytown Lane. The basin is associated with Outfall #43, is functioning, and is operated and maintained by the Hopewell Homeowners Association. Refer to the photograph below as documentation.



Figure 8- Tarrytown Lane Basin

N. Terralee Lane Basin

This extended detention basin is located in the Heatherwynd West development (NPDES Permit No. PAG2001504051, issued 9/1/2010), west of N. Terralee Lane. The basin is associated with Outfall

#96, is functioning, and is operated and maintained by Darrin and Margot Gardiner. Refer to the photograph below as documentation.



Figure 9- N. Terralee Lane Basin

S. Terralee Lane Basin

This underground infiltration basin is located in the Heatherwynd West development (NPDES Permit No. PAG2001504051, issued 9/1/2010), west of S. Terralee Lane. The basin is associated with Outfall #95, is functioning, and is operated and maintained by Michael Berardi. Refer to the photograph of the basin cleanout below as documentation.



Figure 10- S. Terralee Lane Basin

Table 7: Existing BMP Sediment Reduction

BMP Name	Drainage Area (ac)	TS [Sediment] Reduction
		lbs/yr
Brookhaven Lane Basin (Hopewell)	7.63	2,651.43
Ferndale Lane Basin (Hopewell)	11.75	3,316.42
Grovehill Court Basin (Hopewell)	6.65	2,077.32
Cherry Grove Lane Basin (Hopewell)	16.94	6,019.88
Wellesley Lane Basin (Hopewell)	5.67	1,940.75
Tarrytown Lane Basin (Hopewell)	20.25	4,661.02
N. Terralee Lane Basin (Heatherwynd West)	18.7	3,266.88
S Terralee Lane Underground Basin (Heatherwynd West)	23.62	5,024.21
TOTAL:	111.21	28,957.91

4.5 Proposed Best Management Practices (BMPs)

East Brandywine Township proposes to meet the required 10 percent sediment load reduction for Culbertson Run and UNTs to Beaver Creek by implementing stormwater improvements along Hawthorne Drive and a stream restoration project along Culbertson Run within five (5) years of the PA DEP approval date of this Pollutant Reduction Plan (PRP). These BMPs are described in more detail below. Maps of the proposed BMPs and their drainage areas are located in Appendix D. The BMP locations are also illustrated on the Storm Sewershed/Planning Area Map in Appendix E and the Land Cover Map in Appendix F.

BMP locations were identified by analyzing the most fiscally responsible solutions that will provide a water quality improvement and real-world benefit, while meeting the mandated pollutant reduction requirements. This analysis was performed in ArcMap 10.5 using aerial imagery, two (2)-foot topographic contours, and hydrologic data. Site visits were conducted to verify project viability and collect information and measurements of existing BMPs where applicable.

Where possible, BMPs that treat a larger drainage area were selected to reduce the number of BMPs to be implemented. Projects that are in planning or design phase within the Planning Area were prioritized (Hawthorne Drive Stormwater Improvements). After those opportunities were exhausted, existing BMPs on Township-owned property within the Planning Area were assessed for retrofit (East Brandywine Community Park Basin Retrofit). Lastly, new BMPs on Township-owned property within the Planning Area were explored (East Brandywine Community Park). BMPs on private property that maximize pollutant reduction credit were investigated.

Pollutant reductions resulting from the proposed BMPs were quantified using the same methodology described above for existing sediment loading with the drainage area delineated for each BMP, loading calculated based on impervious area, then applying reduction rates. Reductions from new BMPs were calculated using the efficiency rates specified in the NPDES Stormwater Discharges from Small MS4s BMP Effectiveness Values table (May 2016). Reductions from stream restorations were calculated using the methodology in the “Recommendations of the Expert Panel to Define Removal

Rates for Individual Stream Restoration Projects” (December 17, 2012). Please refer to Appendix C for supporting calculations. Calculations for phosphorous and nitrogen loading have also been provided, though not required.

Sediment load reductions achieved through the proposed implementation of these BMPs are located in Table 8 below. A total reduction of ten (10) percent has been achieved.

Table 8: Sediment Load Reductions from Proposed BMPs

Receiving Waters Impaired By Sediment	BMP Name	Drainage Area (ac)	TSS Reduction		
			lbs/yr	% Reduction	% of Required Reduction
Culbertson Run	Hawthorne Drive Subsurface Detention Bed A	4.50	260.07	0.1	1.0
	Hawthorne Drive Subsurface Infiltration Bed B	3.69	2,541.99	1.0	10.0
	Hawthorne Drive Subsurface Infiltration Bed C	1.96	1,258.12	0.5	5.0
	Hawthorne Drive Swale 1	0.27	89.12	0.03	0.3
	Hawthorne Drive Swale 2	0.28	86.53	0.03	0.3
	Hawthorne Drive Swale 3	0.22	83.93	0.03	0.3
	Hawthorne Drive Swale 4	0.15	47.15	0.02	0.2
	Hawthorne Drive Swale 6	0.17	68.22	0.02	0.2
	Hawthorne Drive Swale 8	6.11	1,909.51	0.75	7.5
	Culbertson Run Stream Restoration (425 LF)	393.09	19,074.00	7.5	75.0
TOTAL:		410.44	25,418.64		
			OVERALL:	10.01%	100.1%

The proposed BMPs are described in more detail below.

Hawthorne Drive Stormwater Improvements

Three (3) stormwater facilities will be implemented under Hawthorne Drive, a Township-owned road; including, one (1) subsurface detention bed and two (2) infiltration beds. Vegetated swales will be constructed within the road right-of-way to convey flow into these facilities, as well as existing storm drains (also proposed for replacement). These stormwater improvements will address an ongoing erosion issue with the existing roadside swales. The stormwater improvements have a combined drainage area of 17.35 acres and will achieve a total sediment reduction of 6,344.64 lbs/yr. The impaired receiving stream for these improvements is Culbertson Run, which is located within the Upper East Branch Brandywine Hydrologic Unit Code (HUC) 12.

Culbertson Run Stream Restoration

A minimum of 425 linear feet of stream restoration is proposed along Culbertson Run on a property owned by the Estates at Hideaway Homeowners Association. This reach of stream is severely eroded and actively incising. Some of the drainage area to the proposed project location was already

included in the Planning Area. The portions of the drainage area to the proposed stream restoration project location that were not included in the Planning Area were added. Therefore, the existing pollutant load reflects the entire drainage area to the proposed project location within the Township boundary.

This stream restoration project will meet the qualifying criteria outlined in the document published by PA DEP on June 22, 2017 entitled “Considerations of Stream Restoration Projects in Pennsylvania for eligibility as an MS4 Best Management Practice”. A feasibility study will be conducted to identify specific design recommendations, ideal project length, and potential project partners.

4.6 Funding Mechanisms

The funding mechanisms and estimated costs for the implementation of each proposed BMP are included in Table 9. The costs provided are conceptual, to be utilized for preliminary planning purposes only, and subject to change. If the linear feet of the Culbertson Run stream restoration project increases, the total estimated cost will increase. It is anticipated that East Brandywine Township will be funding all proposed BMPs unless grant money is secured.

Table 9: Proposed BMP Funding Mechanisms

Proposed BMP	Property Owner	Funding Mechanism	Estimated Design Cost ¹	Estimated Construction Cost ²	Total Estimated Cost
Hawthorne Drive Infiltration Trenches (5)	East Brandywine Township	East Brandywine Township (2016 Growing Greener Grant Application pending)	\$49,000	\$492,250	\$541,250
Culbertson Run Stream Restoration	Estates at Hideaway Homeowners Association	East Brandywine Township	\$79,200	\$129,000	\$208,200
TOTAL:			\$128,200	\$621,250	\$749,450

¹Estimated Design Cost includes survey, design, engineering, any anticipated permitting, bid administration, and construction inspection. Developed based on 2017-2018 costs/rates.

²Estimated Construction Cost includes construction, materials, and as-built survey. Developed based on 2017-2018 costs/rates. It does NOT include costs associated with operations and maintenance (O&M).

4.7 Operations and Maintenance

To ensure the long-term effectiveness of these proposed BMPs, operation and maintenance (O&M) is crucial. As all the proposed BMPs are on Township property, it will be the responsibility of the Township to maintain the integrity of these facilities. The chart below (Table 10) outlines the responsible party and the necessary O&M practices required for each proposed BMP (Pennsylvania Stormwater BMP Manual, December 30, 2006).

As the current property owner, the Township is already performing some level of maintenance for these areas through mowing and sediment and debris removal. As a result, the anticipated increased operations and maintenance expenses of the new and/or retrofitted facilities in these locations will be minimal.

Table 10: Proposed BMP O&M Responsibilities

Proposed BMP	Property Owner	Responsible Party for O&M	O&M Responsibilities
Hawthorne Drive Stormwater Improvements	East Brandywine Township	East Brandywine Township	<ul style="list-style-type: none"> • Inspect at least 2x per year • Clean inlets at least 2x per year • Maintain vegetation • Prohibit vehicular access • Avoid excessive compaction by mowers
Culbertson Run Stream Restoration	Estates at Hideaway Homeowners Association	East Brandywine Township	<ul style="list-style-type: none"> • Inspect at least 2x per year • Avoid excess use of fertilizers, pesticides, or other chemicals • Mow surrounding area as appropriate (remove clippings) • Remove invasive species • Remove debris

5.0 Conclusion

The required ten (10) percent sediment reduction has been achieved through the proposed implementation of the Hawthorne Drive Stormwater Improvements and a stream restoration project along Culbertson Run. These BMPs will be implemented within five (5) years of the PA DEP approval date of this Pollutant Reduction Plan (PRP).

6.0 Definitions

Best Management Practices (BMPs): Schedules of activities, prohibitions of practices, structural controls (e.g., infiltration trenches), design criteria, maintenance procedures, and other management practices to prevent or reduce pollution to the waters of the Commonwealth. BMPs include Erosion and Sedimentation Control Plans, Post Construction Stormwater Management Plans, MS4 TMDL Plans, Stormwater Management Act Plans, and other treatment requirements, operating procedures and practices to control runoff, spillage or leaks, sludge or waste disposal, drainage from raw material storage, and methods to reduce pollution, to recharge groundwater, to enhance stream base flow and to reduce the threat of flooding and stream bank erosion. [NPDES Stormwater Discharges from Small MS4s General Permit 5/2016 (PAG-13)]

Municipal Separate Storm Sewer System (MS4): All separate storm sewers that are defined as “large” or “medium” or “small” municipal separate storm sewer systems pursuant to 40 CFR §§ 122.26(b)(18), or designated as regulated under 40 CFR § 122.26(a)(1)(v). [PAG-13]

National Pollutant Discharge Elimination System (NPDES): A permit issued under 25 Pa. Code Chapter 92a (relating to National Pollutant Discharge Elimination System permitting, monitoring and compliance) for the discharge or potential discharge of pollutants from a point source to surface waters. [PAG-13]

Outfall: A “Point Source” as defined by 40 CFR § 122.2 is the point where an MS4 discharges stormwater to other surface waters of this Commonwealth. This does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream and are used to convey waters of the Commonwealth (40 CFR § 122.26 (b) (9)). [PAG-13]

Owner or operator: The owner or operator of any “facility” or “activity” subject to regulation under the NPDES program. [PAG-13]

Parsing: A process in which land area is removed from a Planning Area in order to calculate the actual or target pollutant loads that are applicable to an MS4. [NPDES from Small MS4 PRP Instructions- Attachment A]

Planning Area: All of the storm sewersheds that an MS4 must calculate existing loads and plan load reductions for. [NPDES from Small MS4 PRP Instructions]

Point Source: A discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, Concentrated Aquatic Animal Production Facility (CAAP), Concentrated Animal Feeding Operation (CAFO), landfill leachate collection system, or vessel or other floating craft from which pollutants are or may be discharged. (25 Pa. Code § 92a.2). [PAG-13]

Pollutant: Any contaminant or other alteration of the physical, chemical, biological, or radiological integrity of surface water which causes or has the potential to cause pollution as defined in section 1 of The Clean Streams Law, 35 P.S. § 691.1. [PAG-13]

Storm Sewershed: The catchment area that drains into the storm sewer system based on the surface topography in the area served by the storm sewer. (Source: NPDES Stormwater Discharges from Small MS4s General Permit [PAG-13])

Stormwater: Runoff from precipitation, snow melt runoff and surface runoff and drainage. “Stormwater” has the same meaning as “Storm Water.” (Source: NPDES Stormwater Discharges from Small MS4s General Permit [PAG-13])

Urbanized Area (UA): Land area comprising one or more places (central place(s)) and the adjacent densely settled surrounding area (urban fringe) that together have a residential population of at least 50,000 and an overall population density of at least 1,000 people per square mile, as defined by the United States Bureau of the Census and as determined by the latest available decennial census. The UA outlines the extent of automatically regulated areas. UA maps are available at: <http://www.epa.gov/npdes/stormwater/urbanmaps>, or at: <http://www.epa.gov/enviro/html/em/index.html>. [PAG-13]

Appendix A

Public Comment and Responses

PHILADELPHIA GROUP

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RECEIVED

APR 23 2018

EAST BRANDYWINE TOWNSHIP
1214 HORSESHOE PIKE
DOWNINGTOWN, PA 19335
Attention:

EAST BRANDYWINE TWP.

