August 2, 2023

Goose Creek TMDL and Pollutant Reduction Plan for Plum Run, Radley Run, Brandywine Creek, Chester Creek, East Branch Chester Creek, Hunters Run, Ridley Creek

August 11, 2017
Updated March 2019
Updated June 2019
Updated July 2023

Prepared For:

Westtown Township
1039 Wilmington Pike
West Chester, PA 19382

Prepared By:

Cedarville Engineering Group, LLC
Pottstown, Pennsylvania | Pensacola, Florida
P: 610-705-4500 E: info@CedarvilleEng.com
CedarvilleEng.com

*Cedarville Engineering Group, LLC (CEG) is a **Federally Certified 8(a)/EDWOSB & DBE/WBE Company** specializing in civil engineering, environmental consulting, geospatial and construction services for federal, state, municipal, private and institutional clients. The CEG team of professionals ensure successful projects from concept to planning and design, through permitting and construction, to project acceptance, operations and maintenance. We deliver value through innovation.*

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The Westtown Township Goose Creek TMDL and Pollutant Reduction Plan for Plum Run, Radley Run, Brandywine Creek, Chester Creek, East Branch Chester Creek, Hunters Run, and Ridley Creek has been updated (July 2023) to reflect a change to the Thorne Drive Basin Retrofit project (Section 4.5). Based on results of the soil infiltration testing, Thorne Drive Basin will be converted to a wet pond stormwater Best Management Practice (BMP) to improve runoff quality through settling, filtration, uptake, chemical and biological decomposition, volatilization, and adsorption. The wet pond BMP is expected to provide the same estimated removal of sediment (4,436.12 lbs./yr) and phosphorus (1.15 lbs./yr) pollution as the originally proposed dry extended detention basin within the Chester Creek/East Branch Chester Creek/Ridley Creek PRP and Goose Creek TMDL Planning Areas, respectively. The TMDL/Pollutant Reduction Plan is a requirement of the Township's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit to reduce pollution to impaired streams within Westtown Township, Chester County, PA.

1.0 Purpose and Scope

Westtown Township is required to develop and implement a Total Maximum Daily Load (TMDL) Plan for phosphorous for Municipal Separate Storm Sewer System (MS4) discharges to Goose Creek and a Pollutant Reduction Plan (PRP) for sediment for MS4 discharges to Plum Run, Radley Run, Brandywine Creek, Chester Creek, East Branch Chester Creek, Hunters Run, and Ridley Creek. These plans are required 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 document will serve as the single plan for both the TMDL and PRP. This plan has been prepared based on the best and most current guidance made available by PA DEP. Definitions of relevant regulatory terms are provided in Section 6.0.

2.0 Permit Requirements

To develop the Township's TMDL and Pollutant Reduction Plans, it is important to understand the Township's requirements. These are summarized in the following paragraphs.

Goose Creek TMDL

Goose Creek has a TMDL established by the United States Environmental Protection Agency (EPA) for total phosphorous (TP), documented in a report entitled "Nutrient Total Maximum Daily Load in Goose Creek Watershed, Pennsylvania", dated June 30, 2008. The report cites Westtown Township's existing TP load as 1.40 lb/day and allocates a TP load of 0.64 lb/day, which is a required reduction of 53.9 percent. Table 1 below lists each MS4 in the Goose Creek watershed and the corresponding TMDL requirements, taken from Table 3-3 of the Goose Creek TMDL report entitled "Land Based Non-Point TP Load in the Goose Creek Watershed by MS4 Area." This TMDL was developed based on the 2001 National Land Cover Dataset but does not cite pollutant loading rates by land cover.

Table 1: Goose Creek TMDL MS4 Allocations and Required Reductions

MS4 Permit Holder	Area by MS4 (acres)	Existing TP Load (lb/day)	Allocated TP Load (lb/day)	Required Reduction
West Goshen Township	1,488	1.16	0.54	53.9%
West Chester Borough	310	0.24	0.11	53.9%
Westtown Township	1,791	1.40	0.64	53.9%
Thornbury Township (Chester County)	772	0.60	0.28	53.9%
Thornbury Township (Delaware County)	113	0.09	0.04	53.9%
TOTAL:	**4,474**	**3.49**	**1.61**	**53.9%**

The Township's Goose Creek TMDL Plan must illustrate how the following two (2) objectives will be achieved through the implementation of projects or Best Management Practices (BMPs):

1) ***Short-term TP reduction***

Per the PA DEP TMDL Plan Instructions (3800-PM-BCW0200d Rev. 3/2017), "short-term reduction" is defined as a plan for reducing TP by five (5) percent over the five (5) year permit term (March 16, 2018 to March 15, 2023), if the wasteload allocations (WLAs) or overall required percent reduction of 53.9 percent cannot be achieved during this timeframe.

2) ***Long-term TP reduction***

"Long-term reduction" is defined by the PA DEP TMDL Plan Instructions as a general plan describing how WLAs or overall required percent reductions will ultimately be achieved.

Goose Creek drains to Chester Creek, which is listed as impaired for sediment. By complying with the Goose Creek TMDL requirements, the Township will simultaneously work towards achieving the required sediment reduction for Chester Creek, which is further described below.

PRP for Discharges to Waters Impaired for Sediment

Westtown has MS4 discharges or "outfalls" to Plum Run, Radley Run, Brandywine Creek, Chester Creek, East Branch Chester Creek, Hunters Run, and Ridley Creek, which are all 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 2 below. Therefore, in addition to the Goose Creek TMDL requirement, Westtown Township is required by the PA DEP and Environmental Protection Agency (EPA) to reduce the sediment loading to Plum Run, Radley Run, Brandywine Creek, Chester Creek, East Branch Chester Creek, Hunters Run, and Ridley Creek by ten (10) percent within five (5) years of permit approval by implementing projects or Best Management Practices (BMPs).

Westtown has no outfalls that discharge directly to Brandywine Creek. Brandywine Creek is listed because the Township has outfalls that discharge to Plum Run and Radley Run, which ultimately flow into Brandywine Creek, and the main stem of the Brandywine Creek is listed as impaired for sediment within five (5) miles downstream of the Township's most downstream outfall.

Table 2: PA DEP MS4 Requirements Table (Municipal) Excerpt (last revised May 9, 2017)

MS4 Name	NPDES ID	Individual Permit Required?	Reason	Impaired Downstream Waters or Applicable TMDL Name	Requirement(s)	Other Cause(s) of Impairment
Westtown Twp, Chester County	PAI130528	Yes	TMDL Plan, SP, IP	Ridley Creek	Appendix E-Siltation (5)	Cause Unknown (5), Water/Flow Variability (4c)
				Radley Run	Appendix E-Siltation (4a)	Water Flow Variability (4c)
				Brandywine Creek	Appendix E-Siltation (4a)	
				Hunters Run	Appendix E-Siltation (5)	Cause Unknown (5), Water/Flow Variability (4c)
				Chester Creek	Appendix B-Pathogens (5), Appendix E-Siltation (5)	Cause Unknown (5), Flow Alterations, Other Habitat Alterations, Water Flow Variability (4c)
				East Branch Chester Creek	Appendix E-Siltation (5)	Cause Unknown (5), Other Habitat Alterations, Water/Flow Variability (4c)
				Goose Creek TMDL	TMDL Plan-Nutrients (4a)	Cause Unknown (4a)
				Plum Run	Appendix E-Siltation (4a)	Water/Flow Variability (4c)

3.0 Background/Setting

Westtown Township comprises approximately 8.8 square miles located near the eastern boundary of Chester County, in southeast Pennsylvania (Figure 1). The 2010 Urbanized Area (U.S. Census Bureau) covers the entire land area of the Township.

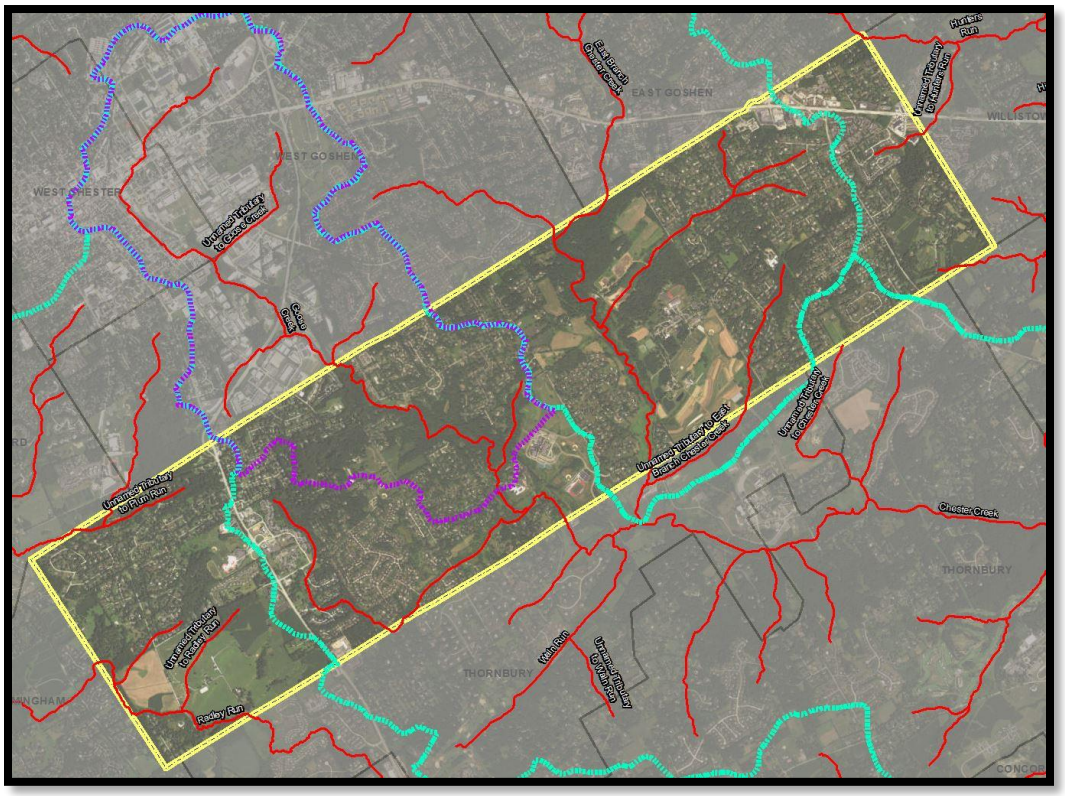
Figure 1: Westtown Township Location Map

Figure 2 below displays a map of the streams that cross Westtown Township. Stream segments displayed in red indicate impaired streams. All streams mapped in Westtown and the surrounding communities are listed as impaired. The purple dashed line delineates the Goose Creek watershed and the turquoise dashed lines delineate U.S. Geological Survey (USGS) National Hydrography Dataset (NHD) Hydrologic Unit Code (HUC)-12 boundaries. From southwest to northeast, HUC-12s within Westtown include the following:

- Upper Brandywine Creek (contains Plum Run, Radley Run, and Brandywine Creek)
- Chester Creek (contains Goose Creek TMDL and Chester Creek)
- East Branch Chester Creek
- Ridley Creek (contains Hunters Run and Ridley Creek)

Westtown Township has 210 MS4 outfalls. These MS4 outfalls discharge to the sediment-impaired Plum Run, Radley Run, Brandywine Creek, Chester Creek (includes 45 outfalls that discharge to Goose Creek), East Branch Chester Creek, Hunters Run, and Ridley Creek. A total of forty-five (45) of these 210 MS4 outfalls discharge to Goose Creek.

Figure 2: Westtown Township Impaired Streams



3.1 Plum Run

An unnamed tributary (UNT) to Plum Run originates in the western portion of Westtown Township and flows in a southwesterly direction where it meets another tributary that enters the main stem of Plum Run west of the Township boundary in East Bradford Township. The UNT tributaries are listed as impaired for sediment and water flow variability. Table 3 below lists the impairment information for the UNTs from the 2014 Integrated Report.

There are fourteen (14) MS4 outfalls that discharge to the UNTs to Plum Run. Plum Run discharges to Brandywine Creek and is part of the Upper Brandywine Creek HUC12. Refer to Appendices for MS4 mapping.

Table 3: 2014 Integrated Report – Plum Run

Impairment Cause	Impairment Source	Category	Assessed Use	Date Listed
Water/Flow Variability	Urban Runoff/Storm Sewers	4c	Aquatic Life	1998
Siltation	Urban Runoff/Storm Sewers	4a	Aquatic Life	1998
Siltation	Agriculture	4a	Aquatic Life	1998

3.2 Radley Run

Radley Run flows in a northwesterly direction through the southwestern corner of Westtown Township. Two (2) UNTs originate in the west-central portion of the Township and flow in a southwesterly direction into Radley Run within the boundaries of the Township. Both Radley Run and its tributaries are listed as impaired for sediment and water/flow variability. Table 4 below lists the impairment information from the 2014 Integrated Report.

There are twenty-four (24) MS4 outfalls that discharge to Radley Run and its UNTs. Radley Run discharges to Brandywine Creek and is part of the Upper Brandywine Creek HUC12. Refer to Appendices for MS4 mapping.

Table 4: 2014 Integrated Report – Radley Run

Impairment Cause	Impairment Source	Category	Assessed Use	Date Listed
Water/Flow Variability	Urban Runoff/Storm Sewers	4c	Aquatic Life	2010
Siltation	Agriculture, Urban Runoff/Storm Sewers	4a	Aquatic Life	1998

3.3 Brandywine Creek

Brandywine Creek lies outside of the township to the west. Radley Run and UNTs to Plum Run flow through Westtown Township into Brandywine Creek, which is listed as impaired for sediment. Table 5 below lists the impairment information for Brandywine Creek from the 2014 Integrated Report.

No MS4 outfalls discharge directly to the Brandywine Creek; however, Radley Run and Plum Run both flow into the Brandywine Creek. Brandywine Creek is listed as impaired for sediment. Refer to Appendices for MS4 mapping.

Table 5: 2014 Integrated Report – Brandywine Creek

Impairment Cause	Impairment Source	Category	Assessed Use	Date Listed
Siltation (sediment)	Agriculture, Urban Runoff/Storm Sewers	4a	Aquatic Life	2010

3.4 Chester Creek

Chester Creek originates in the western portion of the Township where it flows in a south-southeasterly direction to the southern boundary of the Township, where it turns and begins flowing in a northeasterly direction. Goose Creek flows into Chester Creek before it turns south-southeast again and continues to flow out of the Township in a south-southeasterly direction. There are outfalls that drain to Chester Creek in the south-eastern half of the Township. Chester Creek is listed as impaired for sediment, other habitat alterations, water/flow variability and cause unknown. Table 6 below lists the impairment information from the 2014 Integrated Report.

There are ninety-four (94) MS4 outfalls that discharge to Chester Creek listed as impaired for sediment. Refer to Appendices for MS4 mapping.

Table 6: 2014 Integrated Report – Chester Creek

Impairment Cause	Impairment Source	Category	Assessed Use	Date Listed
Cause Unknown	Urban Runoff/Storm Sewers	4a	Aquatic Life	2014
Siltation	Urban Runoff/Storm Sewers	5	Aquatic Life	2014
Other Habitat Alterations	Habitat Modifications	4c	Aquatic Life	2014
Water/Flow Variability	Urban Runoff/Storm Sewers	4c	Aquatic Life	2014

3.5 Goose Creek (TMDL)

Goose Creek flows through the center of the Township in a southeasterly direction until it meets Chester Creek at the southern boundary of the Township. Goose Creek roughly parallels the railroad that transects the Township. Table 7 below lists the impairment information from the 2014 Integrated Report.

There are forty-five (45) MS4 outfalls that discharge to Goose Creek. Goose Creek has a TMDL for phosphorous as referenced in Section 2.0. It is also listed as impaired for sediment. Refer to Appendices for MS4 mapping.

Table 7: 2014 Integrated Report – East Branch Chester Creek

Impairment Cause	Impairment Source	Category	Assessed Use	Date Listed
Water/Flow Variability	Urban Runoff/Storm Sewers	4c	Aquatic Life	2014
Other Habitat Alterations	Habitat Modification	4c	Aquatic Life	2014
Cause Unknown	Urban Runoff/Storm Sewers	5	Aquatic Life	2014
Siltation	Urban Runoff/Storm Sewers	5	Aquatic Life	2014

3.6 East Branch Chester Creek

The East Branch Chester Creek flows through the center of the Township (east of Goose Creek), roughly paralleling the western side of Westtown Road. There are multiple unnamed tributaries to East Branch Chester Creek within the Township, all of which are listed as impaired for sediment, water/flow variability, other habitat alterations, and cause unknown. Table 8 below lists the impairment information from the 2014 Integrated Report.