SCANNED

STATE OF PENNSYLVANIA,
COUNTY OF MONTGOMERY

PUBLIC NOTICE

The undersigned *Maureen Schmidt*, being duly sworn the he/she is the principal clerk of Daily Local News, Daily Local News Digital, published in the English language for the dissemination of local or transmitted news and intelligence of a general character, which are duly qualified newspapers, and the annexed hereto is a copy of certain order, notice, publication or advertisement of:

The updated East Brandywine Township Pollutant Reduction Plan for Culbertson Run and unnamed tributaries to Beaver Creek is available for public review on the Township website at www.ebrandywine.org and by request at the Township Building at 1214 Horseshoe Pike, Downingtown, PA 19335. Written comments from the public will be accepted for a period of 30 days from the date of this public notice. Verbal and written comments will also be accepted during the Board of Supervisors workshop meeting scheduled for May 3, 2018 at 8:00am at the Township Building. The Pollutant Reduction Plan describes proposed measures to be taken to reduce sediment pollution to Culbertson Run and unnamed tributaries to Beaver Creek within East Brandywine Township and is a requirement of the Township's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit. DL-Apr 20-1a

EAST BRANDYWINE TOWNSHIP

Published in the following edition(s):

Daily Local News 04/12/18
Daily Local News Digital 04/12/18

Sworn to the subscribed before me this 4/12/18

Jacqueline A. Kelly
Notary Public, State of Pennsylvania
Acting in County of Montgomery

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
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**EAST BRANDYWINE TOWNSHIP BOARD OF SUPERVISORS
WORK SESSION
May 3, 2018**

Those in Attendance:

Kyle P. Scribner, Chairman
Jay G. Fischer, Esquire, Vice-Chairman
Jason R. Winters, Member
Scott Piersol, Township Manager
Luke Reven, Assistant Township Manager
Mark Kocsi, Chief of Police
Matthew VanLew, Roadmaster
Kristin S. Camp, Esquire, Township Solicitor
Mary Kemble Slade, Secretary/Treasurer

The East Brandywine Township Board of Supervisors meeting of Thursday, May 3, 2018, was called to order by Chairman Scribner at 8:00 A.M. at the East Brandywine Township Municipal Complex.

Opening of Meeting

Chairman Scribner announced that this morning's meeting is being audio and video recorded.

EBT Police Department

Chairman Scribner introduced the swearing in of Officer Tanner Smith, Corporal Dan Orris, and Lieutenant Jeffery Yankanich. Chief Kocsi began by welcoming all in attendance. He advised that due to the retirement of Lt. Babetski earlier in the month, opportunity had been presented for other officers. The Honorable District Judge Jeffrey Valocchi presided over the swearing in ceremonies. The Board of Supervisors, staff and audience congratulated the Officers and their families were invited for refreshments at the conclusion of the ceremony.

Public Comment on Non-Agenda Items

Chairman Scribner asked if there were comments on non-agenda items. He reminded the audience of Rules for Conduct at Public Meetings, established by Resolution 2001-08, and stated, "The times allocated to each individual making comments shall be three minutes, unless otherwise set by the presiding officer under 4c. Additional public comment may be granted by the presiding officer at the conclusion of the meeting."

Beth Uhler from Cedarville Engineering was present to receive and discuss any comments related to the Public Participation component of the NPDES MS4 Permit Pollutant Reduction Program ("PRP"). Ms. Uhler noted the application for the new permit was submitted in September 2017 and, as part of this permit application, the Township is required to reduce pollutants by 10% over the next 5 years. The application proposed the Hawthorne Drive Project and a basin retrofit project in Community Park as two projects to implement to reduce sediment. A comment letter from PADEP was received in February that suggested revisions to the two

projects which led to the Public Participation requirement. The Community Park project was removed from the list as part of this process while the Hawthorne Drive Project is working through the design component. On April 12, 2018, a public notice was issued, with the plans for this project being available for review both online and at the Township offices. Today's date falls within the 30-day comment period to have a public meeting. Vice-Chairman Fischer asked if there were any public comments to date. Ms. Uhler noted the HOA Board has asked that the Hatchery be removed and Cedarville is looking into that possibility. He also asked if Ms. Uhler thought the next permit would require another 10% reduction over the next 5 years after this initial 5-year permit period. She noted that it appears that is how PADEP is looking at structuring the permitting until the streams are de-listed.

Supervisor Winters noted this was not listed as an agenda item. Ms. Uhler advised the notice published in the newspaper on April 12th established the public comment period, and that her meeting attendance was a formality. Chairman Scribner restated that residents can comment on this plan until the end of the 30-day comment period. Solicitor Camp inquired how often public comment is received, and Ms. Uhler responded that it is typically minimal.

Minutes: Board of Supervisors – April 19, 2018

Chairman Scribner noted the April 19, 2018 minutes were offered for consideration. Vice-Chairman Fischer made a motion to approve the minutes as presented. Chairman Scribner seconded the motion, with all members voting Aye. Motion passed 3-0.

Minutes: Planning Commission – April 4, 2018

Chairman Scribner noted the April 4, 2018 minutes were offered for consideration. Vice-Chairman Fischer made a motion to approve the minutes as presented. Chairman Scribner seconded the motion, with all members voting Aye. Motion passed 3-0.

Pension Committee Items

Vice-Chairman Fischer made a motion to appoint Manager Piersol as the East Brandywine Township Pension Plans CFO. Chairman Scribner asked what this was for. Manager Piersol noted this reappointment was overlooked as part of the appointments at the annual reorganization meeting. He noted this reappointment allows the Township Manager to sign all of the required paperwork for the uniformed and non-uniformed pension plans. Supervisor Winters expressed reservations, and therefore Chairman Scribner tabled action on the motion until the next meeting.

Vice-Chairman Fischer made a motion to appoint Officer John Hayes to the Uniformed Pension Committee. Chairman Scribner seconded the motion, with all members voting Aye. Motion passed 3-0.

Solicitor Camp provided an overview of an Ordinance amendment related to the Collective Bargaining Agreement currently in place, which calls for the police pension plan to receive a service increment benefit. She explained changes in the plan must be addressed through the

Ordinance process. This amendment adds a new subsection (d) stating that any eligible participant shall receive a service increment benefit of \$100 per month for each completed year of benefit service in excess of 25. The total service increment benefit shall not exceed \$500 per month after the participant has completed 5 years of benefit service in excess of 25 years. Manager Piersol requested permission to advertise this Ordinance amendment. Vice-Chairman Fischer motioned to advertise. Chairman Scribner seconded the motions, with all members voting Aye. Motion passed 3-0.

Old Business - None

New Business

Lieutenant Yankanich Contract Approval

Vice-Chairman Fischer made a motion to approve the Contract for Lieutenant Yankanich as presented. Chairman Scribner seconded the motion, with all members voting Aye. Motion passed 3-0.

Subdivision & Zoning Applications

Planebrook Partners, 321 Zynn Road-Vic Kelly of Commonwealth Engineers and Scott Risbon of Planebrook Partners attended the meeting seeking final subdivision and land development plan approval for this project. Solicitor Camp asked Mr. Kelly if there was only one waiver being requested (Section 350-46.A regarding monuments). Mr. Kelly indicated that was correct. Solicitor Camp advised that the Township Planning Commission recommended final plan approval subject to a clean review letter from Pennoni, executing all of the necessary legal agreements such as the Stormwater Management Agreement, Developer Agreement, Financial Security Agreement, payment of the Fee in Lieu of Open Space, and approval of the requested waiver. Solicitor Camp recommended payment of the traffic impact fee should also be included in the Board's motion.

Chairman Scribner noted for the record that he will recuse himself from voting in this matter, due to the fact that he has a relationship with Planebrook Partners. Vice-Chairman Fischer advised that he is the attorney for the Gindin estate, and has been advised by the solicitor that he must note this for the record; however, that does not require him to recuse himself from consideration of this application. Vice-Chairman Fischer asked Mr. Kelly if there are any concerns with complying with the outstanding items listed in the Pennoni letter. Mr. Kelly advised there are none. There were no other questions.

Vice-Chairman Fischer made a motion to grant final subdivision and land development plan approval of Planebrook Partners, LLC, for 321 Zynn Road, subject to compliance with all of the outstanding conditions of the March 28, 2018 Pennoni letter, obtaining sewage facilities planning module approval, and payment of all Township fees and outstanding engineering fees to be paid by the Applicant. Mr. Risbon presented a check to Ms. Norann King, Permits Administrator, for

the outstanding engineering fees. Supervisor Winters seconded the motion, and Chairman Scribner abstained. Motion passed 2-0.

Mapleview-The applicant issued a letter dated February 16, 2018 requesting a reduction in the traffic impact fees required for this project. Solicitor Camp noted the amount required is \$308,000.00 and that the Applicant believes some of this amount should be offset by the improvements being proposed as part of the project. Solicitor Camp indicated she has met with Nate Cline of Pennoni and Manager Piersol, and has developed a draft letter for the Board's consideration that outlines the traffic fees applicable. Solicitor Camp also addressed the Fee in Lieu of Open Space item raised by the Applicant. She indicated the work proposed allows for a credit in the amount of \$174,429, resulting in the amount required for Fee in Lieu of Open Space as \$133,571. Lastly, there is an amount of \$20,000 which the Township previously agreed to allow to be used from the traffic impact fees towards right of way acquisition for the Horseshoe Pike/Hopewell Intersection work. Supervisor Winters asked if the \$20,000 was adequate to acquire the necessary easements. Solicitor Camp advised that Pulte is required to secure the easements. With that stated, Solicitor Camp asked for the Board's approval to send the draft letter to the Applicant. Vice-Chairman Fischer motioned to give Mapleview a credit of \$174,429 towards their in their Fee in Lieu of Open Space and require them to pay \$133,571, and to authorize Solicitor Camp to issue the letter as drafted. Chairman Scribner seconded the motion, with all members voting Aye. Motion passed 3-0.

Ordinances & Resolutions for Consideration

Correction to Resolution 12 of 2018 dated April 19, 2018 to instead reflect Resolution 13 of 2018 dated April 19, 2018

This corrects the resolution number for the acceptance of a deed of dedication for a public street/road and stormwater management facilities for Kestrel Drive. Vice-Chairman Fischer made a motion to adopt Resolution 13 of 2018. Chairman Scribner seconded the motion, with all members voting Aye. Motion passed 3-0.

Public Comment

Chairman Scribner asked if there were additional public comments from the audience. There were none.

NOTICES

Chairman Scribner announced that the Board of Supervisors will meet immediately following the meeting for the Uniform and Non-Uniform Pension Committee meeting.

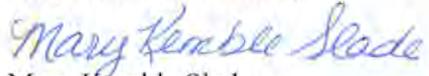
Chairman Scribner announced that the Board of Supervisors will meet in Executive Session following the Pension Committee meeting to discuss legal and personnel matters.

East Brandywine Township Board of Supervisors
May 3, 2018
Page 5

Adjournment

Vice-Chairman Fischer made a motion to adjourn the public meeting at 8:36 A.M. Chairman Scribner seconded the motion, with all members voting Aye. Motion passed 3-0

Respectfully submitted,



Mary Kemble Slade
Secretary/Treasurer

Beth Uhler

From: Maggie Trio <Maggie.Trio@associa.us>
Sent: Monday, April 30, 2018 3:43 PM
To: Matthew VanLew
Cc: Beth Uhler; Scott T. Piersol
Subject: RE: East Brandywine Township

Matthew:

Good afternoon, I met with the Board in April , we discussed the notice you had sent regarding the plan to reduce sediment and pollution in the tow streams. The Board is requesting that the Township consider demolishing the Hatchery as part of the plan. Please let me know if you have any further questions regarding the matter and thank you for your consideration. Also, Estates is having their Annual Meeting on Thursday, July 26th at 6:30. If you wish to attend, you could discuss with the Community. Thank you.

Best Regards,

Maggie Trio

Community Manager

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F: 610-834-7541

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From: Matthew VanLew [mailto:roadmaster@ebrandwine.org]

Sent: Wednesday, April 11, 2018 3:23 PM

To: Maggie Trio <Maggie.Trio@associa.us>

Cc: Beth Uhler <buhler@cedarvilleeng.com>; Scott T. Piersol <scottpiersol@ebrandywine.org>

Subject: East Brandywine Township

Good afternoon Ms. Trio,

East Brandywine Township is required by DEP to develop a plan to reduce sediment and pollution in two streams in the Township. These streams are listed as impaired by DEP. One of the streams is in the southern portion of the Township which essentially flows from behind the Township Building to Beaver Creek at the intersection of Bondsville and Hadfield Roads.

The second stream, Culbertson Run, is partially located in the Hideaway Development. Culbertson Run starts in West Brandywine Township, crosses under 322 in East Brandywine near the Downingtown National Bank and eventually into the Hideaway Development. It continues winding its way to the East Branch of the Brandywine in Lyndell. There is a tributary to Culbertson Run which flows through the center of the Development which is also considered impaired.

We are required to have a Pollutant Reduction Plan (PRP) submitted to DEP this year. Our original plan included installation of sub-surface stormwater basins in the Culbertson Run Development and stormwater Best Management Practices BMPs in the Township's Community Park located on Dilworth Road. This original plan was considered as deficient by DEP due to the Township not including additional area in the planning.

Our latest plan still includes the work in the Culbertson Run Development but also includes stream restoration within the Hideaway Development. As stated, this is just a plan, we would need a more formal plan to present to the HOA to see if they would be interested in pursuing the restoration. We just want to advise you of the current plan so you didn't read of it elsewhere. The cost of the plan and restoration would be the responsibility of the Township.

I have enclosed our Pollutant Reduction Plan which is also available on line at www.EBrandywine.org . We hope to meet with you and the HOA in the future for additional information and to see if you are interested in the project.

Thank you,

Matthew T. VanLew
Township Roadmaster

East Brandywine Township
1214 Horseshoe Pike
Downingtown, PA 19335



Phone: 610.269.8230 x 204
Fax: 610.269.4157

Email: Roadmaster@Ebrandywine.org
Web: www.EBrandywine.org

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BEN FRANKLIN

PHILADELPHIA GROUP

AFFIDAVIT OF PUBLICATION
307 Derstine Avenue • Lansdale, PA 19446

EAST BRANDYWINE TOWNSHIP
1214 HORSESHOE PIKE
DOWNINGTOWN, PA 19335
Attention:

STATE OF PENNSYLVANIA,
COUNTY OF MONTGOMERY

The undersigned *Rachel Vincent*, being duly sworn the he/she is the principal clerk of Daily Local News, Daily Local News Digital, published in the English language for the dissemination of local or transmitted news and intelligence of a general character, which are duly qualified newspapers, and the annexed hereto is a copy of certain order, notice, publication or advertisement of:

PUBLIC NOTICE
The East Brandywine Township Pollutant Reduction Plan for Culbertson Run and unnamed tributaries to Beaver Creek is available for public review on the Township website at www.ebrandywine.org and by request at the Township Building at 1214 Horseshoe Pike, Downingtown, PA 19335. Written comments from the public will be accepted for a period of 30 days from the date of this public notice. Verbal and written comments will also be accepted during the Board of Supervisors workshop meeting scheduled for June 1, 2017 at 8:00am at the Township Building. The Pollutant Reduction Plan describes proposed measures to be taken to reduce sediment pollution to Culbertson Run and unnamed tributaries to Beaver Creek within East Brandywine Township and is a requirement of the Township's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit.
dln. 5/25 - 1a.

EAST BRANDYWINE TOWNSHIP

Published in the following edition(s):

Daily Local News 05/25/17
Daily Local News Digital 05/25/17

Sworn to the subscribed before me this 5/31/2017.

Maureen Schmid
Notary Public, State of Pennsylvania
Acting In County of Montgomery

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MAUREEN SCHMID, Notary Public
Lansdale Boro., Montgomery County
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RESPONSE DOCUMENT FOR EAST BRANDYWINE TOWNSHIP'S POLLUTANT REDUCTION PLAN

Culbertson Run and Unnamed Tributaries to Beaver Creek

Comment #1: Submitted by Michael Mize on June 6, 2017

Hi - I am a resident of Culbertson Run and I have reviewed (to the best of my ability) the Hawthorne Drive Comprehensive Stormwater Management Study and the more recent MS4 Pollutant Reduction Plan. My only question regarding the sensitive topic of potential tree removal - is there any calculation that acknowledges the likely increase in stormwater runoff due to the removal of the trees?

I do not have exact numbers but have found various articles which indicate that mature London Plane trees intercept over 1,000 gallons of stormwater per year.

Response: East Brandywine Township understands residents' concerns regarding removal of trees for stormwater projects. In most instances, trees are beneficial for stormwater management by contributing to infiltration and evapotranspiration. This is not the circumstance at the Hawthorne Drive location. These trees are located within the stormwater collection and conveyance system (i.e. roadside swales) and are causing accelerated erosion and sedimentation as evidenced by the erosion features in and around the trees. In order to adequately address these erosion issues, some of the trees will need to be removed.

**EAST BRANDYWINE TOWNSHIP BOARD OF SUPERVISORS
WORK SESSION
Thursday, June 1, 2017**

Those in Attendance:

Jay G. Fischer, Chairman
Arnold M. Kring, Vice-Chairman
Kyle P. Scribner, Member
Scott T. Piersol, Township Manager
Luke R. Reven, Assistant Township Manager
Mark Kocsi, Chief of Police
Matthew T. VanLew, Roadmaster
Mary Beth Smedley, Secretary/Treasurer

Chairman Fischer called the East Brandywine Township Board of Supervisors meeting of Thursday, June 1, 2017 to order at 8:00 A.M. at the East Brandywine Township Municipal Complex. There were four visitors present.

Presentation of LTAP Certificate to Christopher Ott

Mr. VanLew said that Township employee Christopher Ott recently received a certificate of achievement for the LTAP Roads Scholar Program. Offered by the Pennsylvania Local Technical Assistance Program (LTAP), the program provides an opportunity for municipal employees to be trained by LTAP's professional team in the latest road-related technologies and innovations. The program provides a professional certification to municipal employees and officials who attend 10 LTAP workshops within a 3-year period. During these workshops, participants are educated on up-to-date maintenance and safety topics taught by LTAP's technical experts. Mr. VanLew said it was his privilege to present this Certificate to Chris for this accomplishment. The Board and other employees in attendance congratulated Mr. Ott.

Public Comment on Non-Agenda Items

Chairman Fischer asked if there were comments on non-agenda items. There were no public comments.

Approval of the Board of Supervisors Minutes for May 17, 2017

Chairman Fischer asked if there were any questions or comments. There were no comments. Vice-Chairman Kring then made a motion to approve the May 17, 2017 minutes. Mr. Scribner seconded the motion with all voting Aye.

Resolution 12 of 2017 – PennDOT Electronic Document Filing of Liquid Fuels Forms

Mrs. Smedley explained that this Resolution allows the Township to use the dotGrants on-line reporting system to file the required Liquid Fuels forms annually and designated the Township Roadmaster and Secretary/Treasurer to act on behalf of the Township. Vice-Chairman Kring

made a motion to adopt Resolution 12 of 2017. Mr. Scribner seconded the motion, with all voting Aye.

Request to waive permit fee for Bradford Davis, U.S. Army (Retired) from the Chester County Department of Veteran's Affairs

Township resident Bradford Davis and Bill Pinamont from the Chester County Department of Veterans' Affairs asked the Board to consider waiving the fee for a building permit that was recently submitted by Mr. Davis. Mr. Davis served as a Field Artillery Officer with almost two years of Foreign Service, including a tour of duty in Afghanistan. He was awarded the Bronze Star, Purple Heart, Combat Action Badge, Army Commendation and two Army Achievement Medals. He was retired from the military after almost five years of service due to his disabilities related to his combat action. Mr. Kring made a motion to waive the fees associated with Mr. Davis' building permit. Mr. Scribner seconded the motion, with all voting Aye.

Act 172 of 2016 – Volunteer Fire & EMS Personnel Tax Credits

A new law passed by the General Assembly is aimed at helping municipalities retain dwindling numbers of volunteer firefighters and EMTs. The ranks of volunteer firefighters in Pennsylvania has dropped from 300,000 in 1977 to about 50,000 today.

Act 172 of 2016 allows municipalities to grant tax credits on Earned Income and Property Taxes to active volunteer firefighters and emergency medical service volunteers. The tax credit can be up to 20% of volunteer's tax liability. Municipalities may base the credit on the number of calls a volunteer responds to, a volunteer's participation in training, or time spent on fund raising, equipment maintenance and other functions. According to statistics, volunteer first responders save municipalities in Pennsylvania nearly \$10 billion a year in local tax savings.

The Board of Supervisors supported the concept and asked Mr. Piersol to continue to pursue information on how this could be accomplished. Not all volunteer firefighters and emergency responders live or work in East Brandywine Township so this may be an issue that can be discussed at a COG meeting or with other nearby municipalities.

Cedarville Engineering Group Pollution Reduction Plan Presentation

Beth Uhler from Cedarville Engineering attended the meeting to discuss the Township's MS4 Pollutant Reduction Plan. Communities that have NPDES Municipal Separate Storm Sewer System (MS4) permits must address new requirements for the 2018 permit, which are due to the Pennsylvania Department of Environmental Protection on September 16, 2018, with the next MS4 permit application/Notice of Intent. These new requirements involve development plans to design and construct stormwater projects with Best Management Practices (BMPs) to reduce pollutants from municipal storm sewer systems to impaired streams over the five (5) year permit term (March 16, 2018 – March 15, 2023).

East Brandywine is required to reduce sediment pollution to Culbertson Run and unnamed tributaries to Beaver Creek by 10% by implementing BMPs. Cedarville Engineering has been working on a Pollutant Reduction Plan to meet these requirements by the proposal dated September 14, 2016. Chairman Fischer asked if PADEP would require another 10% reduction for the next round as a new basis. Ms. Uhler said they could and there could be new areas that are considered impaired as well.

The development of the Pollutant Reduction Plan involved utilizing Geographic Information System (GIS) mapping, calculating existing pollutant loading, and pollutant reductions achieved through the implementation of BMPs.

BMP locations were identified by analyzing solutions that will provide water quality improvement and real-world benefit, while meeting the mandated pollutant reduction requirements. Site visits were conducted to verify project viability and collect information and measurements of existing BMPs.

After analyzing all available information and assessing alternatives, Cedarville showed that East Brandywine would meet pollutant reduction requirements through the implementation of three BMP's on Township-owned property, along Hawthorne Drive within infiltration trenches, and a new bioswale and retrofit in an existing basin in the East Brandywine Community Park. The cost will total approximately \$422,000 for the projects.

The Pollutant Reduction Plan is available for public review and comments for a period of thirty days. A notice was published in the Daily Local News on May 25, 2017 and on the Township's Facebook page and website.

The Board asked whether there was funding for the projects. Ms. Uhler said that the Township has applied for a Growing Greener grant for Hawthorne Drive but the grant has not yet been awarded. Other than applying for grants, municipalities are financially responsible for funding the projects.

Mr. Scribner wondered whether the Township could charge developers for the projects. Ms. Uhler said she was not sure that developers could be charged for improvements that were not part of their project. Some municipalities are looking at a dedicated stormwater tax since it is expected that the stormwater regulations from PADEP will be very expensive to implement.

Mr. Piersol asked about sediment from the Culbertson Run that originates in another municipality. Mr. Uhler said that PADEP does not factor other municipalities into sediment pollution in neighboring municipalities. However, joint projects to reduce sediment can be considered.

Mr. George Holmes said that when he lived on Little Washington Road, an inch or more of rainfall could erode the stream bank. He wondered if PADEP considered this erosion. Ms. Uhler stated that it was challenging to regulate, but that even mowing can cause erosion of stream banks.

The Board thanked Ms. Uhler for her presentation.

Additional Public Comment

Chairman Fischer asked if there were additional public comments. There were no comments.

Adjournment

There being no further business, Vice-Chairman Kring moved to adjourn the meeting at 9:00 A.M. Mr. Scribner seconded the motion, with all voting Aye.

Respectfully submitted,

A handwritten signature in cursive script that reads "Mary Beth Smedley".