There are one-hundred fifty-nine (159) MS4 outfalls that discharge to East Branch Chester Creek and its UNTs that are listed as impaired for sediment. Refer to Appendices for MS4 mapping.

Table 8: 2014 Integrated Report – East Branch Chester Creek

Impairment Cause	Impairment Source	Category	Assessed Use	Date Listed
Cause Unknown	Urban Runoff/Storm Sewers	5	Aquatic Life	2014
Other Habitat Alterations	Habitat Modification	4c	Aquatic Life	2014
Siltation	Urban Runoff/Storm Sewers	5	Aquatic Life	2014
Water/Flow Variability	Urban Runoff/Storm Sewers	4c	Aquatic Life	2014

3.7 Hunters Run

Hunters Run flows across the northeastern corner of the Township in a southeasterly direction. An unnamed tributary to Hunters Run originates in the eastern portion of the Township and flows in an east-northeasterly direction, eventually into Hunters Run outside of the Township boundary to the east. Hunters Run and its tributary are listed as impaired for sediment. This stream was listed as impaired for other water/flow variability, siltation and cause unknown in 2012. Table 9 below lists the impairment information from the 2014 Integrated Report.

There are ten (10) MS4 outfalls that discharge to Hunters Run and its UNT. Refer to Appendices for MS4 mapping.

Table 9: 2014 Integrated Report – Hunters Run

Impairment Cause	Impairment Source	Category	Assessed Use	Date Listed
Cause Unknown	Urban Runoff/Storm Sewers	5	Aquatic Life	2012
Water/Flow Variability	Urban Runoff/Storm Sewers	4c	Aquatic Life	2012
Siltation	Urban Runoff/Storm Sewers	5	Aquatic Life	2012

3.8 Ridley Creek

An unnamed tributary to Ridley Creek originates in the southeastern corner of the Township and flows in an easterly direction out of the Township eventually into Ridley Creek. This tributary is listed as impaired for sediment, water/flow variability, and cause unknown. Table 10 below lists the impairment information for the UNT from the 2014 Integrated Report.

There are three (3) MS4 outfalls that discharges to the UNT to Ridley Creek listed as impaired for sediment. Refer to Appendices for MS4 mapping.

Table 10: 2014 Integrated Report – Ridley Creek

Impairment Cause	Impairment Source	Category	Assessed Use	Date Listed
Cause Unknown	Urban Runoff/Storm Sewers	5	Aquatic Life	2012
Water/Flow Variability	Urban Runoff/Storm Sewers	4c	Aquatic Life	2012
Siltation	Urban Runoff/Storm Sewers	5	Aquatic Life	2012

4.0 Pollutant Reduction

Per the MS4 permit and PRP Instructions document (3800-PM-BCW0100k Rev. 3/2017), the following sections are addressed 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 TMDL-PRP was updated to address comments received from the PA DEP in a letter dated January 30, 2018. The Township completed the required public comment period. A copy of the affidavit of publication in the Daily Local News is included in Appendix A. No comments were received. The PRP was presented at a regular Board of Supervisors meeting on March 18, 2019, and comments were accepted from any interested members of the public.

The TMDL-PRP was updated again in July 2023 to reflect a change in the proposed stormwater Best Management Practice (BMP) for the Thorne Drive Basin Retrofit project. A copy of the TMDL-PRP will be posted on the Township's website and a notice published in

the Daily Local News describing the amendment. The TMDL-PRP will be announced at the public meeting on August 7, 2023 and comments accepted for a thirty (30) day period. Public comments will also be formally accepted at a subsequent Board of Supervisors meeting. Any comments received will be summarized for consideration of the TMDL-PRP accordingly.

4.2 Storm Sewersheds/Planning Area

Storm sewersheds, the areas which drain to each of the 210 outfalls, were manually delineated in ArcMap 10.6 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.

"Parsing" is defined by the PRP Instructions Attachment A, entitles "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 #2 and #4 as described above. These parsed areas have been further categorized and identified on the Storm Sewershed/Planning Area Map in Appendix D.

Storm sewersheds that extend outside of the municipal boundary are not included in the overall planning area. The drainage areas to existing, and/or proposed, BMPs located outside of the storm sewersheds were added to the overall planning area.

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 May 9, 2017), Westtown Township may achieve the ten (10) percent sediment pollutant reduction in the following aggregated Planning Areas, as opposed to a 10 percent reduction in the Planning Areas for each receiving impaired surface water.

Table 11: Pollutant Aggregation Suggestions for MS4 Requirements Table (Municipal) Excerpt

MS4 Name	NPDES ID	HUC-12	Impaired Downstream Waters or Applicable TMDL Name	Requirement(s)
Westtown Twp, Chester County	PAI130528	Middle Brandywine Creek, Upper Brandywine Creek	Brandywine Creek, Plum Run, Radley Run	Appendix E-Siltation
		Chester Creek	Chester Creek, Goose Creek TMDL	Appendix B-Pathogens, TMDL Plan-Nutrients
		Chester Creek, East Branch Chester Creek, Ridley Creek	Chester Creek, East Branch Chester Creek, Hunters Run, Ridley Creek	Appendix E-Siltation

To simplify planning and reporting efforts, from this point forward the report will reference the Middle Brandywine Creek/ Upper Brandywine Creek PRP Planning Area, the Chester Creek/East Branch Chester Creek/Ridley Creek PRP Planning Area, and the Goose Creek TMDL Planning Area (which is also contained within the Chester Creek/East Branch Chester Creek/Ridley Creek PRP Planning Area, since Goose Creek drains to Chester Creek).

4.3 *Pollutants of Concern*

Westtown Township is required to reduce total phosphorous loading for MS4 outfalls that discharge to Goose Creek per the TMDL. Additionally, for the PRPs, Westtown Township is required to reduce sediment loading for MS4 outfalls that discharge to waters impaired by sediment, which includes all receiving streams within the Township.

To meet the PRP requirements, a minimum of ten (10) percent sediment reduction within five (5) years of permit approval has been demonstrated in this plan. Though not required, existing loading and BMP reduction calculations were also provided for phosphorous and nitrogen in Appendix C.

To meet the short- and long-term Goose Creek TMDL reduction objectives, the entire 53.9 percent total phosphorous reduction required has been demonstrated as being implemented within five (5) years of permit approval in this plan.

4.4 *Existing Pollutant Loading*

To determine existing sediment loading to Plum Run, Radley Run, Brandywine Creek, Chester Creek, East Branch Chester Creek, Hunters Run, and Ridley Creek, the general methodology described in the DEP guidance document entitled "Pollution Reduction Plan: A Methodology" was used. To provide a consistent calculation methodology across the Goose Creek TMDL and the PRP requirements, the total phosphorous allocation for Goose Creek was recalculated for the Goose Creek Planning Area per the same methodology. The short and long-term reduction objectives of the TMDL were then applied to the recalculated load. Utilizing ArcGIS 10.6, 2011 National Land Cover Dataset (NLCD) data, the acreage of each land cover classification type within the Planning Area was calculated.

The aggregate National Land Cover Data (NLCD) statistics within the Planning Areas for each aggregation group is compiled in Table 12 below with a breakdown of the area by land cover classification type. Refer to Appendix F for the Land Cover Map.

Table 12: NLCD 2011 Land Cover by PRP Planning Area

PRP Planning Area/Aggregated HUC-12s	Aggregated Receiving Sediment-Impaired Surface Waters	NLCD 2011 Land Cover Classification within Planning Area	Area (acres)	Percent Impervious	Impervious Area (acres)	Pervious Area (acres)
Middle Brandywine Creek/ Upper Brandywine Creek	Brandywine Creek, Plum Run, Radley Run	Developed, Open Space	306.80	19	58.29	248.51
		Developed, Low Intensity	14.12	49	6.92	7.20
		Developed, Medium Intensity	8.52	79	6.73	1.79
		Developed, High Intensity	3.16	100	3.16	0
		Deciduous Forest	70.04	0	0	70.04
		Evergreen Forest	2.03	0	0	2.03
		Mixed Forest	13.27	0	0	13.27
		Shrub/Scrub	33.76	0	0	33.76
		Hay/Pasture	45.87	0	0	45.87
		Cultivated Crop	10.03	0	0	10.03
		Woody Wetlands	1.36	0	0	1.36
		Grassland/Herbaceous	1.33	0	0	1.33
		TOTAL:	**510.29**		**75.10**	**435.19**
Chester Creek/East Branch Chester Creek/Ridley Creek	Chester Creek, East Branch Chester Creek, Hunters Run, Ridley Creek, Goose Creek	Developed, Open Space	1494.95	19	284.04	1210.91
		Developed, Low Intensity	206.13	49	101.00	105.13
		Developed, Medium Intensity	77.20	79	60.99	16.21
		Developed, High Intensity	10.44	100	10.44	0
		Deciduous Forest	421.95	0	0	421.95
		Evergreen Forest	16.01	0	0	16.01
		Mixed Forest	38.24	0	0	38.24
		Shrub/Scrub	109.74	0	0	109.74
		Hay/Pasture	67.97	0	0	67.97
		Cultivated Crop	11.97	0	0	11.97
		Woody Wetlands	37.12	0	0	37.12
		Emergent Herbaceous Wetland	0.72	0	0	0.72
		Grassland/Herbaceous	1.56	0	0	1.56
		TOTAL:	**2494.00**		**456.47**	**2037.53**

The Goose Creek TMDL Planning Area is located within and included in the Chester Creek/East Branch Chester Creek/Ridley Creek PRP Planning Area. However, because Goose Creek has a separate TMDL requirement, this information is also provided separately in Table 13 below.

Table 13: NLCD 2011 Land Cover within Goose Creek TMDL Planning Area

TMDL Planning Area	NLCD 2011 Land Cover Classification within Planning Area	Area (acres)	Percent Impervious	Impervious Area (acres)	Pervious Area (acres)
Goose Creek	Developed, Open Space	332.55	19	63.18	269.37
	Developed, Low Intensity	28.73	49	14.08	14.65
	Developed, Medium Intensity	5.66	79	4.47	1.19
	Developed, High Intensity	0.67	100	0.67	0
	Deciduous Forest	154.02	0	0	154.02
	Evergreen Forest	2.65	0	0	2.65
	Mixed Forest	8.35	0	0	8.35
	Shrub/Scrub	35.28	0	0	35.28
	Hay/Pasture	17.35	0	0	17.35
	Woody Wetlands	6.64	0	0	6.64
	Grassland/Herbaceous	1.56	0	0	1.56
	Cultivated Crops	3.78	0	0	3.78
	TOTAL:	**597.24**		**82.40**	**514.84**

"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 PRP sediment loading is in Table 14 below. Please refer to Appendix C for supporting calculations. Calculations for phosphorous and nitrogen loading have also been provided, though not required. The recalculated total phosphorous loading for Goose Creek is in Table 15 below.

Using the pollutant removal efficiency rates specified in the PA DEP NPDES Stormwater Discharges from Small MS4s BMP Effectiveness Values Table (Revised 6/2018), BMPs were credited to reduce the existing sediment loading. The existing sediment loading quantified from the Middle Brandywine Creek/Upper Brandywine Creek PRP Planning Area is 193,571.35 lbs/yr. The existing sediment loading quantified from the Chester Creek/East Branch Chester Creek/Ridley Creek PRP Planning Area is 1,064,074.48 lbs/yr. A more detailed breakdown is in the table below. Please refer to Appendix C for supporting calculations.

Table 14: Existing Sediment Loading for PRP Planning Areas

PRP Planning Area	Category	Area (ac)	TSS [Sediment] (lbs/yr)
Middle Brandywine Creek/ Upper Brandywine Creek	Impervious, Developed	75.10	113,008.98
	Pervious, Developed	435.19	80,562.37
SUBTOTAL:		**510.29**	**193,571.35**
Existing BMP Reduction:			5,803.23
TOTAL:			**187,768.12**
Required 10% Sediment Reduction			**18,776.81**
Chester Creek/East Branch Chester Creek/Ridley Creek/Goose Creek	Impervious, Developed	456.47	686,886.93
	Pervious, Developed	2,037.53	377,187.55
SUBTOTAL:		**2,494.00**	**1,064,074.48**
Existing BMP Reduction:			30,944.78
TOTAL:			**1,033,129.70**
Required 10% Sediment Reduction			**103,312.97**

The existing (recalculated) total phosphorous loading for the Goose Creek TMDL is 305.65 lbs/yr and is provided separately in Table 15 below. Please refer to Appendix C for supporting calculations.

Table 15: Existing Phosphorous Loading for Goose Creek TMDL Planning Area

TMDL Planning Area	Category	Area (ac)	TP [Phosphorous] (lbs/yr)
Goose Creek	Impervious, Developed	82.40	120.30
	Pervious, Developed	514.84	185.34
TOTAL:		**597.24**	**305.65**
Required Short-Term 5% Phosphorous Reduction			**15.28**
Required Long-Term 53.9% Phosphorous Reduction			**164.75**

Thirteen (13) existing BMPs were credited to reduce the existing loading to 187,768.12 lbs/yr for the Middle Brandywine Creek/Upper Brandywine Creek and 1,033,129.70 lbs/yr for the Chester Creek/East Branch Chester Creek/Ridley Creek, which resulted in a required 10 percent reduction of 18,776.81 lbs/yr for the Middle Brandywine Creek/Upper Brandywine Creek and 103,312.97 lbs/yr for the Chester Creek/East Branch Chester Creek/Ridley Creek. Each existing BMP is described below and summarized in Table 16. Please refer to Appendix C for supporting calculations and the Storm Sewershed Map in Appendix E for BMP locations. Individual maps of the existing BMPs and their drainage areas are located in Appendix D.

Westtown Reserve Dry Extended Detention Basin

This dry extended detention basin is located at the corner of Pleasant Grove Road and Skiles Boulevard. The basin is associated with Outfall #76. The basin is functioning and is operated and maintained by Westtown Apartments Property Owner, LLC. The total drainage area is 17.27 acres; it provides a total sediment pollutant load reduction of 10,810.08 lbs./yr.

Figure 3: Overall View of Westtown Reserve Dry Extended Detention Basin

Simon and Jude Dry Extended Detention Basin

This dry extended detention basin is located near the corner of Cavanaugh Court and Chester Road. The basin is associated with Outfall #45. The basin is functioning and is operated and maintained by Archdiocese of Philadelphia. The total drainage area is 6.00 acres; it provides a total sediment pollutant load reduction of 2,440.06 lbs./yr.

Figure 4: Overall View of Simon and Jude Dry Extended Detention Basin

Kolbe Lane Dry Extended Detention Basin

This dry extended detention basin is located off of Kolbe Lane behind house #1128. The basin is associated with Outfall #161. The basin is functioning and is operated and maintained by John Zabilowicz and Maryann Rock-Zabilowicz. The total drainage area is 12.35 acres; it provides a total sediment pollutant load reduction of 3,231.51 lbs./yr.

Figure 5: Overall View of Kolbe Lane Dry Extended Detention Basin

West Glen Dry Extended Detention Basin

This dry extended detention basin is located near the corner of Piedmont Road and Dalmally Drive. The basin is associated with Outfall #77. The basin is functioning and is operated and maintained by West Glen Community Association. The total drainage area is 14.93 acres; it provides a total sediment pollutant load reduction of 5,134.29 lbs./yr.

Figure 6: Overall View of West Glen Dry Extended Detention Basin

Kilduff Circle Dry Extended Detention Basin

This dry extended detention basin is located behind 940 Kilduff Circle. The basin is associated with Outfall #24. The basin is functioning and is operated and maintained by Russell Hatton and Shirley Leclerc. The total drainage area is 35.39 acres; it provides a total sediment pollutant load reduction of 7,548.24 lbs./yr.

Figure 7: Overall View of Kilduff Circle Dry Extended Detention Basin

Arborview Wet Pond

This wet pond is located near the corner of Wilmington Pike and Pleasant Grove Road. The basin is associated with Outfall #58. The basin is functioning and is operated and maintained by Arborview HOA. The total drainage area is 13.42 acres; it provides a total sediment pollutant load reduction of 2,820.80 lbs./yr.

Figure 8: Overall View of Arborview Wet Pond

Arborview Infiltration Trench

This filtering practice is located between Hidden Pond Way and West Pleasant Grove Road. The basin is associated with Outfall #58. The basin is functioning and is operated and maintained by Arborview HOA. The total drainage area is 5.32 acres; it provides a total sediment pollutant load reduction of 938.10lbs./yr.

Figure 9: Overall View of Arborview Infiltration Trench

Stetson Middle School Dry Extended Detention Basin

This dry extended detention basin is located on Stetson Middle School grounds; 1060 Wilmington Pike. The basin is associated with Outfall #20. The basin is functioning and is operated and maintained by West Chester Area School District. The total drainage area is 4.88 acres; it provides a total sediment pollutant load reduction of 1,009.19 lbs./yr.