Mary Beth Smedley
Secretary/Treasurer

Appendix B

Developed Land Loading Rates for PA Counties

ATTACHMENT B

DEVELOPED LAND LOADING RATES FOR PA COUNTIES^{1,2,3}

County	Category	Acres	TN lbs/acre/yr	TP lbs/acre/yr	TSS (Sediment) lbs/acre/yr
Adams	impervious developed	10,373.2	33.43	2.1	1,398.77
	pervious developed	44,028.6	22.99	0.8	207.67
Bedford	impervious developed	9,815.2	19.42	1.9	2,034.34
	pervious developed	19,425	17.97	0.68	301.22
Berks	impervious developed	1,292.4	36.81	2.26	1,925.79
	pervious developed	5,178.8	34.02	0.98	264.29
Blair	impervious developed	3,587.9	20.88	1.73	1,813.55
	pervious developed	9,177.5	18.9	0.62	267.34
Bradford	impervious developed	10,423	14.82	2.37	1,880.87
	pervious developed	23,709.7	13.05	0.85	272.25
Cambria	impervious developed	3,237.9	20.91	2.9	2,155.29
	pervious developed	8,455.4	19.86	1.12	325.3
Cameron	impervious developed	1,743.2	18.46	2.98	2,574.49
	pervious developed	1,334.5	19.41	1.21	379.36
Carbon	impervious developed	25.1	28.61	3.97	2,177.04
	pervious developed	54.2	30.37	2.04	323.36
Centre	impervious developed	7,828.2	19.21	2.32	1,771.63
	pervious developed	15,037.1	18.52	0.61	215.84
Chester	impervious developed	1,838.4	21.15	1.46	1,504.78
	pervious developed	10,439.8	14.09	0.36	185.12
Clearfield	impervious developed	9,638.5	17.54	2.78	1,902.9
	pervious developed	17,444.3	18.89	1.05	266.62
Clinton	impervious developed	7,238.5	18.02	2.80	1,856.91
	pervious developed	11,153.8	16.88	0.92	275.81
Columbia	impervious developed	7,343.1	21.21	3.08	1,929.18
	pervious developed	21,848.2	22.15	1.22	280.39
Cumberland	impervious developed	8,774.8	28.93	1.11	2,065.1
	pervious developed	26,908.6	23.29	0.34	306.95
Dauphin	impervious developed	3,482.4	28.59	1.07	1,999.14
	pervious developed	9,405.8	21.24	0.34	299.62
Elks	impervious developed	1,317.7	18.91	2.91	1,556.93
	pervious developed	1,250.1	19.32	1.19	239.85
Franklin	impervious developed	13,832.3	31.6	2.72	1,944.85
	pervious developed	49,908.6	24.37	0.76	308.31
Fulton	impervious developed	3,712.9	22.28	2.41	1,586.75
	pervious developed	4,462.3	18.75	0.91	236.54
Huntington	impervious developed	7,321.9	18.58	1.63	1,647.53
	pervious developed	11,375.4	17.8	0.61	260.15
Indiana	impervious developed	589	19.29	2.79	1,621.25
	pervious developed	972	20.1	1.16	220.68
Jefferson	impervious developed	21.4	18.07	2.76	1,369.63
	pervious developed	20.4	19.96	1.24	198.60
Juniata	impervious developed	3,770.2	22.58	1.69	1,903.96
	pervious developed	8,928.3	17.84	0.55	260.68
Lackawana	impervious developed	2,969.7	19.89	2.84	1,305.05
	pervious developed	7,783.9	17.51	0.76	132.98
Lancaster	impervious developed	4,918.7	38.53	1.55	1,480.43
	pervious developed	21,649.7	22.24	0.36	190.93
Lebanon	impervious developed	1,192.1	40.58	1.85	1,948.53
	pervious developed	5,150	27.11	0.4	269.81
Luzerne	impervious developed	5,857	20.43	3	1,648.22
	pervious developed	13,482.9	19.46	0.98	221.19
Lycoming	impervious developed	10,031.7	16.48	2.57	1,989.64
	pervious developed	19,995.5	16	0.84	277.38

County	Category	Acres	TN lbs/acre/yr	TP lbs/acre/yr	TSS (Sediment) lbs/acre/yr
McKean	impervious developed	38.7	20.93	3.21	1,843.27
	pervious developed	5.3	22.58	1.45	249.26
Mifflin	impervious developed	5,560.2	21.83	1.79	1,979.13
	pervious developed	16,405.5	21.13	0.71	296.07
Montour	impervious developed	5,560.2	21.83	1.79	1,979.13
	pervious developed	16,405.5	21.13	0.71	296.07
Northumberland	impervious developed	8,687.3	25.73	1.54	2,197.08
	pervious developed	25,168.3	24.63	0.54	367.84
Perry	impervious developed	5,041.1	26.77	1.32	2,314.7
	pervious developed	9,977	23.94	0.51	343.16
Potter	impervious developed	2,936.3	16.95	2.75	1,728.34
	pervious developed	2,699.3	17.11	1.09	265.2
Schuylkill	impervious developed	5,638.7	30.49	1.56	1,921.08
	pervious developed	14,797.2	29.41	0.57	264.04
Snyder	impervious developed	4,934.2	28.6	1.11	2,068.16
	pervious developed	14,718.1	24.35	0.4	301.5
Somerset	impervious developed	1,013.6	25.13	2.79	1,845.7
	pervious developed	851.2	25.71	1.14	293.42
Sullivan	impervious developed	3,031.7	19.08	2.85	2,013.9
	pervious developed	3,943.4	21.55	1.31	301.58
Susquehanna	impervious developed	7,042.1	19.29	2.86	1,405.73
	pervious developed	14,749.7	20.77	1.21	203.85
Tioga	impervious developed	7,966.9	12.37	2.09	1,767.75
	pervious developed	18,090.3	12.22	0.76	261.94
Union	impervious developed	4,382.6	22.98	2.04	2,393.55
	pervious developed	14,065.3	20.88	0.69	343.81
Wayne	impervious developed	320.5	18.69	2.89	1,002.58
	pervious developed	509	21.14	1.31	158.48
Wyoming	impervious developed	3,634.4	16.03	2.53	2,022.32
	pervious developed	10,792.9	13.75	0.7	238.26
York	impervious developed	10,330.7	29.69	1.18	1,614.15
	pervious developed	40,374.8	18.73	0.29	220.4
All Other Counties	impervious developed	-	23.06	2.28	1,839
	pervious developed	-	20.72	0.84	264.96

Notes:

- 1 These land loading rate values may be used to derive existing pollutant loading estimates under DEP's simplified method for PRP development. MS4s may choose to develop estimates using other scientifically sound methods.
- 2 Acres and land loading rate values for named counties in the Chesapeake Bay watershed are derived from CAST. (The column for Acres represents acres within the Chesapeake Bay watershed). For MS4s located outside of the Chesapeake Bay watershed, the land loading rates for "All Other Counties" may be used to develop PRPs under Appendix E; these values are average values across the Chesapeake Bay watershed.
- 3 For land area outside of the urbanized area, undeveloped land loading rates may be used where appropriate. When using the simplified method, DEP recommends the following loading rates (for any county) for undeveloped land:
 - TN – 10 lbs/acre/yr
 - TP – 0.33 lbs/acre/yr
 - TSS (Sediment) – 234.6 lbs/acre/yr

These values were derived by using the existing loads for each pollutant, according to the 2014 Chesapeake Bay Progress Run, and dividing by the number of acres for the unregulated stormwater subsector.

Appendix C

Supporting Calculations

Conversion from NLCD 2011 Land Use Designation to Impervious and Pervious Areas

MUNICIPALITY: East Brandywine Township
MS4 SEWER SHED: Culbertson Run/UNT Beaver Creek
COUNTY: Chester

Developed Land:

Land Use ¹	Area (ac)	% Impervious ²	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	227.12	19	43.15	183.97
Developed, Low Intensity	99.59	49	48.80	50.79
Developed, Medium Intensity	4.00	79	3.16	0.84
Developed, High Intensity	0.22	100	0.22	
Hay/Pasture	196.23	0		196.23
Cultivated Crops	100.29	0		100.29
Grassland/Herbaceous	4.74	0		4.74
Shrub/Scrub	74.02	0		74.02
Woody Wetlands	3.22	0		3.22
Mixed Forest	1.37	0		1.37
Evergreen Forest	6.03	0		6.03
Deciduous Forest	131.54	0		131.54
Total	848.37		95.33	753.04

1. NLCD 2011 Land Use and Areas
2. Highest % of impervious used from each NLCD 2011 definition per PADEP



Existing Loads using Chesapeake Bay Loading Rates without BMPs

MUNICIPALITY: East Brandywine Township
 MS4 SEWER SHED: Culbertson Run/UNT Beaver Creek
 COUNTY: Chester

Developed Land:

Land Use	Area (ac)	Pollutant Loading Rates ¹			Pollutant Load		
		TN (lbs/ac/yr)	TP (lbs/ac/yr)	TSS [Sediment] (lbs/ac/yr)	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious, Developed	95.33	21.15	1.46	1,504.78	2,016.23	139.18	143,450.68
Pervious, Developed	753.04	14.09	0.36	185.12	10,610.33	271.09	139,402.76
Culbertson Run Total Pollutant Load					12,626.56	410.28	282,853.44

1. From PADEP PRP Instructions Attachment B - Developed Land Loading Rates for PA Counties



Pollutant Removal Reductions using PADEP BMP Effectiveness Value Table for Existing BMPs

BMP NAME: Brookhaven Basin
MUNICIPALITY: East Brandywine Township
MS4 SEWERSHED: Culbertson Run/UNT Beaver Creek
COUNTY: Chester
RETROFIT CLASS: Existing BMP
LOCATION: 113 Brookhaven Ln
GPS LOCATION: Lat: 40.0361 / Long: -75.7652
TOTAL DRAINAGE AREA TREATED (ac): 7.63
TYPE OF BMP: Extended Detention

Developed Land Imp/Pervious Calculations:

Land Use ¹	Area (ac)	% Impervious ²	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	4.42	19	0.84	3.58
Developed, Low Intensity	2.71	49	1.33	1.38
Developed, Medium Intensity	0.14	79	0.11	0.03
Deciduous Forest	0.02	0		0.02
Woody Wetlands	0.34	0		0.34
Total	7.63		2.28	5.35

Developed Land - Pollutant Reduction:

Land Use	Area (ac)	Pollutant Loading Rates ³			BMP Effectiveness Value ⁴			Pollutant Load Reduction		
								TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious, Developed	2.28	21.15	1.46	1,504.78	20%	20%	60%	9.64	0.67	2057.00
Pervious, Developed	5.35	14.09	0.36	185.12	20%	20%	60%	15.08	0.39	594.42
Total Pollutant Reduction								24.72	1.05	2,651.43

1. NLCD 2011 Land Use and Areas
2. Highest % of impervious used from each NLCD 2011 definition per PADEP
3. From PADEP PRP Instructions Attachment B - Developed Land Loading Rates for PA Counties
4. Per PADEP NPDES BMP Effectiveness Values Table



Pollutant Removal Reductions using PADEP BMP Effectiveness Value Table for Existing BMPs

BMP NAME: Ferndale Basin
MUNICIPALITY: East Brandywine Township
MS4 SEWERSHED: Culbertson Run/UNT Beaver Creek
COUNTY: Chester
RETROFIT CLASS: Existing BMP
LOCATION: 230 Ferndale Lane
GPS LOCATION: Lat: 40.0352 / Long: -75.7628
TOTAL DRAINAGE AREA TREATED (ac): 11.75
TYPE OF BMP: Extended Detention

Developed Land Imp/Pervious Calculations:

Land Use ¹	Area (ac)	% Impervious ²	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	3.26	19	0.62	2.64
Developed, Low Intensity	3.92	49	1.92	2.00
Hay/Pasture	1.44	0		1.44
Shrub/Scrub	0.43	0		0.43
Cultivated Crops	1.41	0		1.41
Deciduous Forest	1.25	0		1.25
Woody Wetlands	0.04	0		0.04
Total	11.75		2.54	9.21

Developed Land - Pollutant Reduction:

Land Use	Area (ac)	Pollutant Loading Rates ³						Pollutant Load Reduction		
		TN (lbs/ac/yr)	TP (lbs/ac/yr)	TSS [Sediment] (lbs/ac/yr)	TN	TP	Sediment	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious, Developed	2.54	21.15	1.46	1,504.78	20%	20%	60%	10.75	0.74	2293.47
Pervious, Developed	9.21	14.09	0.36	185.12	20%	20%	60%	25.95	0.66	1022.95
Total Pollutant Reduction								36.70	1.40	3,316.42

- NLCD 2011 Land Use and Areas
- Highest % of impervious used from each NLCD 2011 definition per PADEP
- From PADEP PRP Instructions Attachment B - Developed Land Loading Rates for PA Counties
- Per PADEP NPDES BMP Effectiveness Values Table



Pollutant Removal Reductions using PADEP BMP Effectiveness Value Table for Existing BMPs

BMP NAME: Grovehill Basin
MUNICIPALITY: East Brandywine Township
MS4 SEWERSHED: Culbertson Run/UNT Beaver Creek
COUNTY: Chester
RETROFIT CLASS: Existing BMP
LOCATION: 30 Grovehill Ct
GPS LOCATION: Lat: 40.0346 / Long: -75.7647
TOTAL DRAINAGE AREA TREATED (ac): 6.65
TYPE OF BMP: Extended Detention

Developed Land Imp/Pervious Calculations:

Land Use ¹	Area (ac)	% Impervious ²	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	4.54	19	0.86	3.68
Developed, Low Intensity	1.69	49	0.83	0.86
Woody Wetlands	0.42	0		0.42
Total	6.65		1.69	4.96

Developed Land - Pollutant Reduction:

Land Use	Area (ac)	Pollutant Loading Rates ³			BMP Effectiveness Value ⁴			Pollutant Load Reduction		
		TN (lbs/ac/yr)	TP (lbs/ac/yr)	TSS [Sediment] (lbs/ac/yr)	TN	TP	Sediment	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious, Developed	1.69	21.15	1.46	1,504.78	20%	20%	60%	7.15	0.49	1526.48
Pervious, Developed	4.96	14.09	0.36	185.12	20%	20%	60%	13.98	0.36	550.84
Total Pollutant Reduction								21.13	0.85	2,077.32

1. NLCD 2011 Land Use and Areas
2. Highest % of impervious used from each NLCD 2011 definition per PADEP
3. From PADEP PRP Instructions Attachment B - Developed Land Loading Rates for PA Counties
4. Per PADEP NPDES BMP Effectiveness Values Table



Pollutant Removal Reductions using PADEP BMP Effectiveness Value Table for Existing BMPs

BMP NAME: Cherry Grove Basin
MUNICIPALITY: East Brandywine Township
MS4 SEWERSHED: Culbertson Run/UNT Beaver Creek
COUNTY: Chester
RETROFIT CLASS: Existing BMP
LOCATION: 118 Cherry Grove Lane
GPS LOCATION: Lat: 40.0325 / Long: -75.7580
TOTAL DRAINAGE AREA TREATED (ac): 16.94
TYPE OF BMP: Extended Detention