Figure 10: Overall View of Stetson Middle School Dry Extended Detention Basin

Table 16: Existing BMP Sediment Reduction

BMP Name	Drainage Area (ac)	TSS [Sediment] Reduction
Chester Creek/East Branch Chester Creek/Ridley Creek		
Westtown Reserve Basin	17.27	10,810.08
Simon and Jude Basin	6.00	2,440.06
Kolbe Lane Basin	12.35	3,231.51
West Glen Basin	14.93	5,134.29
Kilduff Circle Basin	35.39	7,548.24
Thorne Drive Basin	19.86	887.22
Sage Road Basin	20.59	893.38
SUBTOTAL:	126.39	30,944.78
Middle Brandywine Creek/Upper Brandywine Creek		
Arborview Wet Pond	13.42	2,820.80
Arborview Infiltration Trench	5.32	938.10
Stetson Middle School Basin	4.88	1,009.19
Dunvegan Road Basin	9.90	408.68
General Greene Basin B	12.38	534.90
General Greene Basin A	9.76	437.17
SUBTOTAL:	55.66	6,148.84
TOTAL:	**182.05**	**37,093.62**

4.5 Proposed Best Management Practices (BMPs)

Proposed BMP locations were identified in coordination with the Township 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 10.6 using aerial imagery, two (2)-foot topographic contours, and hydrologic data. Site visits were conducted to verify project viability and to collect information and measurements of existing BMPs.

Where possible, BMPs that treat a larger drainage area were selected to reduce the number of BMPs to be implemented. Existing BMPs on Township-owned property within the Planning Areas were assessed for retrofit. After those opportunities were exhausted, existing BMPs on homeowner's association (HOA)-owned property within the Planning Areas were assessed for retrofit. Lastly, new BMPs on Township-owned and HOA-owned property within the Planning Area were explored.

Pollutant reductions resulting from the proposed BMPs were quantified using the same methodology described above for existing sediment loading within the drainage area for each BMP, then applying reduction rates. Reductions from new BMPs (infiltration trenches and bioretention swale) were calculated using the efficiency rates specified in the NPDES Stormwater Discharges from Small MS4s BMP Effectiveness Values table (May 2016). Reductions from retrofits of existing BMPs were calculated using the methodology in the "Recommendations of the Expert Panel to Define Removal Rates for Urban Stormwater Retrofit Projects" (revised January 20, 2015). Please refer to Appendix C for supporting calculations.

TMDL and PRP Objectives

Westtown Township proposes to meet the entire Goose Creek TMDL total phosphorous reduction requirement of 53.9 percent through an existing BMP, and four (4) basin retrofit projects within five (5) years of permit approval and approximately 2,150 linear feet of stream restoration (>5 years) for the Goose Creek TMDL Planning Area. The location(s) of the 2,150 linear feet of stream restoration have not yet been determined and will be explored as the next permit term approaches.

Because Goose Creek drains to Chester Creek, these BMPs will also satisfy a portion of the ten (10) percent sediment load reduction requirements within the Chester Creek/East Branch Chester Creek/Ridley Creek PRP Planning Area. A stream restoration project along a reach of East Branch Chester Creek, referred to as Pleasant Grove Stream Restoration, will satisfy the remainder of these requirements.

The Township will meet its ten (10) percent sediment load reduction requirements within the Middle Brandywine Creek/Upper Brandywine Creek PRP Planning Area through the implementation of a stream restoration project along Radley Run along with three (3) basin retrofit projects.

Maps of the proposed BMPs and the land cover within their drainage areas are 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.

Pollutant Load Reductions through Proposed BMP Implementation

Phosphorous load reductions achieved through the implementation of the proposed BMPs in the Goose Creek TMDL Planning area are documented in Table 17.

Table 18: PRP Planning Areas: Sediment Load Reductions from Proposed BMPs

PRP Planning Area	BMP Name	Drainage Area (ac)	TSS Reduction		
			lbs/yr	% Reduction	% of Required Reduction
Chester Creek/ East Branch Chester Creek/ Ridley Creek (contains Goose Creek TMDL Planning Area)	Tyson Park	41.4	13,595.28	1.32	13.16
	Thorne Drive Basin Retrofit	19.86	4,436.12	0.43	4.29
	Sage Road Basin Retrofit	20.59	4,466.88	0.43	4.32
	Wild Goose Farms Basin B Retrofit	9.95	4,288.58	0.42	4.15
	Wild Goose Farms Basin A Retrofit	5.21	1,797.73	0.17	1.74
	Pleasant Grove Stream Restoration	21.36	77,408.39	7.49	74.93
TOTAL:		**118.37**	**105,992.98**	**10.26**	**102.59**
Middle Brandywine Creek/Upper Brandywine Creek	Dunvegan Road Basin Retrofit	9.9	2,043.40	1.09	10.90
	General Greene Basin B Retrofit	12.38	2,674.52	1.43	14.27
	General Greene Basin A Retrofit	9.76	2,185.83	1.17	11.66
	Radley Run Stream Restoration	1.92	11,984.36	6.39	63.95
TOTAL:		**33.96**	**18,888.11**	**10.08**	**100.78**

Table 17: Goose Creek TMDL Planning Area: Total Phosphorous Load Reductions from Proposed BMPs

Timeline	BMP Name	Drainage Area (ac)	TP Reduction		
			lbs/yr	% Reduction	% of Required Reduction to meet 53.9%
2019-2024	Tyson Park Bioswale (installed 2015)	41.4	17.01	5.57	10.33
	Thorne Drive Basin Retrofit	19.86	1.15	0.38	0.70
	Sage Road Basin Retrofit	20.59	1.17	0.38	0.71
	Wild Goose Farms Basin B Retrofit	9.95	1.60	0.52	0.97
	Wild Goose Farms Basin A Retrofit	5.21	0.71	0.23	0.43
	SUB-TOTAL:	**97.01**	**21.64**	**7.08**	**13.14**
>2024	Stream Restoration	2,150 LF	142.80	47.83	88.74
	SUB-TOTAL:		**142.80**	**47.83**	**88.74**
	TOTAL:	**97.01**	**190.84**	**54.91**	**101.88**

Sediment load reductions achieved through the implementation of the proposed BMPs in each PRP Planning Area are in Table 18 below. Because the Goose Creek TMDL Planning Area is contained within the Chester Creek/ East Branch Chester Creek/ Ridley Creek PRP Planning Area, these BMPs were also counted towards the PRP sediment reduction requirements.

Detailed BMP Descriptions – Short-Term (2019 – 2024)

Each of the BMPs proposed to meet short-term objectives are described in more detail below.

Tyson Park Bioswale (Existing)

A bioswale was designed and constructed in Tyson Park, a Township-owned park property, in 2015, in anticipation of the TMDL Plan requirements. The drainage area to the bioswale is 41.4 acres. This existing BMP has been properly maintained by the Township as illustrated in the photograph below. The Township has also installed educational signage as a component of the project.

It is being credited as reducing the existing sediment loading for the Chester Creek/East Branch Chester Creek/Ridley Creek PRP Planning Area and towards achieving the long-term total phosphorous reduction of 53.9 percent in the Goose Creek TMDL Planning Area, reducing total phosphorous loading by 17.01 lbs/year (5.57 percent).

Figure 11: Tyson Park Bioswale and Signage

Thorne Drive Basin Retrofit

This existing basin is located in the southwest quadrant of the intersection of Thorne Drive and Little Shiloh Road in the west-central portion of the Township on a Township-owned property. The basin has a drainage area of 19.86 acres. The existing basin is located outside of the Planning Area as the outfall is located to the north in West Goshen Township. Therefore, the drainage area has been added to the Goose Creek TMDL Planning Area and the Chester Creek/East Branch Chester Creek/Ridley Creek PRP Planning Area and accounted for in the existing loading.

The basin is overgrown and has reduced volume capacity. In addition, a defined channel has eroded through it causing the basin to short-circuit. The existing outlet of the basin is an open pipe that is the same elevation as the basin bottom. The basin effectively holds no water during smaller storm events, providing no water quality benefit.

The scope of the proposed retrofit includes removing the trees, vegetation, and sediment accumulation, regrading/removing the defined channel, and installing a new outlet structure to convert the basin to a wet bond Best Management Practice. This project will provide an estimated removal of 4,436.12 lbs/yr of sediment (0.43 percent) within the Chester Creek/East Branch Chester Creek/Ridley Creek PRP Planning Area and an estimated removal of 1.15 lbs/yr of total phosphorous (0.38 percent) within the Goose Creek TMDL Planning Area.

Sage Road Basin Retrofit

This existing basin is located at the southern end of a cul-de-sac off Sage Road on a Township-owned property. It has been proposed to retrofit this existing basin. The basin has a drainage area of 20.59 acres. Goose Creek is the receiving stream for this area, which lies within the Chester Creek Hydrologic Unit Code (HUC) 12.

The basin is overgrown and has accumulated mounds of sediment in some areas. The scope of the proposed retrofit includes removing trees and shrubs, accumulated sediment, as well as modifying the outlet structure orifice to increase volume treated through infiltration and extended detention. Assumptions for the preliminary calculations included reducing the orifice from 12 inches to 6 inches through the installation of a steel plate and coring 6-inch orifice 2 feet above the basin bottom. This project will provide an estimated removal of 4,466.88 lbs/yr of sediment (0.43 percent) within the Chester Creek/East Branch Chester Creek/Ridley Creek PRP Planning Area and an estimated removal of 1.17 lbs/yr of total phosphorus (0.38 percent) within the Goose Creek TMDL Planning Area.

Radley Run Stream Restoration

The section of Radley Run proposed for restoration is located on the west side of S. New Street between W. Pleasant Grove Road and W. Street Road on private property. This reach has been identified for restoration based on the presence of bank erosion and the lack of tree removal required. Radley Run is the receiving stream for this area, which lies within the Upper Brandywine Creek Hydrologic Unit Code (HUC) 12.

For the purposes of this plan, it has been assumed that approximately 260 linear feet of restoration along with wetland pockets being formed as part of the restoration. The stream restoration will be completed at a sediment reduction rate of 44.88/lbs/ft/yr. Between the stream restoration and the wetland pockets, this project will provide an estimated removal of 11,984.36 lbs/yr of sediment (6.38 percent) within the Middle Brandywine Creek/Upper Brandywine Creek PRP Planning Area.

Wild Goose Farms Basin B Retrofit

This existing basin is located to the west of the intersection of Picket Way and Trellis Lane on a property owned by Wild Goose Farms Homeowners Association (HOA). It has been proposed to retrofit this existing basin. The basin has a drainage area of 9.95 acres. Goose Creek is the receiving stream for this area, which lies within the Chester Creek Hydrologic Unit Code (HUC) 12.

The scope of the proposed retrofit includes the removal of a concrete low flow channel, regrading the basin bottom and a modification to the outlet structure orifice to increase volume treated through infiltration and extended detention. Assumptions for the preliminary calculations included sealing the basin outlet structure orifice, which is currently 6-inches, through the installation of a steel plate and coring a 6-inch orifice 1.5-feet above the basin bottom. This project will provide an estimated removal of 4,288.58 lbs/yr of sediment (0.42

percent) within the Chester Creek/East Branch Chester Creek/Ridley Creek PRP Planning Area and an estimated removal of 1.60 lbs/yr of total phosphorus (0.52 percent) within the Goose Creek TMDL Planning Area.

Wild Goose Farms Basin A Retrofit

This existing basin is located to the west of the cul-de-sac on Picket Way on a property owned by Wild Goose Farms HOA. It has been proposed to retrofit this existing basin. The basin has a drainage area of 5.21 acres. Goose Creek is the receiver stream for this area, which lies within the Chester Creek Hydrologic Unit Code (HUC) 12.

There is currently minimal distance between the inlet and outlet of the basin, as well as a concrete low flow channel, which is causing the basin to short-circuit. The scope of the proposed retrofit includes the removal of a concrete low flow channel, regrading the basin bottom, creating a long meandering vegetated channel, and modifying the outlet structure orifice to increase volume treated through infiltration and extended detention. Assumptions for the preliminary calculations included sealing the existing 6-inch outlet structure orifice through the installation of a steel plate. This project will provide an estimated removal of 1,797.73 lbs/yr of sediment (0.17 percent) within the Chester Creek/East Branch Chester Creek/Ridley Creek PRP Planning Area and an estimates removal of 0.71 lbs/yr of total phosphorus (0.23 percent) within the Goose Creek TMDL Planning Area.

Pleasant Grove Stream Restoration

An approximately 1,600 linear foot section of East Branch Chester Creek is being proposed for floodplain restoration within the Pleasant Grove Development; which includes wetland pockets. This section of East Branch Chester Creek flows through a large, open space property owned by the Township in an easterly direction. Chester Creek is the receiving stream for this area, which lies within the Chester Creek Hydrologic Unit Code (HUC) 12.

A feasibility study was completed in December 2018 by LandStudies, Inc. The recommended length and location of restoration includes two sections of East Branch Chester Creek totaling approximately 1,450 linear feet from Tower Course Road to Blenheim Road and from Blenheim Road to South Concord Road. An additional 150 linear feet of restoration on the tributary from the existing pond is recommended for an overall total restoration length of 1,600 linear feet. The feasibility study indicates that this reach demonstrates an excellent opportunity for floodplain restoration because of the following factors:

1) High degree of channel instability and overall need for restoration.
2) Adequate amount of available space (width) for use as floodplain exists on-site.
3) High potential for significant measurable ecological uplift.
4) Limited existing tree cover (mostly all invasive/undesirable); and well-defined tie-in locations (bridges).

The 1,600 linear feet of stream restoration implemented with a sediment reduction rate of 44.88/lbs/ft/yr and the wetland pockets associated with the restoration will yield an estimated removal of 77,408.39 lbs/yr of sediment (7.49 percent) within the Chester Creek PRP Planning Area.

Dunvegan Road Basin Retrofit

This existing basin is located southeast of the intersection of S. New Street and Dunvegan Road on a private residential property. It has been proposed to retrofit this existing basin. The basin has a drainage area of 9.9 acres. Radley Run is the receiver stream for this area, which lies within the Upper Brandywine Creek Hydrologic Unit Code (HUC) 12.

The scope of the proposed retrofit includes removing trash and debris, regrading the basin bottom, and modifying the outlet structure orifice to increase volume treated through infiltration and extended detention. Assumptions for the preliminary calculations included sealing the existing 9-inch orifice, through the installation of a steel plate and coring a 4-inch orifice 2-feet above the basin bottom. This project will provide an estimated removal of 2,043.40 lbs/yr of sediment (1.09 percent) within the Middle Brandywine Creek/Upper Brandywine Creek PRP Planning Area.

General Greene B Basin Retrofit

This existing basin is located southwest of the intersection of General Greene Drive and S. New Street on a private residential property. It has been proposed to retrofit this existing basin. The basin has a drainage area of 12.38 acres. Radley Run is the receiver stream for this area, which lies within the Upper Brandywine Creek Hydrologic Unit Code (HUC) 12.

The scope of the proposed retrofit includes removal of sediment and debris, regrading the basin bottom, and modifying the outlet structure orifice to increase volume treated through infiltration and extended detention. Assumptions for the preliminary calculations included sealing an existing 4-inch orifice at the basin bottom through the installation of a steel plate. The existing 4-inch orifice located approximately 2 feet above the basin bottom will be utilized as the primary outlet. This project will provide an estimated removal of 2,674.52 lbs/yr of sediment (1.43 percent) within the Middle Brandywine Creek/Upper Brandywine Creek PRP Planning Area.

General Greene A Basin Retrofit

This existing basin is located behind 1006 and 1008 General Green Drive on a private residential property. It has been proposed to retrofit this existing basin. The basin has a drainage area of 9.76 acres. Radley Run is the receiver stream for this area, which lies within the Upper Brandywine Creek Hydrologic Unit Code (HUC) 12.

The scope of the proposed retrofit includes the removal of trash and debris, regarding the existing basin bottom, and replacing the existing outlet structure, due to its age and vegetative overgrowth. Assumptions for the preliminary calculations of the new outlet structure included a new standard outlet structure box with a 4-inch orifice at an elevation of 2-feet above the basin bottom and top of grate approximately 5-feet from the existing

ground elevation. This project will provide an estimated removal of 2,185.83 lbs/yr of sediment (1.17 percent) within the Middle Brandywine Creek/Upper Brandywine Creek PRP Planning Area.

Detailed BMP Descriptions – Long-Term (> 2024)

The BMP proposed to meet long-term objectives is described in more detail below.

Stream Restoration (Goose Creek Watershed)

Approximately 2,100 linear feet of stream restoration is proposed within the Goose Creek watershed to meet long-term TMDL objectives (>5 years). Location(s) of the stream restoration will be determined at a later date, as the next permit term approaches. These project(s) will provide an estimated removal of 96,492 lbs/yr of sediment and 146.20 lbs/yr of total phosphorus (47.83 percent) within the Goose Creek TMDL Planning Area for the long-term reduction.

4.6 Funding Mechanisms

The funding mechanisms and estimated costs for the implementation of each proposed BMP to be implemented within five (5) years of permit approval are included in Table 19. Note that the 1,700 linear feet of proposed stream restoration to meet the long-term (>5 years) objectives of the Goose Creek TMDL is not included. The costs provided are conceptual, to be utilized for preliminary planning purposes only, and subject to change.

Table 19: Proposed BMP Funding Mechanisms

Proposed BMP	Property Owner	Funding Mechanism	Total Estimated Cost (Low)	Total Estimated Cost (High)	Total Estimated Cost (Median)
Tyson Park Bioswale	Westtown Township	Existing BMP	n/a	n/a	n/a
Thorne Drive Basin Retrofit	Westtown Township	Westtown Township	$146,831	$220,247	$183,539
Sage Road Basin Retrofit	Westtown Township	Westtown Township	$47,625	$71,438	$59,532
Wild Goose Farms Basin B Retrofit	Wild Goose Farms HOA	Westtown Township	$49,299	$73,948	$61,624
Wild Goose Farms Basin A Retrofit	Wild Goose Farms HOA	Westtown Township	$37,290	$55,936	$46,613
Pleasant Grove Stream Restoration	Westtown Township	Westtown Township	$438,811	$658,217	$548,514
Dunvegan Road Basin Retrofit	Perry & Anna Marie Cozzone	Westtown Township	$64,324	$96,486	$80,405
General Greene Basin B Retrofit	Louis & Susan McCray	Westtown Township	$52,837	$79,256	$66,046
General Greene Basin A Retrofit	Roman Chojnacki & Margaret Uttrodt	Westtown Township	$58,672	$88,008	$73,340
Radley Run Stream Restoration	Brent & Celeste Celek	Westtown Township	$79,672	$119,508	$99,590
		TOTAL:	$975,361	$1,463,044	$1,219,203

*Estimated Cost includes survey, design, engineering, any anticipated permitting, bid administration, construction inspection, construction, materials, and as-built survey. Thorne Drive Basin Retrofit cost estimate is based on the 2023 costs/rates; all other BMPs developed based on 2019 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. Table 20 below outlines the responsible party and the necessary O&M practices required for each proposed BMP (Pennsylvania Stormwater BMP Manual, December 30, 2006).

Table 20: Proposed BMP O&M Responsibilities

BMP	Current Owner	Responsible Party for O&M	O&M Responsibilities
Tyson Park Bioswale (Installed in 2015)	Westtown Township	Westtown Township	• Inspect at least 2x per year • Pruning, weeding, watering • Re-spread mulch every 2-3 years • Remove sediment buildup • Repair and re-stabilize areas of erosion • Maintain vegetation
Stream Restoration (undetermined locations in Goose Creek Watershed)	Undetermined	Westtown Township	• 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
Thorne Drive Basin Retrofit	Westtown Township	Westtown Township	• Inspect at least 2x per year • Clean inlets at least 2x per year • Maintain vegetation • Remove invasive species • Mow as appropriate (remove clippings) • Remove accumulated sediment
Sage Road Basin Retrofit	Westtown Township	Westtown Township	• Inspect at least 2x per year • Clean inlets at least 2x per year • Maintain vegetation • Remove invasive species • Prohibit vehicular access • Avoid excessive compaction by mowers • Drain-down time < 72 hours • Mow as appropriate (remove clippings) • Remove accumulated sediment
Radley Run Stream Restoration	Brent & Celeste Celek	Brent & Celeste Celek	• 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
Wild Goose Farms Basin B Retrofit	Wild Goose Farms HOA	Wild Goose Farms HOA	• Inspect at least 2x per year • Clean inlets at least 2x per year • Maintain vegetation • Remove invasive species • Prohibit vehicular access • Avoid excessive compaction by mowers • Drain-down time < 72 hours • Mow as appropriate (remove clippings) • Remove accumulated sediment
Wild Goose Farms Basin A Retrofit	Wild Goose Farms HOA	Wild Goose Farms HOA	• Inspect at least 2x per year • Clean inlets at least 2x per year • Maintain vegetation • Remove invasive species

Table 20: Proposed BMP O&M Responsibilities

BMP	Current Owner	Responsible Party for O&M	O&M Responsibilities
			• Prohibit vehicular access • Avoid excessive compaction by mowers • Drain-down time < 72 hours • Mow as appropriate (remove clippings) • Remove accumulated sediment
Pleasant Grove Stream Restoration	Westtown Township	Westtown Township	• 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
Dunvegan Road Basin Retrofit	Perry & Anna Marie Cozzone	Perry & Anna Marie Cozzone	• Inspect at least 2x per year • Clean inlets at least 2x per year • Maintain vegetation • Remove invasive species • Prohibit vehicular access • Avoid excessive compaction by mowers • Drain-down time < 72 hours • Mow as appropriate (remove clippings) • Remove accumulated sediment
General Greene B Basin Retrofit	Louis & Susan McCray	Louis & Susan McCray	• Inspect at least 2x per year • Clean inlets at least 2x per year • Maintain vegetation • Remove invasive species • Prohibit vehicular access • Avoid excessive compaction by mowers • Drain-down time < 72 hours • Mow as appropriate (remove clippings) • Remove accumulated sediment
General Greene A Basin Retrofit	Roman Chojnacki & Margaret Uttrodt	Roman Chojnacki & Margaret Uttrodt	• Inspect at least 2x per year • Clean inlets at least 2x per year • Maintain vegetation • Remove invasive species • Prohibit vehicular access • Avoid excessive compaction by mowers • Drain-down time < 72 hours • Mow as appropriate (remove clippings) • Remove accumulated sediment

5.0 Conclusion

The required ten (10) percent sediment reduction for the PRP Planning Areas and the short-term objectives of the Goose Creek TMDL have been demonstrated through the existing bioswale and proposed implementation of two (2) stream restoration projects and seven (7) basin retrofits. BMPs will be implemented within 5 years of PA DEP approval of this plan. An additional 2,100 linear feet of stream restoration is proposed within the Goose Creek

watershed to meet the long-term objectives of the TMDL, which is a total phosphorous reduction of 53.9 percent.

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]

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

Cedarville Engineering Group, LLC
Pottstown, Pennsylvania | Pensacola, Florida
P: 610-705-4500 E: info@CedarvilleEng.com
CedarvilleEng.com

21ST CENTURY media

digitalfirst MEDIA

PHILADELPHIA GROUP

AFFIDAVIT OF PUBLICATION

307 Derstine Avenue • Lansdale, PA 19446

WESTTOWN TOWNSHIP
1039 WILMINGTON PIKE
WEST CHESTER, PA 19382
Attention:

STATE OF PENNSYLVANIA,
COUNTY OF MONTGOMERY

The undersigned Jacqueline A Kelly, 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:

WESTTOWN TOWNSHIP

Published in the following edition(s):

Daily Local News	03/14/19
Daily Local News Digital	03/14/19

WESTTOWN TOWNSHIP
PUBLIC NOTICE

The Westtown Township Goose Creek TMDL and Pollutant Reduction Plan for Plum Run, Radley Run, Brandywine Creek, Chester Creek, East Branch Chester Creek, Hunters Run, and Ridley Creek has been updated and is available for public review on the Township website at http://www.westtownpa.org/ and by request at the Township Building at 1039 Wilmington Pike, West Chester, PA 19382. Written comments from the public will be accepted for a period of 30 days from the date of this public notice. A presentation will be made and verbal and written comments accepted at the Board of Supervisors meeting scheduled for March 18, 2019 at 7:30pm at the Township Building. The TMDL/Pollutant Reduction Plan describes proposed measures to be taken to reduce sediment and phosphorous pollution to impaired streams within Westtown Township and is a requirement of the Township's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit.
DL-Mar 14-1a

Sworn to the subscribed before me this 3/14/2019.

Maureen Schmid

Notary Public, State of Pennsylvania
Acting in County of Montgomery

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
MAUREEN SCHMID, Notary Public
Lansdale Boro., Montgomery County
My Commission Expires March 31, 2021

Advertisement Information

Client Id: 884891 **Ad Id:** 1767719 **PO:** **Sales Person:** 018NA

WESTTOWN TOWNSHIP BOARD OF SUPERVISORS REGULAR MEETING

Westtown Township Municipal Building, 1039 Wilmington Pike, Westtown
Monday, March 18, 2019 at 7:30 PM

Present were: Chair Scott Yaw, Vice Chair Michael Di Domenico, Police Commissioner Carol De Wolf, Township Manager Robert Pingar, WEGO Police Chief Brenda Bernot, Planning Commissioner Jack Embick, and Parks & Recreation Commissioner Allison Corcoran. There were 14 guests.

I. Pledge of Allegiance & Call to Order

Mr. Yaw called the meeting to order at 7:34 PM, and led the Pledge of Allegiance. He asked if anyone was recording the meeting. No one responded.

II. Approval of Minutes (March 4, 2019)

Ms. De Wolf then made a motion to approve the March 4, 2019 Board of Supervisors meeting minutes with changes. Mr. Di Domenico seconded the motion. There were no questions or comments, and the minutes were unanimously approved.

III. Workshop Meeting Summary (March 18, 2019)

Mr. Yaw stated that the Board conducted a two-part workshop, beginning with an Executive Session to discuss personnel, litigation, police, real estate, and emergency preparedness matters. In the public workshop, the Board considered an ordinance for liquor license transfers, and discussed the Malvern School preliminary/final land development application and the Comprehensive Plan update hearing which are both on tonight's agenda.

There were no questions or comments.

IV. Departmental Reports

A. Westtown East Goshen Regional Police (WEGO) – Chief Brenda Bernot

Chief Bernot reported that the department started their ReadyChesco promotion over the weekend, and over the next six weeks every officer will provide information and encourage residents to sign up for this service. The Chief stressed that in the event of an emergency, this is the best way to receive important information.

The Chief also stated that warmer weather brings an increase in thefts and reminded residents to lock their cars, sheds, and garages.

There were no comments or questions.

B. Parks & Recreation Commission (P&R) – Allison Corcoran

Mrs. Corcoran reported that members of the Historical Commission and P&R have started planning Westtown Day which is scheduled for Sunday, September 29, 2019. They are currently soliciting sponsors and community involvement. Mrs. Corcoran asked anyone interested in participating to contact the township [or visit www.westtownday.com].

The commission also worked on the Egg Hike which is scheduled for 10:00 AM on Saturday, April 13 at Oakbourne Park. Participants will pick up a map at the pavilion and visit ten egg stations along the park trails. Mrs. Corcoran noted that Mr. Di Domenico and his wife will be staffing one of the egg stations and thanked them for their involvement. This event will be cancelled in the event of rain.

Dates for the Summer Children's Series have been set for Wednesday mornings:

- June 26 (Science Tellers)
- July 24 (musical entertainment)
- August 21 (magician)

P&R is also planning the three Summer Movie Nights. Vote for the movies on the township's Facebook page.

The commission also discussed ideas for an event geared to adults in September.

There were no comments or questions.

C. Planning Commission (PC) – Jack Embick

Mr. Embick reported that at their March 6 meeting, the PC discussed the Malvern School application and reviewed the requested waivers. The PC also discussed revisions to the township's sign ordinance. A variance request involving a fence in the right-of way was postponed because the applicant (Italiano) could not attend the meeting.

During their meeting, Mr. Flynn raised the topic of a township warning system for pipeline emergencies, noting that several neighboring townships may be considering warning systems. This may be a topic of future PC discussions.

At their next meeting, the PC will hear from Mr. Italiano regarding his fence variance request, and they will also work on the ordinance for bi-directional amplifiers for emergency communications.

Ms. De Wolf asked why the PC was passing the sign ordinance back to the Township's solicitor. Mr. Embick explained that the solicitor is going to review setback requirements in the Commercial District. The PC is not in favor of allowing additional billboards in the township.

There were no other comments or questions.

D. Manager's Report – Rob Pingar

Mr. Pingar stated that there are six ordinance amendments that will be before the Board in the coming months:

1. Harmful Waste (Grease Traps)
2. On-Lot Sewage Management (OLM)
3. Signs
4. Bi-Directional Amplifiers
5. Accessory Dwelling Units
6. Accessory Structures

Mr. Pingar reported that he attended the Rustin Walk Homeowner's Association (RW HOA) meeting on March 11. They discussed project completion items such as road paving and permanent detention basins.

Mr. Pingar gave an update on the Sunoco pipeline project. He spoke with a representative of Energy Transfer Partners (the Sunoco parent company) who said drill rigs will be delivered soon.

Finally, Mr. Pingar reported that Westtown will be hosting a severe weather emergency response tabletop exercise next week for Westtown, East Goshen, and Thornbury Townships. This meeting is not open to the public.

Ms. De Wolf asked Mr. Pingar what amendments are being made to the OLM ordinance. Mr. Pingar explained that the proposed changes are to clarify inspection language. He added that the township hosted a meeting for area pumping companies in order to get their feedback and address their questions.

There were no other comments or questions.

V. Public Comment (Non Agenda Items)

Matt Kelly, 107 Piper Lane, stated he has not heard anything from the Township about the following items that he has brought up at previous meetings:

1. An ordinance prohibiting exhaust brakes (Jake brakes) on Rte 202,
2. Pursuing a grant from PennDOT for the traffic signal at Rte 202 and Skiles Blvd.,
3. The engineering fees he paid for his new driveway on Piper Lane.

Mr. Kelly also complained that utility companies have been doing a lot of work in the Township, and he does not feel they are doing an adequate job restoring roads and property.

Mr. Yaw stated that the municipal boundary between Westtown and West Goshen presents a challenge to enforcing any ordinance regarding Jake brakes. Mr. Yaw stated that the Township has discussed the issue with West Goshen and WEGO, but it is not a simple matter. Regarding the engineering fees, Ms. De Wolf stated that she reviewed the bills, and given the scope of his driveway project, she did not think they were out of line. Regarding the signal at Skiles Blvd./Stetson Drive and Rte 202, Mr. Pingar stated that he asked WEGO to manually operate the signal during the school drop off and dismissal times to see if they could improve traffic flow. The manual operation exercise resulted in a massive backup on Rte 202. He stated that the conclusion was to keep the signal timing as-is. Ms. De Wolf stated that the proposed frontage road between E. Pleasant Grove Road and Rte 202 will alleviate some of the congestion. Mr. Pingar stated that the connector road project will also include a separate right turn lane out of Stetson and is expected to be completed this year. He added that PennDOT is also working on adaptive signal technology for Rte 202, which will coordinate signals from Matlack Street to Rte 1. Together, these improvements should improve traffic flow.

Dan Martin, representing his father Norman Martin at 203 Jacqueline Drive, stated that his father's backyard has become a swamp as a result of stormwater runoff from the Westtown Woods development. Mr. Martin stated that he has spoken to Mr. Pingar about the problem on two occasions. Mr. Pingar stated that he asked Mr. Gallagher of McCormick Taylor to meet with Mr. Martin last week. Ms. De Wolf asked Mr. Pingar if he has visited the property. Mr. Pingar replied that he would schedule a meeting with Tim Townes (builder representative), Mr. Gallagher, Mr. Martin, and himself next week.

There were no other comments or questions.

VI. Old Business

A. TMDL & Pollutant Reduction Plan – Presentation and Public Comment

Beth Uhler of Cedarville Engineering made a presentation on the township's Total Maximum Daily Load (TMDL) and Pollutant Reduction Plan (PRP). She began with a brief overview of the Municipal Storm Sewer System (MS4) permit requirements mandated by the PA Dept. of Environmental Protection (PA DEP). The intent of the program is to recognize stormwater as a point source pollutant, raise awareness of water quality, and reduce pollution to streams. The current permit has TMDL and PRP requirements to reduce sediment by 10% and phosphorus pollution by 5% over the five year permit cycle. Pollution comes from uncontrolled stormwater runoff from urbanized areas entering the streams and eroding the stream banks. Every stream in the Township and neighboring townships is impaired. The Township can use various best management practices (BMPs) such as basin retrofits, rain gardens, infiltration trenches, riparian buffers, and stream restoration projects to reduce sediment and phosphorus pollutants.

Mrs. Uhler explained that the plan process begins by mapping the Township's stormwater infrastructure, overlaying storm sewer watershed information to determine what drains to an outfall, and then identifying potential BMPs. The Township receives credit for existing BMPs and basins in the planning area. The proposed BMPs include Tyson Park bioswale, and basin retrofits for Thorne Drive, Sage Road, and two in Wild Goose Farm. As part of the plan, the

Township also has to identify the operations and maintenance at the BMPS to make sure they are going to be installed and functioning for the long term.