Developed Land Imp/Pervious Calculations:

Land Use ¹	Area (ac)	% Impervious ²	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	7.91	19	1.50	6.41
Developed, Low Intensity	6.39	49	3.13	3.26
Developed, Medium Intensity	0.75	79	0.59	0.16
Shrub/Scrub	1.48	0		1.48
Cultivated Crops	0.20	0		0.20
Woody Wetlands	0.21	0		0.21
Total	16.94		5.23	11.71

Developed Land - Pollutant Reduction:

Land Use	Area (ac)	Pollutant Loading Rates ³			BMP Effectiveness Value ⁴			Pollutant Load Reduction		
								TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious, Developed	5.23	21.15	1.46	1,504.78	20%	20%	60%	22.11	1.53	4718.84
Pervious, Developed	11.71	14.09	0.36	185.12	20%	20%	60%	33.01	0.84	1301.04
Total Pollutant Reduction								55.12	2.37	6,019.88

1. NLCD 2011 Land Use and Areas
2. Highest % of impervious used from each NLCD 2011 definition per PADEP
3. From PADEP PRP Instructions Attachment B - Developed Land Loading Rates for PA Counties
4. Per PADEP NPDES BMP Effectiveness Values Table



Pollutant Removal Reductions using PADEP BMP Effectiveness Value Table for Existing BMPs

BMP NAME: N Terralee Basin
MUNICIPALITY: East Brandywine Township
MS4 SEWERSHED: Culbertson Run/UNT Beaver Creek
COUNTY: Chester
RETROFIT CLASS: Existing BMP
LOCATION: 41 N Terralee Lane
GPS LOCATION: Lat: 40.0329 / Long: -75.7552
TOTAL DRAINAGE AREA TREATED (ac): 18.7
TYPE OF BMP: Extended Detention

Developed Land Imp/Pervious Calculations:

Land Use ¹	Area (ac)	% Impervious ²	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	2.34	19	0.44	1.90
Developed, Low Intensity	1.45	49	0.71	0.74
Developed, Medium Intensity	0.44	79	0.35	0.09
Hay/Pasture	0.42	0		0.42
Shrub/Scrub	0.18	0		0.18
Grassland/Herbaceous	0.18	0		0.18
Woody Wetlands	0.76	0		0.76
Deciduous Forest	12.93	0		12.93
Total	18.70		1.50	17.20

Developed Land - Pollutant Reduction:

Land Use	Area (ac)	Pollutant Loading Rates ³			BMP Effectiveness Value ⁴			Pollutant Load Reduction		
		TN (lbs/ac/yr)	TP (lbs/ac/yr)	TSS [Sediment] (lbs/ac/yr)	TN	TP	Sediment	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious, Developed	1.50	21.15	1.46	1,504.78	20%	20%	60%	6.36	0.44	1356.74
Pervious, Developed	17.20	14.09	0.36	185.12	20%	20%	60%	48.46	1.24	1910.14
Total Pollutant Reduction								54.82	1.68	3,266.88

1. NLCD 2011 Land Use and Areas
2. Highest % of impervious used from each NLCD 2011 definition per PADEP
3. From PADEP PRP Instructions Attachment B - Developed Land Loading Rates for PA Counties
4. Per PADEP NPDES BMP Effectiveness Values Table



Pollutant Removal Reductions using PADEP BMP Effectiveness Value Table for Existing BMPs

BMP NAME: S Terralee Basin
MUNICIPALITY: East Brandywine Township
MS4 SEWERSHED: Culbertson Run/UNT Beaver Creek
COUNTY: Chester
RETROFIT CLASS: Existing BMP
LOCATION: 20 S Terralee Lane
GPS LOCATION: Lat: 40.0308 / Long: -75.7528
TOTAL DRAINAGE AREA TREATED (ac): 23.62
TYPE OF BMP: Infiltration Bed

Developed Land Imp/Pervious Calculations:

Land Use ¹	Area (ac)	% Impervious ²	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	1.90	19	0.36	1.54
Developed, Low Intensity	0.68	49	0.33	0.35
Hay/Pasture	14.16	0		14.16
Shrub/Scrub	0.72	0		0.72
Cultivated Crops	2.12	0		2.12
Deciduous Forest	4.04	0		4.04
Total	23.62		0.69	22.93

Developed Land - Pollutant Reduction:

Land Use	Area (ac)	Pollutant Loading Rates ³			BMP Effectiveness Value ⁴			Pollutant Load Reduction		
								TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious, Developed	0.69	21.15	1.46	1,504.78	85%	85%	95%	12.48	0.86	992.39
Pervious, Developed	22.93	14.09	0.36	185.12	85%	85%	95%	274.57	7.02	4031.82
Total Pollutant Reduction								287.05	7.88	5,024.21

- NLCD 2011 Land Use and Areas
- Highest % of impervious used from each NLCD 2011 definition per PADEP
- From PADEP PRP Instructions Attachment B - Developed Land Loading Rates for PA Counties
- Per PADEP NPDES BMP Effectiveness Values Table



Pollutant Removal Reductions using PADEP BMP Effectiveness Value Table for Existing BMPs

BMP NAME: Tarrytown Basin
MUNICIPALITY: East Brandywine Township
MS4 SEWERSHED Culbertson Run/UNT Beaver Creek
COUNTY: Chester
RETROFIT CLASS: Existing BMP
LOCATION: 44 Tarrytown Lane
GPS LOCATION: Lat: 40.0340 / Long: -75.7561
TOTAL DRAINAGE AREA TREATED (ac): 20.25
TYPE OF BMP: Extended Detention

Developed Land Imp/Pervious Calculations:

Land Use ¹	Area (ac)	% Impervious ²	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	8.85	19	1.68	7.17
Developed, Low Intensity	2.43	49	1.19	1.24
Developed, Medium Intensity	0.22	79	0.17	0.05
Hay/Pasture	3.32	0		3.32
Shrub/Scrub	1.10	0		1.10
Grassland/Herbaceous	0.31	0		0.31
Cultivated Crops	4.02	0		4.02
		0		
Total	20.25		3.05	17.20

Developed Land - Pollutant Reduction:

Land Use	Area (ac)	Pollutant Loading Rates ³			BMP Effectiveness Value ⁴			Pollutant Load Reduction		
		TN (lbs/ac/yr)	TP (lbs/ac/yr)	TSS [Sediment] (lbs/ac/yr)	TN	TP	Sediment	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious, Developed	3.05	21.15	1.46	1,504.78	20%	20%	60%	12.88	0.89	2750.14
Pervious, Developed	17.20	14.09	0.36	185.12	20%	20%	60%	48.48	1.24	1910.88
Total Pollutant Reduction								61.37	2.13	4,661.02

1. NLCD 2011 Land Use and Areas
2. Highest % of impervious used from each NLCD 2011 definition per PADEP
3. From PADEP PRP Instructions Attachment B - Developed Land Loading Rates for PA Counties
4. Per PADEP NPDES BMP Effectiveness Values Table



Pollutant Removal Reductions using PADEP BMP Effectiveness Value Table for Existing BMPs

BMP NAME: Wellesley Basin
MUNICIPALITY: East Brandywine Township
MS4 SEWERSHED: Culbertson Run/UNT Beaver Creek
COUNTY: Chester
RETROFIT CLASS: Existing BMP
LOCATION: 151 N Guthriesville Road
GPS LOCATION: Lat: 40.0343 / Long: -75.7621
TOTAL DRAINAGE AREA TREATED (ac): 5.67
TYPE OF BMP: Extended Detention

Developed Land Imp/Pervious Calculations:

Land Use ¹	Area (ac)	% Impervious ²	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	2.86	19	0.54	2.32
Developed, Low Intensity	2.27	49	1.11	1.16
Deciduous Forest	0.52	0		0.52
Woody Wetlands	0.02	0		0.02
		0		
Total	5.67		1.66	4.01

Developed Land - Pollutant Reduction:

Land Use	Area (ac)	Pollutant Loading Rates ³			BMP Effectiveness Value ⁴			Pollutant Load Reduction		
		TN (lbs/ac/yr)	TP (lbs/ac/yr)	TSS [Sediment] (lbs/ac/yr)	TN	TP	Sediment	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious, Developed	1.66	21.15	1.46	1,504.78	20%	20%	60%	7.00	0.48	1494.88
Pervious, Developed	4.01	14.09	0.36	185.12	20%	20%	60%	11.31	0.29	445.88
Total Pollutant Reduction								18.32	0.77	1,940.75

1. NLCD 2011 Land Use and Areas
2. Highest % of impervious used from each NLCD 2011 definition per PADEP
3. From PADEP PRP Instructions Attachment B - Developed Land Loading Rates for PA Counties
4. Per PADEP NPDES BMP Effectiveness Values Table



Pollutant Removal Reductions using PADEP BMP Effectiveness Value Table for New BMPs

BMP NAME: Detention Bed A
MUNICIPALITY: East Brandywine Township
MS4 SEWERSHED: Culbertson Run
COUNTY: Chester
RETROFIT CLASS: New BMP
LOCATION: Detention Bed A
GPS LOCATION:
TOTAL DRAINAGE AREA TREATED (ac): 4.5
TYPE OF BMP: Underground Stone Bed - only detention no infiltration

Developed Land Imp/Pervious Calculations:

Land Use ¹	Area (ac)	% Impervious ²	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	2.14	19	0.41	1.73
Developed, Low Intensity	2.00	49	0.98	1.02
Developed, Medium Intensity		79		
Developed, High Intensity		100		
Pasture, Hay		0		
Cultivated Crops		0		
Total			1.39	2.75

Developed Land - Pollutant Reduction:

Land Use	Area (ac)	Pollutant Loading Rates ³			BMP Effectiveness Value ⁴			Pollutant Load Reduction		
		TN (lbs/ac/yr)	TP (lbs/ac/yr)	TSS [Sediment] (lbs/ac/yr)	TN	TP	Sediment	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious, Developed	1.39	21.15	1.46	1,504.78	5%	10%	10%	1.47	0.20	209.16
Pervious, Developed	2.75	14.09	0.36	185.12	5%	10%	10%	1.94	0.10	50.91
Total Pollutant Reduction								3.41	0.30	260.07

1. NLCD 2011 Land Use and Areas
2. Highest % of impervious used from each NLCD 2011 definition per PADEP
3. From PADEP PRP Instructions Attachment B - Developed Land Loading Rates for PA Counties
4. Per PADEP NPDES BMP Effectiveness Values Table



Pollutant Removal Reductions using PADEP BMP Effectiveness Value Table for New BMPs

BMP NAME: Infiltration Bed B
MUNICIPALITY: East Brandywine Township
MS4 SEWERSHED: Culbertson Run
COUNTY: Chester
RETROFIT CLASS: New BMP
LOCATION: Inf Bed B
GPS LOCATION:
TOTAL DRAINAGE AREA TREATED (ac): 3.69
TYPE OF BMP: Infiltration bed

Developed Land Imp/Pervious Calculations:

Land Use ¹	Area (ac)	% Impervious ²	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	0.90	19	0.17	0.73
Developed, Low Intensity	2.73	49	1.34	1.39
Developed, Medium Intensity		79	0.00	0.00
Developed, High Intensity		100	0.00	0.00
Pasture, Hay		0	0.00	0.00
Shurbs/Scrub	0.06	0	0.00	0.06
Total			1.51	2.18

Developed Land - Pollutant Reduction:

Land Use	Area (ac)	Pollutant Loading Rates ³			BMP Effectiveness Value ⁴			Pollutant Load Reduction		
		TN (lbs/ac/yr)	TP (lbs/ac/yr)	TSS [Sediment] (lbs/ac/yr)	TN	TP	Sediment	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious, Developed	1.51	21.15	1.46	1,504.78	85%	85%	95%	27.15	1.87	2158.61
Pervious, Developed	2.18	14.09	0.36	185.12	85%	85%	95%	26.11	0.67	383.38
Total Pollutant Reduction								53.25	2.54	2,541.99

1. NLCD 2011 Land Use and Areas
2. Highest % of impervious used from each NLCD 2011 definition per PADEP
3. From PADEP PRP Instructions Attachment B - Developed Land Loading Rates for PA Counties
4. Per PADEP NPDES BMP Effectiveness Values Table

Pollutant Removal Reductions using PADEP BMP Effectiveness Value Table for New BMPs

BMP NAME: Infiltration Bed C
MUNICIPALITY: East Brandywine Township
MS4 SEWERSHED Culbertson Run
COUNTY: Chester
RETROFIT CLASS: New BMP
LOCATION: Inf Bed C
GPS LOCATION:
TOTAL DRAINAGE AREA TREATED (ac): 1.96
TYPE OF BMP: Infiltration bed

Developed Land Imp/Pervious Calculations:

Land Use ¹	Area (ac)	% Impervious ²	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	0.74	19	0.14	0.60
Developed, Low Intensity	1.20	49	0.59	0.61
Developed, Medium Intensity		79	0.00	0.00
Developed, High Intensity		100	0.00	0.00
Pasture, Hay		0	0.00	0.00
Shrubs/Scrub	0.01	0	0.00	0.01
Total			0.73	1.22