Ms. Uhler noted that the cost of meeting this unfunded mandate is significant, and stated that the Township may want to consider potential funding sources such as grants, low interest loans through Pennvest, and stormwater fees to finance these projects.

Ms. Uhler noted that Westtown is meeting the permit's public participation requirement by making a copy of the plan available for review. It's posted on the township website and available by request. Public notice establishing a minimum of a 30-day comment period was published on March 14th. Written and verbal comments have to be accepted at a public meeting, which is tonight's meeting. After the public comment period closes and any public comments are addressed, the plan is submitted to DEP. The five-year implementation period starts after DEP approves the plan.

Mr. Di Domenico expressed concern over the cost, and problems with implementing a stormwater fee, such as what was done in West Chester Borough. Ms. De Wolf stated that in addition to grants, volunteers from Chester Ridley Crum Watersheds Association (CRC) and other organizations can assist the township to reduce costs.

Kathy Di Domenico, 1530 Woodland Road, asked if individual homeowners can apply for grants for stormwater projects on their property. Ms. Uhler said that grants are normally for the municipality, but a homeowner may be able to partner with a non-profit to apply for a grant on a large project. Mrs. Di Domenico asked if homeowner actions such as using a rain barrel or creating a riparian buffer could reduce his stormwater fee. Ms. Uhler responded that if the township institutes a stormwater fee, then the plan would define any credits. Ms. De Wolf stated that the township has not implemented a stormwater fee, but is looking at funding options. Mrs. Di Domenico stated that she thought it was important for the township to inform residents as the MS4 program evolves.

There were no additional comments.

B. The Malvern School – Preliminary/Final Land Development application

Mr. Yaw introduced Mr. Lou Colagreco, who made a presentation on behalf of the applicant, The Malvern School. Mr. Colagreco stated that the applicant has met all the requirements set forth in McCormick Taylor's review letter and has received unanimous recommendation of approval from the Township Planning Commission. Mr. Colagreco introduced the civil engineer on the project, Adam Brower from EB Walsh & Associates, who stated that they are seeking a waiver for curbing on E. Pleasant Grove Road. Mr. Brower explained that there is no other curbing along E. Pleasant Grove Road.

Mr. Yaw stated that the PC recommended the inclusion of bollards. Mr. Colagreco stated that although the applicant does not believe the traffic circulation warrants bollards, he is agreeable to installing them. Mr. Yaw also stated that the PC raised the issue of overflow parking. Mr. Colagreco stated that The Malvern School does not hold special events, and that the parking plan is compliant with the township's ordinance, and in fact exceeds the parking requirements. He stated that the Malvern School would not seek any formal overflow parking arrangement with their neighbor, St. Maximilian Kolbe Church and School.

Ms. De Wolf asked how many employees and students the school will have. Deb Jackson from the Malvern School stated that they anticipate 34 teachers, some part time, and a maximum of 170 students.

Mr. Yaw made a motion to approve the preliminary/final land development application for The Malvern School at 1081 Wilmington Pike with two waivers of Westtown's Subdivision of Land Ordinance:

1. **§149-925.I.5** – Shrubs and trees shall not be placed closer than ten (10) feet from any side or rear property line or five (5) feet from the street line (right-of-way).

2. **§149-911.B** – Vertical curbs meeting the dimensional requirements for plain cement concrete curb contained in the PennDOT Standards for Roadway Construction (RC-64) shall be required on all streets.

Mr. Yaw also stipulated that approval is based on the inclusion of the four safety bollards to be located as depicted on the plan sheets and constructed of appropriate materials as approved by the township in consultation with the applicant.

Mr. Di Domenico seconded the motion. Ms. De Wolf stated her objection to the project due to the waiver of the curbing requirement, which precludes eventually installing a sidewalk. Mr. Yaw clarified that the motion does not include a requirement for sidewalks or a requirement to obtain a waiver for overflow parking.

Mr. Martin agreed with Ms. De Wolf in support of requiring sidewalks for the project. Mr. Colagreco explained that sidewalks are not required by ordinance. The waiver being requested is for curbing. He stated that the township's engineer explained that curbing would exacerbate stormwater problems. Mr. Colagreco also added that this is a preschool, serving working parents who drop their very young children off and pick them up on their way to and from work. They do not walk their children to preschool.

There was no additional comment and the motion passed 2-1, with Ms. De Wolf dissenting due to the curbing waiver.

VII. New Business

A. Parks & Recreation Commission Appointment

Mr. Di Domenico made a motion to appoint Meghan Hanney to the Westtown Parks & Recreation Commission for an unexpired term ending December 31, 2020. Ms. De Wolf seconded the motion. There was no public comment and the motion was unanimously approved.

B. Resolution 2019-06 - Endorsing Landscapes3, Chester County's Comprehensive Plan

Mr. Di Domenico made a motion to adopt Resolution 2019-06 whereby the Westtown Board of Supervisors endorses Landscapes3, Chester County's Comprehensive Plan. Ms. De Wolf seconded the motion.

Mr. Di Domenico then expressed his opposition to the plan, stating that he was not in favor of sidewalks, trails, or affordable housing, and did not think the county sought enough public input. Ms. De Wolf offered her support of the plan. Mr. Yaw stated that the plan is a guiding document, a visioning statement.

Mr. Kelly stated he had never heard of the County's Landscape Plan and agreed that the public should have been more involved in the process. Chris Patriarca from the Chester County Planning Commission explained that although the county can't reach everybody, they make efforts through social media, multiple public workshops, and their municipal partners. He stated that Westtown had a direct link to the plan on the Township website homepage. Mr. Patriarca described the plan as an aspirational document, building on two previous iterations of the plan.

Mr. Embick, Pheasant Run Road, stated that there were scores of public events, meetings, and stakeholder interviews; literally thousands of people were involved in the creation of Landscapes.

There was no other public comment and the motion was approved 2-1, with Mr. Di Domenico dissenting.

VIII. Resolution 2019-07 Amending the Comprehensive Plan of Westtown Township

Mr. Yaw stated that the Board meeting was being suspended to hold a hearing to consider the amendment to the Comprehensive Plan of Westtown Township as well as Resolution 2019-07 to adopt the new plan, as required by Section 302 of the Municipalities Planning Code. Mr. Pingar

provided a brief overview of the genesis of the Comprehensive Plan. Mr. Yaw introduced Mr. John Theilacker, Associate Director of the Brandywine Conservancy and its municipal assistance program, Mr. John Snook, recently retired planner with the Brandywine Conservancy, and Mr. Will Ethridge, Westtown Township Director of Planning and Zoning. Mr. Yaw then opened up the hearing for public comment.

Mr. Embick stated that he felt the Board of Supervisors did not respect the efforts of the Comp Plan Task Force and the Planning Commission. He also objected to the removal of Article One, Section 27 of the Pennsylvania constitution.

The Board explained that they thought the tone of the draft provided by the Task Force needed to be more positive. The Board offered their thanks and appreciation to the many people involved in the update of the plan including the Comp Plan Task Force members, the Planning Commission, Will Ethridge, Mila Robinson, Chris Patriarca of the Chester County Planning Commission, Mr. Snook and Mr. Theilacker of the Brandywine Conservancy, Thomas Commita Associates, stakeholders, and all the other people who were involved.

Mr. Di Domenico made a motion to adopt Resolution 2019-07 whereby the Westtown Board of Supervisors adopts the Westtown Township Comprehensive Plan Update 2019. Ms. De Wolf seconded the motion. There was no additional public comment and the motion was unanimously approved.

IX. Announcements

Mr. Yaw made the following announcements:

1. **County Household Hazardous Waste (HHW) Collection** – The first of six county sponsored HHW collection events will be held on Saturday April 6 from 9 AM to 3 PM at the CAT Pickering Campus, 1580 Charlestown Road, Phoenixville, PA. Electronics are NOT accepted at these events. For more information, visit the Trash & Recycling page on the township website.
2. **Parks & Recreation Commission Egg Hike -** Hit the trails at Oakbourne Park to locate egg pickup stations from 10 AM to noon (or while eggs last), Saturday, April 13. Pick up the trail map at the Oakbourne pavilion.
3. **CRC Streams Cleanup** – The annual Chester Ridley Crum Watershed Association Stream Clean Up will be held on Saturday, April 13 at 34 stream locations, including Goose Creek. For more information and to register visit the CRC website www.crcwatersheds.org.

X. Public Comment on All Topics

There was none.

XI. Payment of Bills

Mr. Di Domenico motioned to approve General Fund bills in the amount of $118,851.73, Wastewater Fund bills of $2,678.72, and Capital Projects Fund bills in the amount of $24,989.30, for a total of $146,519.75. There were no other comments and the check registers were unanimously approved.

XII. Adjournment

Ms. De Wolf made a motion to adjourn the meeting, seconded by Mr. Yaw. The meeting adjourned at 9:58 PM.

Respectfully submitted,

Robert Pingar
Township Manager

APPENDIX B

Developed Land Loading Rates for PA Counties

Cedarville Engineering Group, LLC
Pottstown, Pennsylvania | Pensacola, Florida
P: 610-705-4500 E: info@CedarvilleEng.com
CedarvilleEng.com

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

Cedarville Engineering Group, LLC
Pottstown, Pennsylvania | Pensacola, Florida
P: 610-705-4500 E: info@CedarvilleEng.com
CedarvilleEng.com

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

MUNICIPALITY: Westtown Township
MS4 SEWER SHED: Chester Creek (Goose Creek + Ridley Creek + East Branch Chester)
COUNTY: Chester

Developed Land:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	1494.95	19	284.04	1210.91
Developed, Low Intensity	206.13	49	101.00	105.13
Developed, Medium Intensity	77.20	79	60.99	16.21
Developed, High Intensity	10.44	100	10.44	
Hay/Pasture	67.97	0		67.97
Cultivated Crops	11.97	0		11.97
Grassland/Herbaceous	1.56	0		1.56
Shrub/Scrub	109.74	0		109.74
Woody Wetlands	37.12	0		37.12
Emergent Herbaceous Wetlands	0.72	0		0.72
Deciduous Forest	421.95	0		421.95
Evergreen Forest	16.01	0		16.01
Mixed Forest	38.24	0		38.24
Total	**2494.00**		**456.47**	**2037.53**

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

MUNICIPALITY: Westtown Township
MS4 SEWER SHED: Upper Brandywine Creek
COUNTY: Chester

Developed Land:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	306.80	19	58.29	248.51
Developed, Low Intensity	14.12	49	6.92	7.20
Developed, Medium Intensity	8.52	79	6.73	1.79
Developed, High Intensity	3.16	100	3.16	
Hay/Pasture	45.87	0		45.87
Cultivated Crops	10.03	0		10.03
Grassland/Herbaceous	1.33	0		1.33
Shrub/Scrub	33.76	0		33.76
Woody Wetlands	1.36	0		1.36
Deciduous Forest	70.04	0		70.04
Evergreen Forest	2.03	0		2.03
Mixed Forest	13.27	0		13.27
Total	**510.29**		**75.10**	**435.19**

Existing Loads using Chesapeake Bay Loading Rates without BMPs

MUNICIPALITY: Westtown Township
MS4 SEWER SHED: Chester Creek (Goose Creek + Ridley Creek + East Branch Chester)
COUNTY: Chester

Developed Land:

		Pollutant Loading Rates[1]			Pollutant Load		
Land Use	Area (ac)	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	456.47	21.15	1.46	1,504.78	9,654.34	666.45	686,886.93
Pervious, Developed	2,037.53	14.09	0.36	185.12	28,708.80	733.51	377,187.55
Chester Creek Total Pollutant Load					**38,363.14**	**1,399.96**	**1,064,074.48**

Existing Loads using Chesapeake Bay Loading Rates without BMPs

MUNICIPALITY: Westtown Township
MS4 SEWER SHED: Upper Brandywine Creek
COUNTY: Chester

Developed Land:

		Pollutant Loading Rates[1]			Pollutant Load		
Land Use	Area (ac)	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	75.10	21.15	1.46	1,504.78	1,588.37	109.65	113,008.98
Pervious, Developed	435.19	14.09	0.36	185.12	6,131.83	156.67	80,562.37
Upper Brandywine Total Pollutant Load					**7,720.19**	**266.31**	**193,571.35**

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

BMP NAME:	Westtown Reserve Dry Extended Detention Basin
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Chester Creek
COUNTY:	Chester
BMP TYPE:	Existing BMP
LOCATION:	1228 Skiles Boulevard, West Chester, PA
GPS LOCATION:	Lat: 39.9307/ Long: -75.5846
TOTAL DRAINAGE AREA TREATED (ac):	17.27
BMP EFFECTIVENESS VALUE TYPE:	Dry Extended Detention Basin

Developed Land - Pollutant Reduction:

		Pollutant Loading Rates[3]			BMP Effectiveness Value[4]			Pollutant Load Reduction		
Land Use[1,2]	Area (ac)	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	11.23	21.15	1.46	1,504.78	20%	20%	60%	47.50	3.28	10139.21
Pervious, Developed	6.04	14.09	0.36	185.12	20%	20%	60%	17.02	0.43	670.87
Total								**64.52**	**3.71**	**10,810.08**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	St Simon and Jude Dry Extended Detention Basin
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Chester Creek
COUNTY:	Chester
BMP TYPE:	Existing BMP
LOCATION:	1570 West Chester Pike West Chester, PA
GPS LOCATION:	Lat: 39.9307/ Long: -75.5846
TOTAL DRAINAGE AREA TREATED (ac):	6
BMP EFFECTIVENESS VALUE TYPE:	Dry Extended Detention Basin

Developed Land - Pollutant Reduction:

		Pollutant Loading Rates[3]			BMP Effectiveness Value[4]			Pollutant Load Reduction		
Land Use[1,2]	Area (ac)	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	2.24	21.15	1.46	1,504.78	20%	20%	60%	9.48	0.65	2022.42
Pervious, Developed	3.76	14.09	0.36	185.12	20%	20%	60%	10.60	0.27	417.63
Total								**20.07**	**0.92**	**2,440.06**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	Kolbe Lane Basin
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Chester Creek
COUNTY:	Chester
BMP TYPE:	Existing BMP
LOCATION:	Kolbe Lane
GPS LOCATION:	Lat: 39.9258/ Long: -75.5790
TOTAL DRAINAGE AREA TREATED (ac):	12.35
BMP EFFECTIVENESS VALUE TYPE:	Dry Extended Detention Basin

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	3.42	19	0.65	2.77
Developed, Low Intensity	3.29	49	1.61	1.68
Developed, Medium Intensity	0.11	79	0.09	0.02
Shrub/Scrub	0.87	0		0.87
Deciduous Forest	4.66	0		4.66
Total	**12.35**		**2.35**	**10.00**

Developed Land - Pollutant Reduction:

		Pollutant Loading Rates[3]			BMP Effectiveness Value[4]			Pollutant Load Reduction		
Land Use[1,2]	Area (ac)	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	2.35	21.15	1.46	1,504.78	20%	20%	60%	9.94	0.69	2120.66
Pervious, Developed	10.00	14.09	0.36	185.12	20%	20%	60%	28.18	0.72	1110.85
Total								**38.12**	**1.41**	**3,231.51**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	West Glen Basin
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Chester Creek
COUNTY:	Chester
BMP TYPE:	Existing BMP
LOCATION:	Kirkcaldy Drive
GPS LOCATION:	Lat: 39.9240/ Long: -75.5788
TOTAL DRAINAGE AREA TREATED (ac):	14.93
BMP EFFECTIVENESS VALUE TYPE:	Dry Extended Detention Basin

Developed Land - Pollutant Reduction:

		Pollutant Loading Rates[3]			BMP Effectiveness Value[4]			Pollutant Load Reduction		
Land Use[1,2]	Area (ac)	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	4.39	21.15	1.46	1,504.78	20%	20%	60%	18.57	1.28	3963.59
Pervious, Developed	10.54	14.09	0.36	185.12	20%	20%	60%	29.70	0.76	1170.70
Total								**48.27**	**2.04**	**5,134.29**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	Kilduff Circle Dry Extended Detention Basin
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Chester Creek
COUNTY:	Chester
BMP TYPE:	Existing BMP
LOCATION:	Kilduff Circle
GPS LOCATION:	Lat: 39.9450/ Long: -75.5537
TOTAL DRAINAGE AREA TREATED (ac):	35.39
BMP EFFECTIVENESS VALUE TYPE:	Dry Extended Detention Basin

Developed Land - Pollutant Reduction:

		Pollutant Loading Rates[3]			BMP Effectiveness Value[4]			Pollutant Load Reduction		
Land Use[1,2]	Area (ac)	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	4.57	21.15	1.46	1,504.78	20%	20%	60%	19.33	1.33	4126.11
Pervious, Developed	30.81	14.09	0.36	185.12	20%	20%	60%	86.82	2.22	3422.13
Total								**106.15**	**3.55**	**7,548.24**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	Thorne Drive Basin Retrofit
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Chester Creek
COUNTY:	Chester
BMP TYPE:	Existing BMP
LOCATION:	Corner of Little Shiloh Rd and Thorne Dr
GPS LOCATION:	Lat: 39.947659 / Long: -75.570443
TOTAL DRAINAGE AREA TREATED (ac):	19.86
BMP EFFECTIVENESS VALUE TYPE:	Wet Pond

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	9.71	19	1.84	7.87
Developed, Low Intensity	4.27	49	2.09	2.18
Shrub/Scrub	0.98	0		0.98
Deciduous Forest	4.90	0		4.90
Total	**19.86**		**3.94**	**15.92**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4]			Pollutant Load Reduction TN (lbs/yr)	Pollutant Load Reduction TP (lbs/yr)	Pollutant Load Reduction TSS [Sediment] (lbs/yr)
Impervious,Developed	3.94	21.15	1.46	1,504.78	5%	10%	10%	4.16	0.57	592.46
Pervious, Developed	15.92	14.09	0.36	185.12	5%	10%	10%	11.22	0.57	294.76
							Total Pollutant Reduction	**15.38**	**1.15**	**887.22**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	Sage Road Basin Retrofit
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Chester Creek
COUNTY:	Chester
BMP TYPE:	Existing BMP
LOCATION:	End of the Sage Road cul-de-sac
GPS LOCATION:	Lat: 39.942411 / Long: -75.565305
TOTAL DRAINAGE AREA TREATED (ac):	20.59
BMP EFFECTIVENESS VALUE TYPE:	Dry Detention Basin

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	17.13	19	3.25	13.88
Developed, Low Intensity	1.27	49	0.62	0.65
Developed, Medium Intensity	0.01	79	0.01	0.00
Shrub/Scrub	1.59	0		1.59
Deciduous Forest	0.60	0		0.60
Total	**20.59**		**3.88**	**16.72**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4]			Pollutant Load Reduction TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious, Developed	3.88	21.15	1.46	1,504.78	5%	10%	10%	4.10	0.57	583.85
Pervious, Developed	16.72	14.09	0.36	185.12	5%	10%	10%	11.78	0.60	309.52
							Total Pollutant Reduction	**15.88**	**1.17**	**893.38**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	Arbor View Wet Pond
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Upper Brandywine
COUNTY:	Chester
BMP TYPE:	Existing BMP
LOCATION:	Hidden Pond Way
GPS LOCATION:	Lat: 39.925 / Long: -75.589
TOTAL DRAINAGE AREA TREATED (ac):	13.42
BMP EFFECTIVENESS VALUE TYPE:	Wet Pond

Developed Land - Pollutant Reduction:

		Pollutant Loading Rates[3]			BMP Effectiveness Value[4]			Pollutant Load Reduction		
Land Use[1,2]	Area (ac)	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	1.68	21.15	1.46	1,504.78	20%	45%	60%	7.11	1.10	1516.82
Pervious, Developed	11.74	14.09	0.36	185.12	20%	45%	60%	33.08	1.90	1303.99
Total								**40.19**	**3.01**	**2,820.80**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	Arbor View Infiltration Trench
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Upper Brandywine
COUNTY:	Chester
BMP TYPE:	Existing BMP
LOCATION:	Hidden Pond Way
GPS LOCATION:	Lat: 39.926 / Long: -75.587
TOTAL DRAINAGE AREA TREATED (ac):	5.32
BMP EFFECTIVENESS VALUE TYPE:	Filtering Practices w/ Sand, Veg.

Developed Land - Pollutant Reduction:

		Pollutant Loading Rates[3]			BMP Effectiveness Value[4]			Pollutant Load Reduction		
Land Use[1,2]	Area (ac)	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	0.00	21.15	1.46	1,504.78	85%	85%	95%	0.04	0.00	2.86
Pervious, Developed	5.318	14.09	0.36	185.12	85%	85%	95%	63.69	1.63	935.24
Total								**63.73**	**1.63**	**938.10**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	Stetson Middle School Basin
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Upper Brandywine
COUNTY:	Chester
BMP TYPE:	Existing BMP
LOCATION:	Stetson Middle School
GPS LOCATION:	Lat: 39.9289 / Long: -75.5866
TOTAL DRAINAGE AREA TREATED (ac):	4.88
BMP EFFECTIVENESS VALUE TYPE:	Dry Extended Detention Basin

Developed Land - Pollutant Reduction:

		Pollutant Loading Rates[3]			BMP Effectiveness Value[4]			Pollutant Load Reduction		
Land Use[1,2]	Area (ac)	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	0.59	21.15	1.46	1,504.78	20%	20%	60%	2.50	0.17	532.69
Pervious, Developed	4.29	14.09	0.36	185.12	20%	20%	60%	12.09	0.31	476.50
Total								**14.58**	**0.48**	**1,009.19**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	Dunvegan Road Basin Retrofit
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Upper Brandywine Creek
COUNTY:	Chester
BMP TYPE:	Existing BMP
LOCATION:	Intersection of S. New Street and Dunvegan Road
GPS LOCATION:	Lat: 39.9288 / Long: -75.5937
TOTAL DRAINAGE AREA TREATED (ac):	9.9
BMP EFFECTIVENESS VALUE TYPE:	Dry Detention Basin

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	8.99	19	1.71	7.28
Mixed Forest	0.1			0.1
Shrub/Scrub	0.81			0.81
Total	**9.90**		**1.71**	**8.19**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4]			Pollutant Load Reduction		
								TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious,Developed	1.71	21.15	1.46	1,504.78	5%	10%	10%	1.81	0.25	257.03
Pervious, Developed	8.19	14.09	0.36	185.12	5%	10%	10%	5.77	0.29	151.65
							Total Pollutant Reduction	**7.58**	**0.54**	**408.68**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	General Greene Basin B Retrofit
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Upper Brandywine Creek
COUNTY:	Chester
BMP TYPE:	Existing BMP
LOCATION:	Southwest of the intersection of General Greene Drive and S. New Street
GPS LOCATION:	Lat: 39.925 / Long: -75.599
TOTAL DRAINAGE AREA TREATED (ac):	12.38
BMP EFFECTIVENESS VALUE TYPE:	Dry Detention Basin

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	12.09	19	2.30	9.79
Developed, Low Intensity	0.04	49	0.02	0.02
Deciduous Forest	0.25			0.25
Total	**12.38**		**2.32**	**10.06**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4]			Pollutant Load Reduction		
								TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious,Developed	2.32	21.15	1.46	1,504.78	5%	10%	10%	2.45	0.34	348.61
Pervious, Developed	10.06	14.09	0.36	185.12	5%	10%	10%	7.09	0.36	186.29
							Total Pollutant Reduction	**9.54**	**0.70**	**534.90**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	General Greene Basin A Retrofit
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Upper Brandywine Creek
COUNTY:	Chester
BMP TYPE:	Existing BMP
LOCATION:	Behind 1006 and 1008 General Greene Drive
GPS LOCATION:	Lat: 39.924 / Long: -75.602
TOTAL DRAINAGE AREA TREATED (ac):	9.76
BMP EFFECTIVENESS VALUE TYPE:	Dry Detention Basin

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	9.43	19	1.79	7.64
Developed, low Intensity	0.31	49	0.15	0.16
Shrub/Scrub	0.02			0.02
Total	**9.76**		**1.94**	**7.82**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4]			Pollutant Load Reduction		
								TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious,Developed	1.94	21.15	1.46	1,504.78	5%	10%	10%	2.06	0.28	292.47
Pervious, Developed	7.82	14.09	0.36	185.12	5%	10%	10%	5.51	0.28	144.70
							Total Pollutant Reduction	**7.56**	**0.57**	**437.17**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	Tyson Park Bioswale
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Goose Creek
COUNTY:	Chester
BMP TYPE:	Proposed BMP
LOCATION:	901 Oakbourne Road
GPS LOCATION:	Lat: 39.9463/ Long: -75.5628
TOTAL DRAINAGE AREA TREATED (ac):	41.4
BMP EFFECTIVENESS VALUE TYPE:	Bioswale

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	32.74	19	6.22	26.52
Developed, Low Intensity	1.36	49	0.67	0.69
Developed, Medium Intensity	0.23	79	0.18	0.05
Shrub/Scrub	1.92			1.92
Deciduous Forest	5.16	0		5.16
Total	**41.41**		**7.07**	**34.34**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4] (Proposed Bioswale)			Pollutant Load Reduction TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious,Developed	7.07	21.15	1.46	1,504.78	70%	75%	80%	104.65	7.74	8509.47
Pervious, Developed	34.34	14.09	0.36	185.12	70%	75%	80%	338.71	9.27	5085.81
							Total Pollutant Reduction	**443.36**	**17.01**	**13,595.28**

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
5. Assumed the retrofit was a bioswale

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

BMP NAME:	Thorne Drive Basin Retrofit
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Goose Creek
COUNTY:	Chester
BMP TYPE:	Proposed BMP
LOCATION:	Corner of Little Shiloh Rd and Thorne Dr
GPS LOCATION:	Lat: 39.947659 / Long: -75.570443
TOTAL DRAINAGE AREA TREATED (ac):	19.86
BMP EFFECTIVENESS VALUE TYPE:	Wet Pond

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	9.71	19	1.84	7.87
Developed, Low Intensity	4.27	49	2.09	2.18
Shrub/Scrub	0.98	0		0.98
Deciduous Forest	4.90	0		4.90
Total	**19.86**		**3.94**	**15.92**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4] (Proposed Retrofit BMP[5] - Existing Detention Basin BMP)			Pollutant Load Reduction TN (lbs/yr)	Pollutant Load Reduction TP (lbs/yr)	Pollutant Load Reduction TSS [Sediment] (lbs/yr)
Impervious,Developed	3.94	21.15	1.46	1,504.78	15%	10%	50%	12.49	0.57	2962.31
Pervious, Developed	15.92	14.09	0.36	185.12	15%	10%	50%	33.65	0.57	1473.81
							Total Pollutant Reduction	**46.14**	**1.15**	**4,436.12**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	Sage Road Basin Retrofit
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Goose Creek
COUNTY:	Chester
BMP TYPE:	Proposed BMP
LOCATION:	End of the Sage Road cul-de-sac
GPS LOCATION:	Lat: 39.942411 / Long: -75.565305
TOTAL DRAINAGE AREA TREATED (ac):	20.59
BMP EFFECTIVENESS VALUE TYPE:	Dry Extended Detention Basin

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	17.13	19	3.25	13.88
Developed, Low Intensity	1.27	49	0.62	0.65
Developed, Medium Intensity	0.01	79	0.01	0.00
Shrub/Scrub	1.59	0		1.59
Deciduous Forest	0.60	0		0.60
Total	**20.59**		**3.88**	**16.72**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4] (Proposed Retrofit BMP[5] - Existing Detention Basin BMP)			Pollutant Load Reduction TN (lbs/yr)	Pollutant Load Reduction TP (lbs/yr)	Pollutant Load Reduction TSS [Sediment] (lbs/yr)
Impervious, Developed	3.88	21.15	1.46	1,504.78	15%	10%	50%	12.31	0.57	2919.27
Pervious, Developed	16.72	14.09	0.36	185.12	15%	10%	50%	35.34	0.60	1547.60
							Total Pollutant Reduction	**47.65**	**1.17**	**4,466.88**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	Wild Goose Farms Basin B Retrofit
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Goose Creek
COUNTY:	Chester
BMP TYPE:	Proposed BMP
LOCATION:	Intersection of Picket Way and Trellis Lane
GPS LOCATION:	Lat: 39.9445 / Long: -75.5734
TOTAL DRAINAGE AREA TREATED (ac):	9.95
BMP EFFECTIVENESS VALUE TYPE:	Dry Extended Detention Basin w/ Low Flow Channel

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	5.12	19	0.97	4.15
Developed, Low Intensity	2.39	49	1.17	1.22
Developed, Medium Intensity	1.54	79	1.22	0.32
Developed, High Intensity	0.66	100	0.66	
Woody Wetlands	0.24	0		0.24
Total	**9.95**		**4.02**	**5.93**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4] (Proposed Retrofit BMP)			Pollutant Load Reduction TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious,Developed	4.02	21.15	1.46	1,504.78	20%	20%	60%	17.01	1.17	3629.98
Pervious, Developed	5.93	14.09	0.36	185.12	20%	20%	60%	16.71	0.43	658.60
							Total Pollutant Reduction	**33.72**	**1.60**	**4,288.58**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	Wild Goose Farms Basin A Retrofit
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Goose Creek
COUNTY:	Chester
BMP TYPE:	Proposed BMP
LOCATION:	Intersection of Trellis Lane and Oakbourne Road
GPS LOCATION:	Lat: 39.9427 / Long: -75.5720
TOTAL DRAINAGE AREA TREATED (ac):	5.21
BMP EFFECTIVENESS VALUE TYPE:	Dry Extended Detention Basin w/ Low Flow Channel

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	3.16	19	0.60	2.56
Developed, Low Intensity	1.82	49	0.89	0.93
Developed, Medium Intensity	0.06	79	0.05	0.01
Developed, High Intensity		100		
Woody Wetlands	0.17	0		0.17
Total	**5.21**		**1.54**	**3.67**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4] (Proposed Retrofit BMP)			Pollutant Load Reduction TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious,Developed	1.54	21.15	1.46	1,504.78	20%	20%	60%	6.51	0.45	1390.06
Pervious, Developed	3.67	14.09	0.36	185.12	20%	20%	60%	10.34	0.26	407.68
							Total Pollutant Reduction	**16.86**	**0.71**	**1,797.73**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	Pleasant Grove Stream Restoration
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	East Branch Chester Creek
COUNTY:	Chester
BMP TYPE:	Proposed BMP
LOCATION:	Pleasant Grove Development
GPS LOCATION:	Lat: 39.9264/ Long: -75.5662
TOTAL DRAINAGE AREA TREATED (ac):	
BMP EFFECTIVENESS VALUE TYPE:	Stream Restoration

Stream Restoration - Pollutant Reduction:

		BMP Effectiveness Value[1]			Pollutant Load Reduction		
Location	Restoration Length (ft)	TN (lbs/ft/yr)	TP (lbs/ft/yr)	Sediment (lbs/ft/yr)	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Pleasant Grove	1600.00	0.075	0.068	44.88	120.00	108.80	71808.00
Total	**1600.00**				**120.00**	**108.80**	**71,808.00**

1. Per PADEP NPDES BMP Effectiveness Values Table

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

BMP NAME:	Pleasant Grove Stream Restoration- Constructed Wetlands
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Upper Brandywine Creek
COUNTY:	Chester
BMP TYPE:	Proposed BMP
LOCATION:	Pleasant Grove Development
GPS LOCATION:	Lat: 39.9264/ Long: -75.5662
TOTAL DRAINAGE AREA TREATED (ac):	21.36
BMP EFFECTIVENESS VALUE TYPE:	Wetlands

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	19.64	19	3.73	15.91
Developed, Low Intensity	0.73	49	0.36	0.37
Deciduous Forest	0.09			
Woody Wetlands	0.90			0.90
Total	**21.36**		**4.09**	**17.18**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4] for the Proposed BMP[5]			Pollutant Load Reduction TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious,Developed	4.09	21.15	1.46	1,504.78	20%	45%	60%	17.30	2.69	3692.10
Pervious, Developed	17.18	14.09	0.36	185.12	20%	45%	60%	48.42	2.78	1908.29
							Total Pollutant Reduction	**65.71**	**5.47**	**5,600.39**

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
5. Assumed the retrofit was a constructed wetland

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

BMP NAME:	Dunvegan Road Basin Retrofit
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Upper Brandywine Creek
COUNTY:	Chester
BMP TYPE:	Proposed BMP
LOCATION:	Intersection of S. New Street and Dunvegan Road
GPS LOCATION:	Lat: 39.9288 / Long: -75.5937
TOTAL DRAINAGE AREA TREATED (ac):	9.9
BMP EFFECTIVENESS VALUE TYPE:	Dry Extended Detention Basin

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	8.99	19	1.71	7.28
Mixed Forest	0.1			0.1
Shrub/Scrub	0.81			0.81
Total	**9.90**		**1.71**	**8.19**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4] (Proposed Retrofit BMP[5] - Existing Detention Basin BMP)			Pollutant Load Reduction		
								TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious,Developed	1.71	21.15	1.46	1,504.78	15%	10%	50%	5.42	0.25	1285.16
Pervious, Developed	8.19	14.09	0.36	185.12	15%	10%	50%	17.31	0.29	758.24
							Total Pollutant Reduction	**22.73**	**0.54**	**2,043.40**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	General Greene Basin B Retrofit
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Upper Brandywine Creek
COUNTY:	Chester
BMP TYPE:	Proposed BMP
LOCATION:	Southwest of the intersection of General Greene Drive and S. New Street
GPS LOCATION:	Lat: 39.925 / Long: -75.599
TOTAL DRAINAGE AREA TREATED (ac):	12.38
BMP EFFECTIVENESS VALUE TYPE:	Dry Extended Detention Basin