Developed Land - Pollutant Reduction:

Land Use	Area (ac)	Pollutant Loading Rates ³			BMP Effectiveness Value ⁴			Pollutant Load Reduction		
		TN (lbs/ac/yr)	TP (lbs/ac/yr)	TSS [Sediment] (lbs/ac/yr)	TN	TP	Sediment	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious, Developed	0.73	21.15	1.46	1,504.78	85%	85%	95%	13.12	0.91	1043.56
Pervious, Developed	1.22	14.09	0.36	185.12	85%	85%	95%	14.61	0.37	214.55
Total Pollutant Reduction								27.73	1.28	1,258.12

1. NLCD 2011 Land Use and Areas

2. Highest % of impervious used from each NLCD 2011 definition per PADEP

3. From PADEP PRP Instructions Attachment B - Developed Land Loading Rates for PA Counties

4. Per PADEP NPDES BMP Effectiveness Values Table

Pollutant Removal Reductions using PADEP BMP Effectiveness Value Table for New BMPs

BMP NAME: Swale 1
MUNICIPALITY: East Brandywine Township
MS4 SEWERSHED: Culbertson Run
COUNTY: Chester
RETROFIT CLASS: New BMP
LOCATION: Swale 1
GPS LOCATION:
TOTAL DRAINAGE AREA TREATED (ac): 0.27
TYPE OF BMP: Vegetated Swale (A/B soils)

Developed Land Imp/Pervious Calculations:

Land Use ¹	Area (ac)	% Impervious ²	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	0.22	19	0.04	0.18
Developed, Low Intensity	0.04	49	0.02	0.02
Developed, Medium Intensity		79	0.00	0.00
Developed, High Intensity		100	0.00	0.00
Pasture, Hay		0	0.00	0.00
Deciduous Forest		0	0.00	0.00
Total			0.06	0.20

Developed Land - Pollutant Reduction:

Land Use	Area (ac)	Pollutant Loading Rates ³			BMP Effectiveness Value ⁴			Pollutant Load Reduction		
		TN (lbs/ac/yr)	TP (lbs/ac/yr)	TSS [Sediment] (lbs/ac/yr)	TN	TP	Sediment	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious, Developed	0.06	21.15	1.46	1,504.78	45%	45%	70%	0.57	0.04	63.20
Pervious, Developed	0.20	14.09	0.36	185.12	45%	45%	70%	1.27	0.03	25.92
Total Pollutant Reduction								1.84	0.07	89.12

1. NLCD 2011 Land Use and Areas

2. Highest % of impervious used from each NLCD 2011 definition per PADEP

3. From PADEP PRP Instructions Attachment B - Developed Land Loading Rates for PA Counties

4. Per PADEP NPDES BMP Effectiveness Values Table

Pollutant Removal Reductions using PADEP BMP Effectiveness Value Table for New BMPs

BMP NAME: Swale 2
MUNICIPALITY: East Brandywine Township
MS4 SEWERSHED: Culbertson Run
COUNTY: Chester
RETROFIT CLASS: New BMP
LOCATION: Swale 2
GPS LOCATION:
TOTAL DRAINAGE AREA TREATED (ac): 0.25
TYPE OF BMP: Vegetated Swale (A/B soils)

Developed Land Imp/Pervious Calculations:

Land Use ¹	Area (ac)	% Impervious ²	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	0.19	19	0.04	0.15
Developed, Low Intensity	0.05	49	0.02	0.03
Developed, Medium Intensity		79	0.00	0.00
Developed, High Intensity		100	0.00	0.00
Pasture, Hay		0	0.00	0.00
Deciduous Forest		0	0.00	0.00
Total			0.06	0.18

Developed Land - Pollutant Reduction:

Land Use	Area (ac)	Pollutant Loading Rates ³			BMP Effectiveness Value ⁴			Pollutant Load Reduction		
		TN (lbs/ac/yr)	TP (lbs/ac/yr)	TSS [Sediment] (lbs/ac/yr)	TN	TP	Sediment	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious, Developed	0.06	21.15	1.46	1,504.78	45%	45%	70%	0.57	0.04	63.20
Pervious, Developed	0.18	14.09	0.36	185.12	45%	45%	70%	1.14	0.03	23.33
Total Pollutant Reduction								1.71	0.07	86.53

1. NLCD 2011 Land Use and Areas

2. Highest % of impervious used from each NLCD 2011 definition per PADEP

3. From PADEP PRP Instructions Attachment B - Developed Land Loading Rates for PA Counties

4. Per PADEP NPDES BMP Effectiveness Values Table

Pollutant Removal Reductions using PADEP BMP Effectiveness Value Table for New BMPs

BMP NAME: Swale 3
MUNICIPALITY: East Brandywine Township
MS4 SEWERSHED: Culbertson Run
COUNTY: Chester
RETROFIT CLASS: New BMP
LOCATION: Swale 3
GPS LOCATION:
TOTAL DRAINAGE AREA TREATED (ac): 0.22
TYPE OF BMP: Vegetated Swale (A/B soils)

Developed Land Imp/Pervious Calculations:

Land Use ¹	Area (ac)	% Impervious ²	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	0.17	19	0.03	0.14
Developed, Low Intensity	0.05	49	0.02	0.03
Developed, Medium Intensity		79	0.00	0.00
Developed, High Intensity		100	0.00	0.00
Pasture, Hay		0	0.00	0.00
Deciduous Forest		0	0.00	0.00
Total			0.06	0.16

Developed Land - Pollutant Reduction:

Land Use	Area (ac)	Pollutant Loading Rates ³			BMP Effectiveness Value ⁴			Pollutant Load Reduction		
		TN (lbs/ac/yr)	TP (lbs/ac/yr)	TSS [Sediment] (lbs/ac/yr)	TN	TP	Sediment	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious, Developed	0.06	21.15	1.46	1,504.78	45%	45%	70%	0.57	0.04	63.20
Pervious, Developed	0.16	14.09	0.36	185.12	45%	45%	70%	1.01	0.03	20.73
Total Pollutant Reduction								1.59	0.07	83.93

1. NLCD 2011 Land Use and Areas

2. Highest % of impervious used from each NLCD 2011 definition per PADEP

3. From PADEP PRP Instructions Attachment B - Developed Land Loading Rates for PA Counties

4. Per PADEP NPDES BMP Effectiveness Values Table

Pollutant Removal Reductions using PADEP BMP Effectiveness Value Table for New BMPs

BMP NAME: Swale 4
MUNICIPALITY: East Brandywine Township
MS4 SEWERSHED: Culbertson Run
COUNTY: Chester
RETROFIT CLASS: New BMP
LOCATION: Swale 4
GPS LOCATION:
TOTAL DRAINAGE AREA TREATED (ac): 0.15
TYPE OF BMP: Vegetated Swale (A/B soils)

Developed Land Imp/Pervious Calculations:

Land Use ¹	Area (ac)	% Impervious ²	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	0.14	19	0.03	0.11
Developed, Low Intensity	0.01	49	0.00	0.01
Developed, Medium Intensity		79	0.00	0.00
Developed, High Intensity		100	0.00	0.00
Pasture, Hay		0	0.00	0.00
Deciduous Forest		0	0.00	0.00
Total			0.03	0.12

Developed Land - Pollutant Reduction:

Land Use	Area (ac)	Pollutant Loading Rates ³			BMP Effectiveness Value ⁴			Pollutant Load Reduction		
		TN (lbs/ac/yr)	TP (lbs/ac/yr)	TSS [Sediment] (lbs/ac/yr)	TN	TP	Sediment	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious, Developed	0.03	21.15	1.46	1,504.78	45%	45%	70%	0.29	0.02	31.60
Pervious, Developed	0.12	14.09	0.36	185.12	45%	45%	70%	0.76	0.02	15.55
Total Pollutant Reduction								1.05	0.04	47.15

1. NLCD 2011 Land Use and Areas

2. Highest % of impervious used from each NLCD 2011 definition per PADEP

3. From PADEP PRP Instructions Attachment B - Developed Land Loading Rates for PA Counties

4. Per PADEP NPDES BMP Effectiveness Values Table

Pollutant Removal Reductions using PADEP BMP Effectiveness Value Table for New BMPs

BMP NAME: Swale 6
MUNICIPALITY: East Brandywine Township
MS4 SEWERSHED: Culbertson Run
COUNTY: Chester
RETROFIT CLASS: New BMP
LOCATION: Swale 6
GPS LOCATION:
TOTAL DRAINAGE AREA TREATED (ac): 0.17
TYPE OF BMP: Vegetated Swale (A/B soils)

Developed Land Imp/Pervious Calculations:

Land Use ¹	Area (ac)	% Impervious ²	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	0.11	19	0.02	0.09
Developed, Low Intensity	0.05	49	0.02	0.03
Developed, Medium Intensity		79	0.00	0.00
Developed, High Intensity		100	0.00	0.00
Pasture, Hay		0	0.00	0.00
Deciduous Forest	0.01	0	0.00	0.01
Total			0.05	0.12

Developed Land - Pollutant Reduction:

Land Use	Area (ac)	Pollutant Loading Rates ³			BMP Effectiveness Value ⁴			Pollutant Load Reduction		
		TN (lbs/ac/yr)	TP (lbs/ac/yr)	TSS [Sediment] (lbs/ac/yr)	TN	TP	Sediment	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious, Developed	0.05	21.15	1.46	1,504.78	45%	45%	70%	0.48	0.03	52.67
Pervious, Developed	0.12	14.09	0.36	185.12	45%	45%	70%	0.76	0.02	15.55
Total Pollutant Reduction								1.24	0.05	68.22

1. NLCD 2011 Land Use and Areas

2. Highest % of impervious used from each NLCD 2011 definition per PADEP

3. From PADEP PRP Instructions Attachment B - Developed Land Loading Rates for PA Counties

4. Per PADEP NPDES BMP Effectiveness Values Table

Pollutant Removal Reductions using PADEP BMP Effectiveness Value Table for New BMPs

BMP NAME: Swale 8
MUNICIPALITY: East Brandywine Township
MS4 SEWERSHED: Culbertson Run
COUNTY: Chester
RETROFIT CLASS: New BMP
LOCATION: Swale 8
GPS LOCATION:
TOTAL DRAINAGE AREA TREATED (ac): 6.11
TYPE OF BMP: Vegetated Swale (A/B soils)

Developed Land Imp/Pervious Calculations:

Land Use ¹	Area (ac)	% Impervious ²	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	1.26	19	0.24	1.02
Developed, Low Intensity	1.98	49	0.97	1.01
Developed, Medium Intensity		79	0.00	0.00
Developed, High Intensity		100	0.00	0.00
Pasture, Hay		0	0.00	0.00
Cultivated Crops	2.87	0	0.00	2.87
Total			1.21	4.90

Developed Land - Pollutant Reduction:

Land Use	Area (ac)	Pollutant Loading Rates ³			BMP Effectiveness Value ⁴			Pollutant Load Reduction		
		TN (lbs/ac/yr)	TP (lbs/ac/yr)	TSS [Sediment] (lbs/ac/yr)	TN	TP	Sediment	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious, Developed	1.21	21.15	1.46	1,504.78	45%	45%	70%	11.52	0.79	1274.55
Pervious, Developed	4.90	14.09	0.36	185.12	45%	45%	70%	31.07	0.79	634.96
Total Pollutant Reduction								42.58	1.59	1,909.51

1. NLCD 2011 Land Use and Areas

2. Highest % of impervious used from each NLCD 2011 definition per PADEP

3. From PADEP PRP Instructions Attachment B - Developed Land Loading Rates for PA Counties

4. Per PADEP NPDES BMP Effectiveness Values Table

Pollutant Removal Reductions using PADEP BMP Effectiveness Value Table for New BMPs

BMP NAME:	Southdown Stream Restoration
MUNICIPALITY:	East Brandywine Township
MS4 SEWERSHED	Culbertson Run/UNT Beaver Creek
COUNTY:	Chester
RETROFIT CLASS:	New BMP
LOCATION:	
GPS LOCATION:	Lat: 39.9769 / Long: -75.8067
TOTAL DRAINAGE AREA TREATED (ac):	393.09
TYPE OF BMP:	Stream Restoration

Stream Restoration - Pollutant Reduction:

Location	Restoration Length (ft)	BMP Effectiveness Value ¹			Pollutant Load Reduction		
		TN (lbs/ft/yr)	TP (lbs/ft/yr)	Sediment (lbs/ft/yr)	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Southdown Stream Restoration	425.00	0.075	0.068	44.88	31.88	28.90	19,074.00
Total					31.88	28.90	19,074.00

1. Per PADEP NPDES BMP Effectiveness Values Table



Pollutant Load Reduction by Existing BMPs

MUNICIPALITY: East Brandywine Township
 MS4 SEWER SHED: Culbertson Run/UNT Beaver Creek
 COUNTY: Chester