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	12.09	19	2.30	9.79
Developed, Low Intensity	0.04	49	0.02	0.02
Deciduous Forest	0.25			0.25
Total	**12.38**		**2.32**	**10.06**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4] (Proposed Retrofit BMP[5] - Existing Detention Basin BMP)			Pollutant Load Reduction TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious,Developed	2.32	21.15	1.46	1,504.78	15%	10%	50%	7.35	0.34	1743.06
Pervious, Developed	10.06	14.09	0.36	185.12	15%	10%	50%	21.27	0.36	931.46
							Total Pollutant Reduction	**28.62**	**0.70**	**2,674.52**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	General Greene Basin A Retrofit
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Upper Brandywine Creek
COUNTY:	Chester
BMP TYPE:	Proposed BMP
LOCATION:	Behind 1006 and 1008 General Greene Drive
GPS LOCATION:	Lat: 39.924 / Long: -75.602
TOTAL DRAINAGE AREA TREATED (ac):	9.76
BMP EFFECTIVENESS VALUE TYPE:	Dry Extended Detention Basin

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	9.43	19	1.79	7.64
Developed, low Intensity	0.31	49	0.15	0.16
Shrub/Scrub	0.02			0.02
Total	**9.76**		**1.94**	**7.82**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4] (Proposed Retrofit BMP[5] - Existing Detention Basin BMP)			Pollutant Load Reduction TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious,Developed	1.94	21.15	1.46	1,504.78	15%	10%	50%	6.17	0.28	1462.35
Pervious, Developed	7.82	14.09	0.36	185.12	15%	10%	50%	16.52	0.28	723.49
							Total Pollutant Reduction	**22.69**	**0.57**	**2,185.83**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	Radley Run Stream Restoration
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Upper Brandywine Creek
COUNTY:	Chester
BMP TYPE:	Proposed BMP
LOCATION:	West side of S. New Street
GPS LOCATION:	Lat: 39.9158 / Long: -75.5967
TOTAL DRAINAGE AREA TREATED (ac):	
BMP EFFECTIVENESS VALUE TYPE:	Stream Restoration

Stream Restoration - Pollutant Reduction:

		BMP Effectiveness Value[1]			Pollutant Load Reduction		
Location	Restoration Length (ft)	TN (lbs/ft/yr)	TP (lbs/ft/yr)	Sediment (lbs/ft/yr)	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Radley Run	260.00	0.075	0.068	44.88	19.50	17.68	11668.80
Total	**260.00**				**19.50**	**17.68**	**11,668.80**

1. Per PADEP NPDES BMP Effectiveness Values Table

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

BMP NAME:	Radley Run Stream Restoration- Constructed Wetlands
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Upper Brandywine Creek
COUNTY:	Chester
BMP TYPE:	Proposed BMP
LOCATION:	West side of S. New Street
GPS LOCATION:	Lat: 39.9158 / Long: -75.5967
TOTAL DRAINAGE AREA TREATED (ac):	1.92
BMP EFFECTIVENESS VALUE TYPE:	Wetlands

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	0.68	19	0.13	0.55
Deciduous Forest	0.71			0.71
Mixed Forest	0.03			0.03
Shrub/Scrub	0.41			0.41
Cultivated Crops	0.09			0.09
Total	**1.92**		**0.13**	**1.79**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4] for the Proposed BMP[5]			Pollutant Load Reduction TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious,Developed	0.13	21.15	1.46	1,504.78	20%	45%	60%	0.55	0.08	116.65
Pervious, Developed	1.79	14.09	0.36	185.12	20%	45%	60%	5.05	0.29	198.91
							Total Pollutant Reduction	**5.59**	**0.37**	**315.56**

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
5. Assumed the retrofit was a constructed wetland

Pollutant Load Reduction by BMPs

MUNICIPALITY: Westtown Township
MS4 SEWER SHED: Chester Creek, East Branch of Chester Creek, Goose Creek, Ridley Creek, Upper Brandywine Creek
COUNTY: Chester

Existing BMP Name	BMP Drainage Area (ac)	Pollutant Reduction by BMPs		
		TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Westtown Reserve Basin	17.27	64.52	3.71	10810.08
Simon and Jude Basin	6.00	20.07	0.92	2440.06
Kolbe Lane Basin	12.35	38.11	1.4	3231.51
West Glen Basin	14.93	48.27	2.04	5134.29
Kilduff Circle Basin	35.39	106.15	3.55	7548.24
Thorne Drive Basin	19.86	15.38	1.15	887.22
Sage Road Basin	20.59	15.88	1.17	893.38
Total	**126.39**	**308.38**	**13.94**	**30944.78**

PRP MS4 Sewershed	Storm sewershed Area (ac)	Existing Pollutant without BMPs			Pollutant Load with BMPs		
		TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Chester Creek	2,494.00	38,363.14	1,399.96	1,064,074.48	38,054.76	1,386.02	1,033,129.70
Total	**2,494.00**	**38,363.14**	**1,399.96**	**1,064,074.48**	**38,054.76**	**1,386.02**	**1,033,129.70**

Existing BMP Name	BMP Drainage Area (ac)	Pollutant Reduction by BMPs		
		TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Arborview Wet Pond	13.42	40.19	3.01	2820.8
Arborview Infiltration Trench	5.32	63.73	1.63	938.1
Stetson Middle School Basin	4.88	14.58	0.48	1009.19
Dunvegan Road Basin	9.9	7.58	0.54	408.68
General Greene Basin B	12.38	9.54	0.70	534.90
General Greene Basin A	9.76	7.56	0.57	437.17
Total	**55.66**	**143.18**	**6.93**	**6148.84**

PRP MS4 Sewershed	Storm sewershed Area (ac)	Existing Pollutant without BMPs			Pollutant Load with BMPs		
		TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Upper Brandywine	510.29	7,720.19	266.31	193,571.35	7,577.01	259.38	187,422.51
Total	**510.29**	**7,720.19**	**266.31**	**193,571.35**	**7,577.01**	**259.38**	**187,422.51**

Pollutant Load Reduction by BMPs

MUNICIPALITY: Westtown Township
MS4 SEWER SHED: Chester Creek, East Branch of Chester Creek, Goose Creek, Ridley Creek, Upper Brandywine Creek
COUNTY: Chester

BMP Name	BMP Drainage Area (ac)	Pollutant Reduction by BMPs		
		TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Chester Creek				
Tyson Park Bioswale	41.4	443.27	17.01	13,595.28
Thorne Drive Basin Retrofit	19.86	46.14	1.15	4,436.12
Sage Road Basin Retrofit	20.59	47.65	1.17	4,466.88
Wild Goose Farms Basin B Retrofit	9.95	33.72	1.6	4,288.58
Wild Goose Farms Basin A Retrofit	5.21	16.86	0.71	1,797.73
Pleasant Grove Stream Restoration	21.36	185.71	114.27	77,408.39
Chester Creek Total	**118.37**	**773.35**	**135.91**	**105,992.98**
Upper Brandywine Creek				
Dunvegan Road Basin Retrofit	9.9	22.73	0.54	2,043.40
General Greene Basin B Retrofit	12.38	28.62	0.7	2,674.52
General Greene Basin A Retrofit	9.76	22.69	0.57	2,185.83
Radley Run Stream Restoration	1.92	25.09	18.05	11,984.36
Upper Brandywine Total	**33.96**	**99.13**	**19.86**	**18,888.11**

PRP Planning Area	Planning Area (ac)	Existing Pollutant without BMPs			Pollutant Load with BMPs			% Reduction		
		TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)	TN	TP	TSS [Sediment]
Chester/East Branch/Ridley (includes Goose)	2,494.00	38,054.76	1,386.02	1,033,129.70	37,281.41	1,250.11	927,136.72	2.03%	9.81%	10.26%
Upper Brandywine (Plum/Radley)	510.29	7,577.01	259.38	187,422.51	7,477.88	239.52	168,534.40	1.31%	7.66%	10.08%

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

MUNICIPALITY: Westtown Township
MS4 SEWER SHED: Goose Creek
COUNTY: Chester

Developed Land:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	332.55	19	63.18	269.37
Developed, Low Intensity	28.73	49	14.08	14.65
Developed, Medium Intensity	5.66	79	4.47	1.19
Developed, High Intensity	0.67	100	0.67	
Grassland/Herbaceous	1.56	0		1.56
Hay/Pasture	17.35	0		17.35
Cultivated Crops	3.78	0		3.78
Shrub/Scrub	35.28	0		35.28
Woody Wetlands	6.64	0		6.64
Deciduous Forest	154.02	0		154.02
Evergreen Forest	2.65	0		2.65
Mixed Forest	8.35	0		8.35
Total	**597.24**		**82.40**	**514.84**

Existing Loads using Chesapeake Bay Loading Rates without BMPs

MUNICIPALITY: Westtown Township
MS4 SEWER SHED: Goose Creek
COUNTY: Chester

Developed Land:

		Pollutant Loading Rates[1]			Pollutant Load		
Land Use	Area (ac)	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	82.40	21.15	1.46	1,504.78	1742.76	120.30	123993.87
Pervious, Developed	514.84	14.09	0.36	185.12	7254.10	185.34	95307.18
Goose Creek Total Pollutant Load					**8,996.86**	**305.65**	**219,301.05**

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

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

BMP NAME:	Thorne Drive Basin Retrofit
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Chester Creek
COUNTY:	Chester
BMP TYPE:	Proposed BMP
LOCATION:	Corner of Little Shiloh Rd and Thorne Dr
GPS LOCATION:	Lat: 39.947659 / Long: -75.570443
TOTAL DRAINAGE AREA TREATED (ac):	19.86
BMP EFFECTIVENESS VALUE TYPE:	Wet Pond

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	9.71	19	1.84	7.87
Developed, Low Intensity	4.27	49	2.09	2.18
Shrub/Scrub	0.98	0		0.98
Deciduous Forest	4.90	0		4.90
Total	**19.86**		**3.94**	**15.92**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4]			Pollutant Load Reduction TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious,Developed	3.94	21.15	1.46	1,504.78	5%	10%	10%	4.16	0.57	592.46
Pervious, Developed	15.92	14.09	0.36	185.12	5%	10%	10%	11.22	0.57	294.76
							Total Pollutant Reduction	**15.38**	**1.15**	**887.22**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	Sage Road Basin Retrofit
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Chester Creek
COUNTY:	Chester
BMP TYPE:	Proposed BMP
LOCATION:	End of the Sage Road cul-de-sac
GPS LOCATION:	Lat: 39.942411 / Long: -75.565305
TOTAL DRAINAGE AREA TREATED (ac):	20.59
BMP EFFECTIVENESS VALUE TYPE:	Dry Detention Basin

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	17.13	19	3.25	13.88
Developed, Low Intensity	1.27	49	0.62	0.65
Developed, Medium Intensity	0.01	79	0.01	0.00
Shrub/Scrub	1.59	0		1.59
Deciduous Forest	0.60	0		0.60
Total	**20.59**		**3.88**	**16.72**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4]			Pollutant Load Reduction TN (lbs/yr)	Pollutant Load Reduction TP (lbs/yr)	Pollutant Load Reduction TSS [Sediment] (lbs/yr)
Impervious, Developed	3.88	21.15	1.46	1,504.78	5%	10%	10%	4.10	0.57	583.85
Pervious, Developed	16.72	14.09	0.36	185.12	5%	10%	10%	11.78	0.60	309.52
							Total Pollutant Reduction	**15.88**	**1.17**	**893.38**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	Tyson Park Bioswale
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Goose Creek
COUNTY:	Chester
RETROFIT CLASS:	Proposed BMP
LOCATION:	901 Oakbourne Road
GPS LOCATION:	Lat: 39.9463/ Long: -75.5628
TOTAL DRAINAGE AREA TREATED (ac):	41.4
TYPE OF BMP:	Bioswale

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	32.74	19	6.22	26.52
Developed, Low Intensity	1.36	49	0.67	0.69
Developed, Medium Intensity	0.23	79	0.18	0.05
Shrub/Scrub	1.92			1.92
Deciduous Forest	5.16	0		5.16
Total	**41.41**		**7.07**	**34.34**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4] (Proposed Bioswale)			Pollutant Load Reduction TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious,Developed	7.07	21.15	1.46	1,504.78	70%	75%	80%	104.65	7.74	8509.47
Pervious, Developed	34.34	14.09	0.36	185.12	70%	75%	80%	338.71	9.27	5085.81
							Total Pollutant Reduction	**443.36**	**17.01**	13,595.28

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
5. Assumed the retrofit was a bioswale

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

BMP NAME:	Thorne Drive Basin Retrofit
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Goose Creek
COUNTY:	Chester
BMP TYPE:	Proposed BMP
LOCATION:	Corner of Little Shiloh Rd and Thorne Dr
GPS LOCATION:	Lat: 39.947659 / Long: -75.570443
TOTAL DRAINAGE AREA TREATED (ac):	19.86
BMP EFFECTIVENESS VALUE TYPE:	Wet Pond

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	9.71	19	1.84	7.87
Developed, Low Intensity	4.27	49	2.09	2.18
Shrub/Scrub	0.98	0		0.98
Deciduous Forest	4.90	0		4.90
Total	**19.86**		**3.94**	**15.92**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4] (Proposed Retrofit BMP[5] - Existing Detention Basin BMP)			Pollutant Load Reduction TN (lbs/yr)	Pollutant Load Reduction TP (lbs/yr)	Pollutant Load Reduction TSS [Sediment] (lbs/yr)
Impervious,Developed	3.94	21.15	1.46	1,504.78	15%	10%	50%	12.49	0.57	2962.31
Pervious, Developed	15.92	14.09	0.36	185.12	15%	10%	50%	33.65	0.57	1473.81
							Total Pollutant Reduction	**46.14**	**1.15**	**4,436.12**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	Sage Road Basin Retrofit
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Goose Creek
COUNTY:	Chester
BMP TYPE:	Proposed BMP
LOCATION:	End of the Sage Road cul-de-sac
GPS LOCATION:	Lat: 39.942411 / Long: -75.565305
TOTAL DRAINAGE AREA TREATED (ac):	20.59
BMP EFFECTIVENESS VALUE TYPE:	Dry Extended Detention Basin

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	17.13	19	3.25	13.88
Developed, Low Intensity	1.27	49	0.62	0.65
Developed, Medium Intensity	0.01	79	0.01	0.00
Shrub/Scrub	1.59	0		1.59
Deciduous Forest	0.60	0		0.60
Total	**20.59**		**3.88**	**16.72**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4] (Proposed Retrofit BMP[5] - Existing Detention Basin BMP)			Pollutant Load Reduction TN (lbs/yr)	Pollutant Load Reduction TP (lbs/yr)	Pollutant Load Reduction TSS [Sediment] (lbs/yr)
Impervious, Developed	3.88	21.15	1.46	1,504.78	15%	10%	50%	12.31	0.57	2919.27
Pervious, Developed	16.72	14.09	0.36	185.12	15%	10%	50%	35.34	0.60	1547.60
							Total Pollutant Reduction	**47.65**	**1.17**	**4,466.88**

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	Wild Goose Farms Basin B Retrofit
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Goose Creek
COUNTY:	Chester
RETROFIT CLASS:	Proposed BMP
LOCATION:	Intersection of Picket Way and Trellis Lane
GPS LOCATION:	Lat: 39.9445 / Long: -75.5734
TOTAL DRAINAGE AREA TREATED (ac):	9.95
TYPE OF BMP:	Low-Flow Channel Retrofit (Extended Detention)

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	5.12	19	0.97	4.15
Developed, Low Intensity	2.39	49	1.17	1.22
Developed, Medium Intensity	1.54	79	1.22	0.32
Developed, High Intensity	0.66	100	0.66	
Woody Wetlands	0.24	0		0.24
Total	**9.95**		**4.02**	**5.93**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4] (Proposed Retrofit BMP)			Pollutant Load Reduction TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious,Developed	4.02	21.15	1.46	1,504.78	20%	20%	60%	17.01	1.17	3629.98
Pervious, Developed	5.93	14.09	0.36	185.12	20%	20%	60%	16.71	0.43	658.60
							Total Pollutant Reduction	**33.72**	**1.60**	4,288.58