Existing BMP Name	BMP Drainage Area (ac)	Pollutant Reduction by BMPs		
		TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Brookhaven Basin	7.63	24.72	1.05	2,651.43
Ferndale Basin	11.75	36.7	1.4	3,316.42
Grovehill Basin	6.65	21.13	0.85	2,077.32
Cherry Grove Basin	16.94	55.12	2.37	6,019.88
N Terralee Basin	18.7	54.82	1.68	3,266.88
S Terralee Infiltration Bed	23.62	287.05	7.88	5,024.21
Tarrytown Basin	20.25	61.37	2.13	4,661.02
Wellesley Basin	5.67	18.32	0.77	1,940.75
Total	111.21	559.23	18.13	28,957.91

PRP MS4 Sewershed	Storm sewershed Area (ac)	Existing Pollutant without BMPs			Pollutant Load with Existing BMPs		
		TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Culbertson Run/UNT Beaver Creek	848.37	12,626.56	410.28	282,853.44	12,067.33	392.15	253,895.53
Total	848.37	12,626.56	410.28	282,853.44	12,067.33	392.15	253,895.53



Sediment Load Reduction by Proposed BMPs

MUNICIPALITY:
MS4 SEWER SHED:
COUNTY:

East Brandywine Township
 Culbertson Run/UNT Beaver Creek
 Chester

BMP Name	BMP Drainage Area (ac)	Existing Pollutant reduced with BMPs		
		TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Culbertson Run/UNT Beaver Creek				
Detention Bed A	4.5	3.41	0.3	260.07
Infiltration Bed B	3.69	53.25	2.54	2,541.99
Infiltration Bed C	1.96	27.73	1.28	1,258.12
Swale 1	0.27	1.84	0.07	89.12
Swale 2	0.28	1.71	0.07	86.53
Swale 3	0.22	1.59	0.07	83.93
Swale 4	0.15	1.05	0.04	47.15
Swale 6	0.17	1.24	0.05	68.22
Swale 8	6.11	42.58	1.59	1,909.51
Southdown Stream Restoration (425 lf)	393.09	31.88	28.9	19,074.00
Sub Total	410.44	166.28	34.91	25,418.64

MS4 Sewershed	Storm sewershed Area (ac)	Existing Pollutant with Existing BMPs			Pollutant Load reduced with Proposed BMPs			% with Proposed BMPs		
		TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)	TN	TP	TSS [Sediment]
Culbertson Run/UNT Beaver Creek	848.37	12,067.33	392.15	253,895.53	11,901.05	357.24	228,476.89	1.38%	8.90%	10.01%
Total	848.37	12,067.33	392.15	253,895.53	11,901.05	357.24	228,476.89	1.38%	8.90%	10.01%

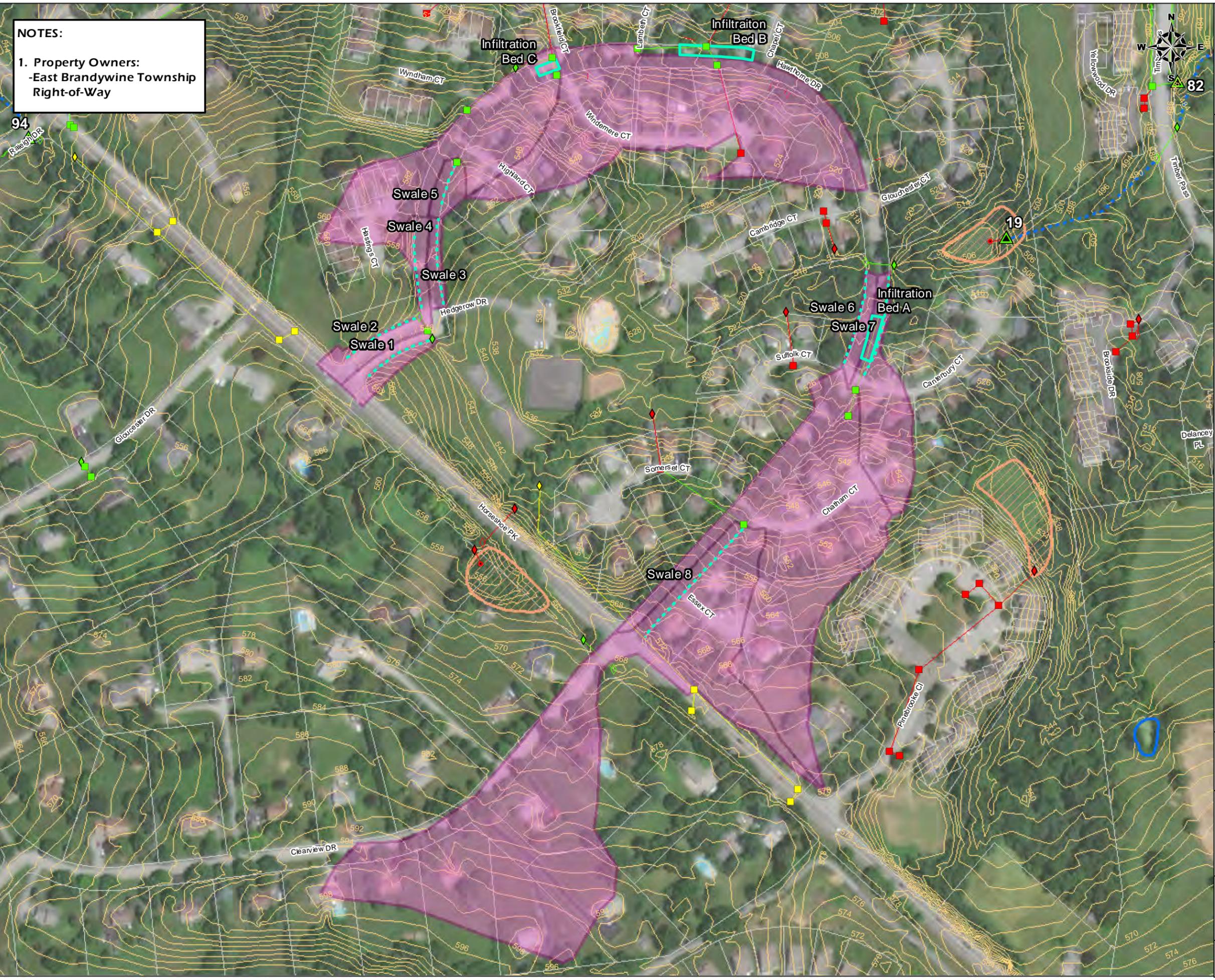


Appendix D

Proposed BMP Maps

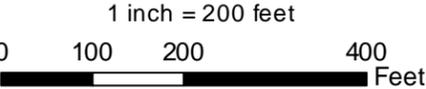
NOTES:
 1. Property Owners:
 -East Brandywine Township
 Right-of-Way

PROPOSED BMPs



- Legend**
- MS4 Outfalls
 - Drainage Area to BMPs
 - Hawthorne Drive BMPs
 - Infiltration Beds
 - Swales
 - Township Stormwater Structures
 - Culvert
 - Inflow
 - Inlet
 - Manhole
 - Outflow
 - Riser
 - State Stormwater Structures
 - Culvert
 - Inflow
 - Inlet
 - Manhole
 - Outflow
 - Private Stormwater Structures
 - Inflow
 - Inlet
 - Manhole
 - Outflow
 - Riser
 - Township Stormwater Conveyances
 - Culvert
 - Pipe
 - Swale
 - State Stormwater Conveyances
 - Bridge
 - Culvert
 - Pipe
 - Private Stormwater Conveyances
 - Bridge
 - Pipe
 - Swale
 - Basins
 - PCSM BMPs
 - Located Tributaries
 - Streams
 - Roads
 - Township Road
 - Private Road
 - State Road
 - 2ft Contours
 - Parcels
 - Township Boundry

Hawthorne Drive Stormwater Improvements



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 This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

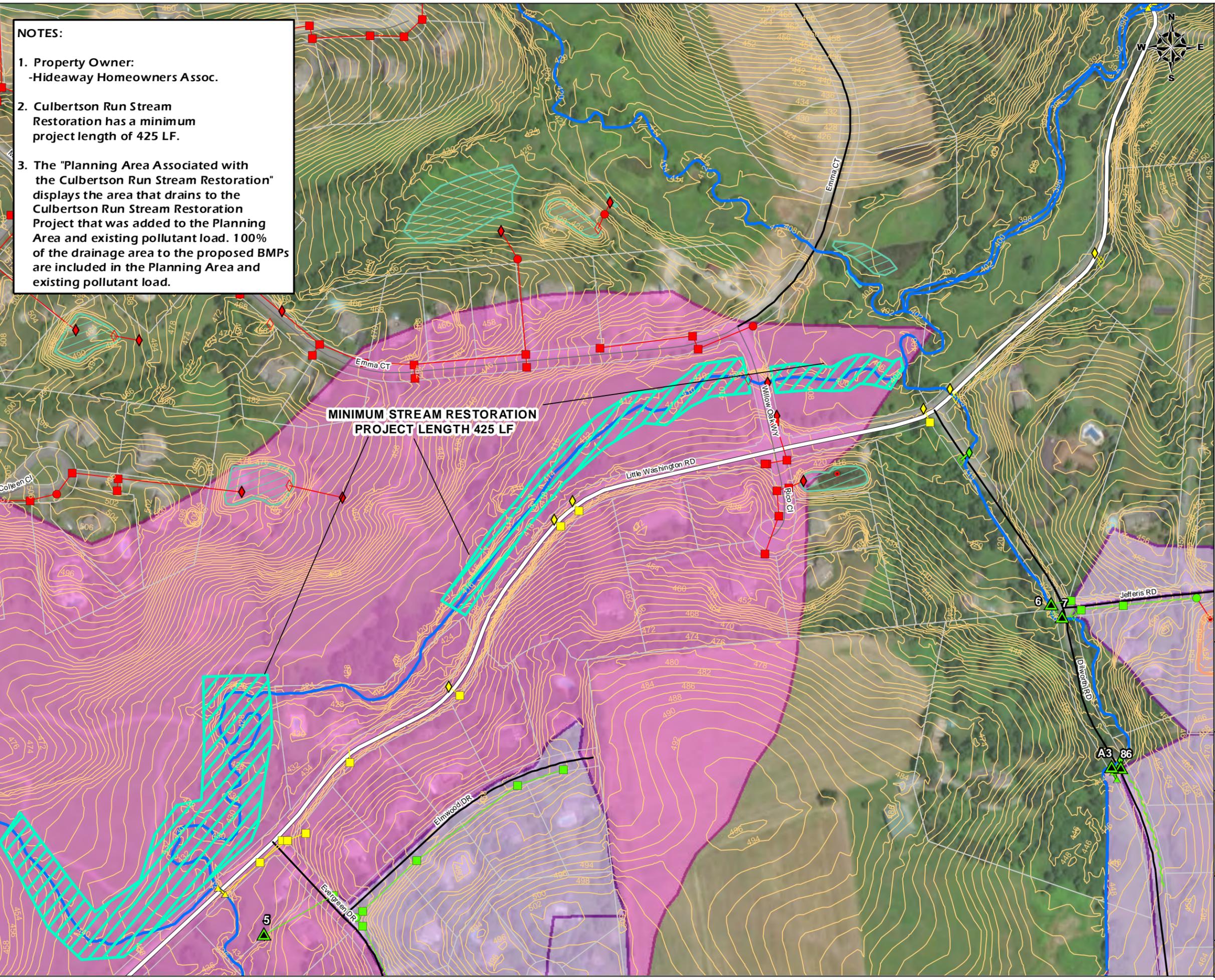


MAP UPDATED: JULY 2018

NOTES:

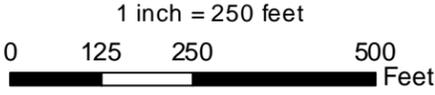
1. Property Owner:
-Hideaway Homeowners Assoc.
2. Culbertson Run Stream Restoration has a minimum project length of 425 LF.
3. The "Planning Area Associated with the Culbertson Run Stream Restoration" displays the area that drains to the Culbertson Run Stream Restoration Project that was added to the Planning Area and existing pollutant load. 100% of the drainage area to the proposed BMPs are included in the Planning Area and existing pollutant load.

PROPOSED BMP



Legend	
Culbertson Run Stream Restoration	Basins
MS4 Outfalls	PCSM BMPs
Planning Area	Located Tributaries
Culbertson Run Stream Restoration	Streams
Planning Area Associated with an Outfall	Roads
Township Stormwater Structures	Township
Culvert	Private
Inflow	State
Inlet	2ft Contours
Manhole	Parcels
Outflow	Township Boundary
Riser	
State Stormwater Structures	
Culvert	
Inflow	
Inlet	
Manhole	
Outflow	
Private Stormwater Structures	
Inflow	
Inlet	
Manhole	
Outflow	
Riser	
Township Stormwater Conveyances	
Culvert	
Pipe	
Swale	
State Stormwater Conveyances	
Bridge	
Culvert	
Pipe	
Private Stormwater Conveyances	
Bridge	
Pipe	
Swale	

Culbertson Run Stream Restoration



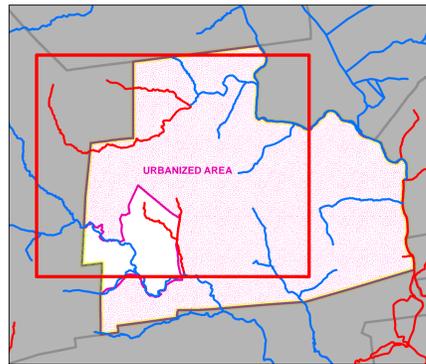
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This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

East Brandywine Township,
Chester County,
Pennsylvania

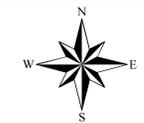
MAP UPDATED: JULY 2018

Appendix E

Storm Sewershed/Planning Area Map



NOTES:
 1. Culbertson Run Stream Restoration has a minimum project length of 425 feet.
 2. The "Planning Area Associated with Proposed BMP" displays the area that drains to the Culbertson Run Stream Restoration Project that was added to the Planning Area and existing pollutant load. 100% of the drainage area to the proposed BMPs are included in the Planning Area and existing pollutant load.

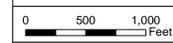


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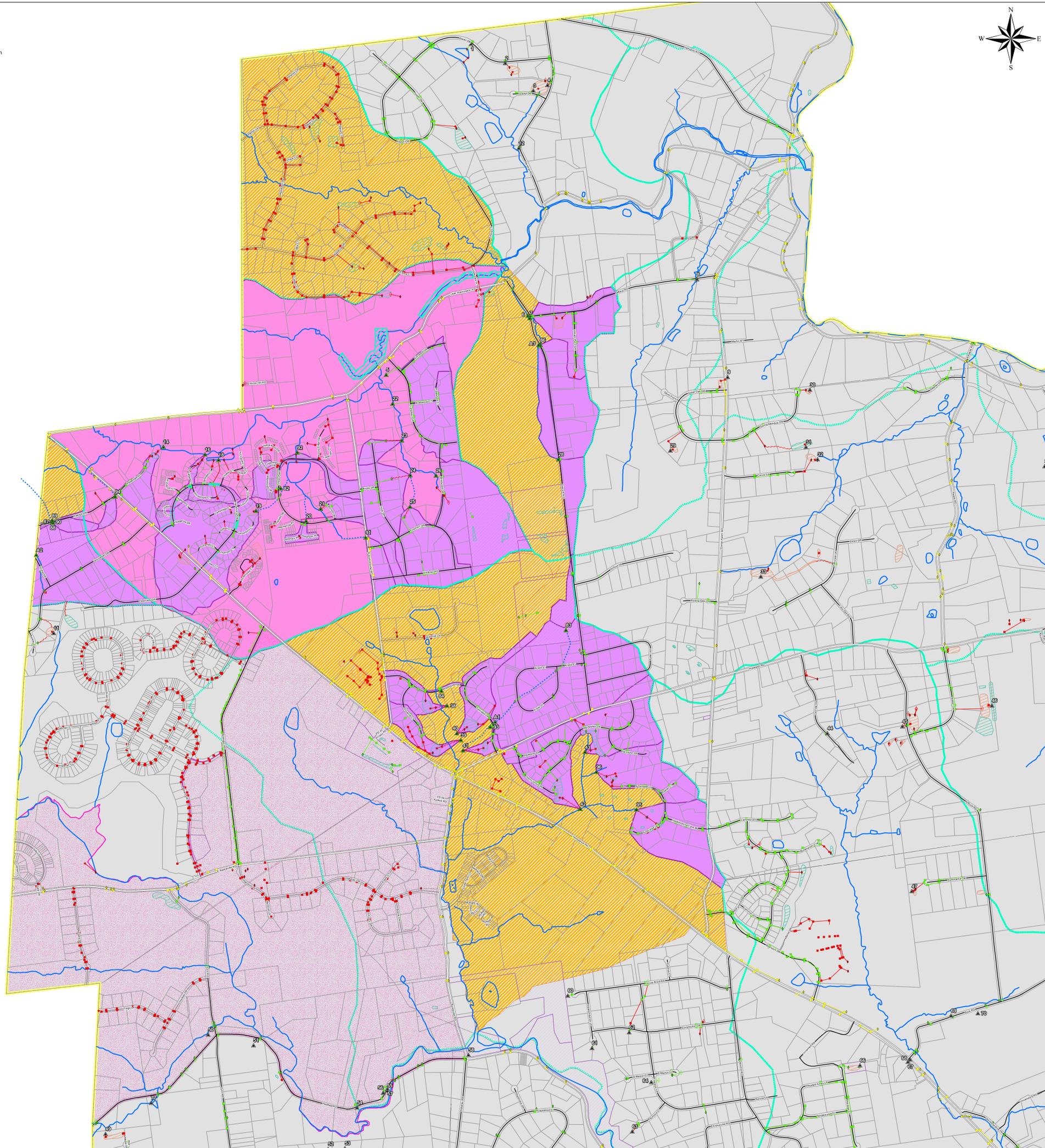
DRAWN BY: AR

DATE: 7/6/2018

1 inch = 500 feet



EAST BRANDYWINE TOWNSHIP
 POLLUTANT REDUCTION PLAN
 PLANNING AREA MAP
 CHESTER COUNTY, PA



BEST MANAGEMENT PRACTICES (BMPs)

Name	Owner	Ownership
Culbertson Run Stream Restoration	Hideaway HOA	Private
Hawthorne Drive BMPs	East Brandywine Township	Township

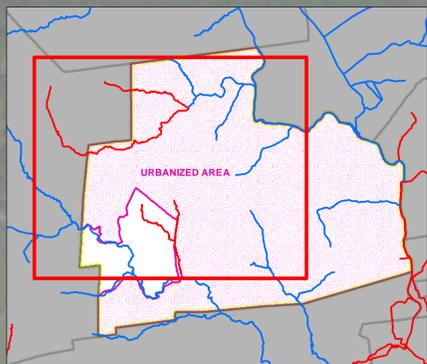
DEP MS4 Aggregated Requirements Table

MS4 ID	MS4 Name	MS4 Type	MS4 Category	MS4 Status	MS4 Location
001	East Brandywine Township	MS4	MS4	MS4	MS4

- Legend
- Culbertson Run Stream Restoration Proposed BMP
 - Hawthorne Drive Proposed BMPs
 - Infiltration Beds
 - Swales
 - Outfalls
 - Impaired
 - Not Impaired
 - Observation Points
 - Planning Area Associated with Proposed BMP
 - Planning Area Associated with an Outfall
 - Parceled Areas
 - Land Areas in Which Stormwater Runoff Does Not Enter the MS4
 - Non-Impaired
 - Stormwater Structures Township
 - Culvert
 - Inflow
 - Inlet
 - Manhole
 - Outflow
 - Riser
 - Stormwater Conveyances Township
 - Culvert
 - Pipe
 - Swale
 - Stormwater Structures Private
 - Inflow
 - Inlet
 - Manhole
 - Outflow
 - Riser
 - Stormwater Conveyances Private
 - Culvert
 - Pipe
 - Swale
 - Stormwater Structures State
 - Culvert
 - Inflow
 - Inlet
 - Manhole
 - Outflow
 - Riser
 - Stormwater Conveyances State
 - Culvert
 - Pipe
 - Swale
 - Roads
 - Private
 - State
 - Township
 - Streams
 - Streams
 - Located Tributaries
 - Parcels
 - Township Owned Parcels
 - PCSM BMPs
 - Area Opposite the 2010 Subwatershed Area
 - Subwatersheds
 - Township Boundary

Appendix F

Land Cover Map



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NOTES:
1. Land cover data is derived from the National Land Cover Database 2011 (NLCD 2011).
2. Culbertson Run Stream Restoration has a minimum project length of 425 feet.

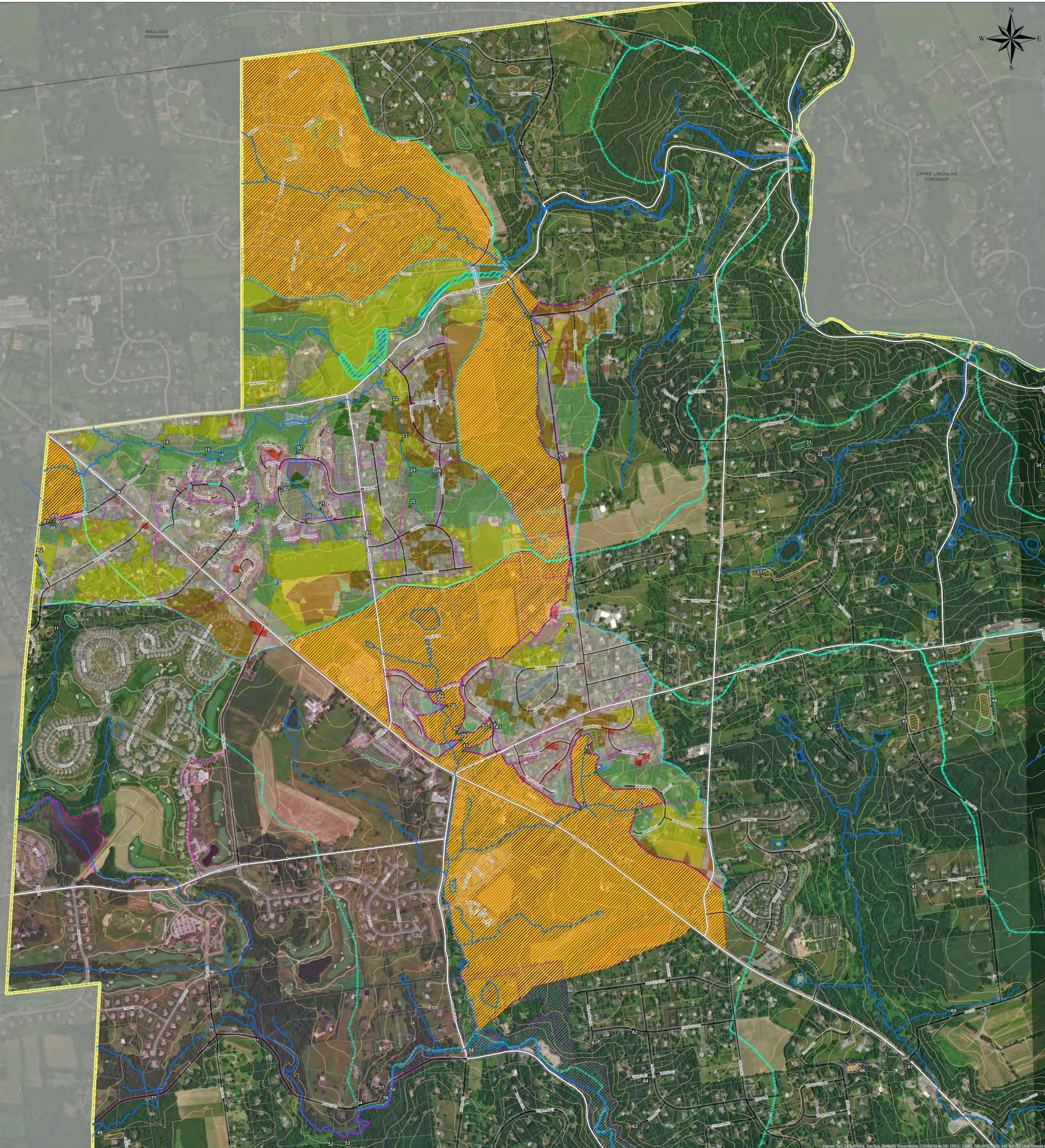
DRAWN BY: AR

DATE: 7/6/2018

1 inch = 500 feet



**EAST BRANDYWINE TOWNSHIP
POLLUTANT REDUCTION PLAN
LAND COVER MAP**
CHESTER COUNTY, PA



BEST MANAGEMENT PRACTICES (BMPs)

Name	Owner	Ownership
Culbertson Run Stream Restoration	Hideaway HOA	Private
Hawthorne Drive BMPs	East Brandywine Township	Township

DEP MS4 Aggregated Requirements Table

MS4 ID	MS4 Name	MS4 Type	MS4 Category	MS4 Status
001	East Brandywine Township	MS4	MS4	MS4

- Legend**
- Culbertson Run Stream Restoration Proposed BMP
 - Hawthorne Drive Proposed BMPs
 - Infiltration Beds
 - Swales
 - Outfalls
 - Impaired
 - Not Impaired
 - Observation Points
 - Planning Area
 - Parceled Areas
 - Land Areas in Which Stormwater Runoff Does Not Enter the MS4
 - Land Cover
 - 21- Developed, Open Space
 - 22- Developed, Low Intensity
 - 23- Developed, Medium Intensity
 - 24- Developed, High Intensity
 - 41- Deciduous Forest
 - 42- Evergreen Forest
 - 43- Mixed Forest
 - 52- Shrub/Scrub
 - 71- Grassland/Herbaceous
 - 81- Pasture/Hay
 - 82- Cultivated Crops
 - 90- Woody Wetlands
 - Roads
 - Private
 - State
 - Township
 - Streams
 - Streams
 - Located Tributaries
 - Index Contours
 - Basins
 - PCSM BMPs
 - Parcels
 - Township Owned Parcels
 - Area Opposite the 2010 Urbanized Area
 - Subwatersheds
 - Township Boundary