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	Wild Goose Farms Basin A Retrofit
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Goose Creek
COUNTY:	Chester
RETROFIT CLASS:	Existing BMP
LOCATION:	Intersection of Trellis Lane and Oakbourne Road
GPS LOCATION:	Lat: 39.9427 / Long: -75.5720
TOTAL DRAINAGE AREA TREATED (ac):	5.21
TYPE OF BMP:	Low-Flow Channel Retrofit (Extended Detention)

Developed Land Imp/Pervious Calculations:

Land Use[1]	Area (ac)	% Impervious[2]	Impervious Area (ac)	Pervious Area (ac)
Developed, Open Space	3.16	19	0.60	2.56
Developed, Low Intensity	1.82	49	0.89	0.93
Developed, Medium Intensity	0.06	79	0.05	0.01
Developed, High Intensity		100		
Woody Wetlands	0.17	0		0.17
Total	**5.21**		**1.54**	**3.67**

Developed Land - Pollutant Reduction:

Land Use		Pollutant Loading Rates[3]			BMP Effectiveness Value[4] (Proposed Retrofit BMP)			Pollutant Load Reduction TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Impervious,Developed	1.54	21.15	1.46	1,504.78	20%	20%	60%	6.51	0.45	1390.06
Pervious, Developed	3.67	14.09	0.36	185.12	20%	20%	60%	10.34	0.26	407.68
							Total Pollutant Reduction	**16.86**	**0.71**	1,797.73

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
5. Assumed the retrofit was an extended detention basin

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

BMP NAME:	Stream Restoration
MUNICIPALITY:	Westtown Township
MS4 SEWERSHED	Goose Creek
COUNTY:	Chester
RETROFIT CLASS:	Proposed BMP
LOCATION:	
GPS LOCATION:	
TOTAL DRAINAGE AREA TREATED (ac):	
TYPE OF BMP:	Stream Restoration

Stream Restoration - Pollutant Reduction:

		BMP Effectiveness Value[1]			Pollutant Load Reduction		
Location	Restoration Length (ft)	TN (lbs/ft/yr)	TP (lbs/ft/yr)	Sediment (lbs/ft/yr)	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Stream Restoration	2150.00	0.075	0.068	44.88	161.25	146.20	96492.00
Total	**2150.00**				**161.25**	**146.20**	**96,492.00**

1. Per PADEP NPDES BMP Effectiveness Values Table

Long Term Goose Creek
Phosphorous Load Reduction by Existing BMPs

MUNICIPALITY: Westtown Township
MS4 SEWER SHED: Goose Creek
COUNTY: Chester

BMP Name	BMP Drainage Area (ac)	Pollutant Reduction by BMPs		
		TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Goose Creek Years 1-5				
Thorne Drive Basin Retrofit	19.86	15.38	1.15	887.22
Sage Road Basin Retrofit	22.44	15.88	1.17	893.38
Total	**42.3**	**31.26**	**2.316452**	**1,780.60**

TMDL MS4 Sewershed	Storm sewershed Area (ac)	Existing Pollutant without BMPs			Pollutant Load with BMPs		
		TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Goose Creek - Years 1-5	597.24	8,996.66	305.65	219,301.05	8,965.40	257.60	217,520.45
Goose Creek - Long Term		8,996.66	305.65	219,301.05	8,996.66	305.65	219,301.05
Total Reduction	**597.24**	**8,996.66**	**305.65**	**219,301.05**	**8,965.40**	**303.33**	**217,520.45**

Long Term Goose Creek
Phosphorous Load Reduction by BMPs

MUNICIPALITY: Westtown Township
MS4 SEWER SHED: Goose Creek
COUNTY: Chester

BMP Name	BMP Drainage Area (ac)	Pollutant Reduction by BMPs		
		TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)
Goose Creek Years 1-5				
Tyson Park Bioswale	41.4	443.36	17.01	13,595.28
Thorne Drive Basin Retrofit	19.86	46.14	1.15	4,436.12
Sage Road Basin Retrofit	20.59	47.65	1.17	4,466.88
Wild Goose Farms Basin B Retrofit	9.95	33.72	1.6	4,288.58
Wild Goose Farms Basin A Retrofit	5.21	16.86	0.71	1,797.73
Subtotal	**97.01**	**587.73**	**21.64**	**28,584.59**
Goose Creek Long-Term (>5 Years)				
Stream Restoration	2,150 l.f.	161.25	146.20	96,492.00
Subtotal		**161.25**	**146.20**	**96,492.00**
Total	**97.01**	**748.98**	**167.84**	**125,076.59**

TMDL MS4 Sewershed	Storm sewershed Area (ac)	Existing Pollutant without BMPs			Pollutant Load with BMPs			% Reduction		
		TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)	TN (lbs/yr)	TP (lbs/yr)	TSS [Sediment] (lbs/yr)	TN	TP	TSS [Sediment]
Goose Creek - Years 1-5	597.24	8,996.66	305.65	219,301.05	8,408.93	284.01	190,716.46	6.53%	7.08%	13.03%
Goose Creek - Long Term		8,996.66	305.65	219,301.05	8,835.41	159.45	122,809.05	1.79%	47.83%	44.00%
Total Reduction	**597.24**	**8,996.66**	**305.65**	**219,301.05**	**8,247.68**	**137.81**	**94,224.46**	**8.33%**	**54.91%**	**57.03%**

53.9% TP reduction required by Goose Creek TMDL

APPENDIX D

Existing and Proposed BMP Maps

Cedarville Engineering Group, LLC
Pottstown, Pennsylvania | Pensacola, Florida
P: 610-705-4500 E: info@CedarvilleEng.com
CedarvilleEng.com

NOTES:

1. Drainage area to the proposed BMP is within the planning area.

2. Property Owners:
   -Westtown Apartments Property Owner, LLC
   67-4-40.1A

CHESTER CREEK PRP
EXISTING BMP

Legend

- Outfalls
- Drainage Area

Stormwater Structures

- Inlet, Township
- Manhole, Township
- Inflow, Township
- Outflow, Township
- Inflow/Outflow, Township
- Riser, Township
- Inlet, State
- Manhole, State
- Inflow, State
- Outflow, State
- Inflow/Outflow, State
- Inlet, Private
- Manhole, Private
- Inflow, Private
- Outflow, Private
- Inflow/Outflow, Private
- Riser, Private

Stormwater Conveyances

- Private, Pipe
- Private, Swale
- State, Pipe
- Township, Pipe
- Township, Swale
- Stream
- Located Surface Waters
- Index Contours

Roads

- Private
- State
- Township

- Parcels
- Township Owned Parcels
- Township Boundary

Westtown Reserve Dry Extended Detention Basin

1 inch = 250 feet

0 125 250 500 Feet

DISCLAIMER:
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.

ceg

Westtown Township, Chester County, Pennsylvania

MAP UPDATED: March 2019

NOTES:

1. Drainage area to the proposed BMP is within the planning area.

2. Property Owners:
   -Archdiocese of Philadelphia
   67-2-42.3

West ChesterPK

McDanielDR

CavanaughCT

WhittlebyCT

ChesterRD

Simon and Jude
Detention Basin

CumbrianCT

WinchesterCT

CumbrianCT

ChesterfieldDR

DurhamCT

WickertonDR

N

W

E

S

CHESTER CREEK PRP
EXISTING BMP

Legend

- Outfalls
- Drainage Area

Stormwater Structures
- Inlet, Township
- Manhole, Township
- Inflow, Township
- Outflow, Township
- Inflow/Outflow, Township
- Riser, Township
- Inlet, State
- Manhole, State
- Inflow, State
- Outflow, State
- Inflow/Outflow, State
- Inlet, Private
- Manhole, Private
- Inflow, Private
- Outflow, Private
- Inflow/Outflow, Private
- Riser, Private

Stormwater Conveyances
- Private, Pipe
- Private, Swale
- State, Pipe
- Township, Pipe
- Township, Swale
- Stream
- Located Surface Waters
- Index Contours

Roads
- Private
- State
- Township

- Parcels
- Township Owned Parcels
- Township Boundary

Simon and Jude Detention Basin

1 inch = 125 feet

0 62.5 125 250 Feet

ceg

Westtown Township,
Chester County,
Pennsylvania

MAP UPDATED: March 2019

NOTES:

1. Drainage area to the proposed BMP is within the planning area.

2. Property Owners:
   -John Zabilowicz, Maryann Rock-Zabilowicz
   67-4-104

CHESTER CREEK PRP
EXISTING BMP

Legend

- Outfalls
- Drainage Area

Stormwater Structures

- Inlet, Township
- Manhole, Township
- Inflow, Township
- Outflow, Township
- Inflow/Outflow, Township
- Riser, Township
- Inlet, State
- Manhole, State
- Inflow, State
- Outflow, State
- Inflow/Outflow, State
- Inlet, Private
- Manhole, Private
- Inflow, Private
- Outflow, Private
- Inflow/Outflow, Private
- Riser, Private

Stormwater Conveyances

- Private, Pipe
- Private, Swale
- State, Pipe
- Township, Pipe
- Township, Swale
- Stream
- Located Surface Waters
- Index Contours

Roads

- Private
- State
- Township

- Parcels
- Township Owned Parcels
- Township Boundary

Kolbe Lane
Extended Detention Basin

1 inch = 150 feet

0 75 150 300 Feet

Westtown Township, Chester County, Pennsylvania

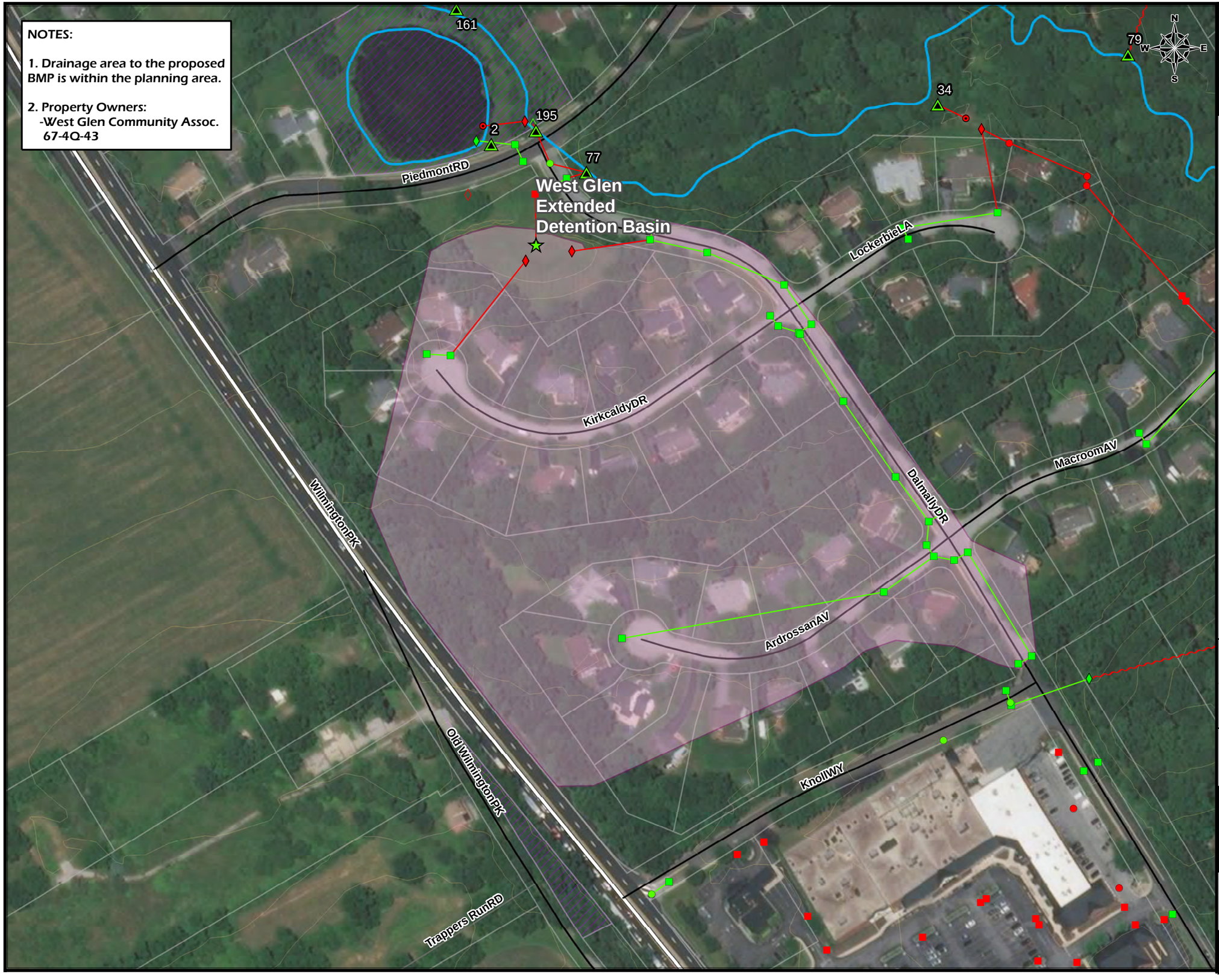
MAP UPDATED: March 2019

NOTES:

1. Drainage area to the proposed BMP is within the planning area.

2. Property Owners:
-West Glen Community Assoc.
67-4Q-43

CHESTER CREEK PRP
EXISTING BMP



Legend

- Outfalls
- Drainage Area

Stormwater Structures

- Inlet, Township
- Manhole, Township
- Inflow, Township
- Outflow, Township
- Inflow/Outflow, Township
- Riser, Township
- Inlet, State
- Manhole, State
- Inflow, State
- Outflow, State
- Inflow/Outflow, State
- Inlet, Private
- Manhole, Private
- Inflow, Private
- Outflow, Private
- Inflow/Outflow, Private
- Riser, Private

Stormwater Conveyances

- Private, Pipe
- Private, Swale
- State, Pipe
- Township, Pipe
- Township, Swale
- Stream
- Located Surface Waters
- Index Contours

Roads

- Private
- State
- Township

- Parcels
- Township Owned Parcels
- Township Boundary

West Glen
Extended Detention Basin

1 inch = 150 feet

0 75 150 300 Feet

ceg

Westtown Township,
Chester County,
Pennsylvania

MAP UPDATED: March 2019

NOTES:

1. Drainage area to the proposed BMP is within the planning area.

2. Property Owners:
   -Russell Hatton, Shirley Leclerc
   67-5-4.1

Kilduff Circle
Extended
Detention Basin

122
71
24

CarolynDR
HuntDR
KilduffCI
ShilohRD
AshleyRD
StableLA
PlumlyRD
CreameryLA

CHESTER CREEK PRP
EXISTING BMP

Legend

- Outfalls
- Drainage Area

Stormwater Structures
- Inlet, Township
- Manhole, Township
- Inflow, Township
- Outflow, Township
- Inflow/Outflow, Township
- Riser, Township
- Inlet, State
- Manhole, State
- Inflow, State
- Outflow, State
- Inflow/Outflow, State
- Inlet, Private
- Manhole, Private
- Inflow, Private
- Outflow, Private
- Inflow/Outflow, Private
- Riser, Private

Stormwater Conveyances
- Private, Pipe
- Private, Swale
- State, Pipe
- Township, Pipe
- Township, Swale
- Stream
- Located Surface Waters
- Index Contours

Roads
- Private
- State
- Township
- Parcels
- Township Owned Parcels
- Township Boundary

Kilduff Circle
Extended Detention Basin

1 inch = 250 feet

0 125 250 500 Feet

ceg

Westtown Township,
Chester County,
Pennsylvania

MAP UPDATED: March 2019

NOTES:

1. Drainage area to the proposed BMP is within the planning area.

2. Property Owners:
-Arborview HOA
67-4-23.38

Stetson SchoolDR

SB RT 202 to Stetson School DR

WilmingtonPK

Hidden PondWY

Arborview Infiltration Trench

Arborview Basin

Pleasant GroveRD

N
W
E
S

UPPER BRANDYWINE CREEK PRP EXISTING BMP

Legend

- Outfalls
- Drainage Area

Stormwater Structures

- Inlet, Township
- Manhole, Township
- Inflow, Township
- Outflow, Township
- Inflow/Outflow, Township
- Riser, Township
- Inlet, State
- Manhole, State
- Inflow, State
- Outflow, State
- Inflow/Outflow, State
- Inlet, Private
- Manhole, Private
- Inflow, Private
- Outflow, Private
- Inflow/Outflow, Private
- Riser, Private

Stormwater Conveyances

- Private, Pipe
- Private, Swale
- State, Pipe
- Township, Pipe
- Township, Swale
- Stream
- Located Surface Waters
- Index Contours

Roads

- Private
- State
- Township

- Parcels
- Township Owned Parcels
- Township Boundary

Arborview Basin
Arborview Infiltration Trench

1 inch = 150 feet

0 75 150 300 Feet

ceg

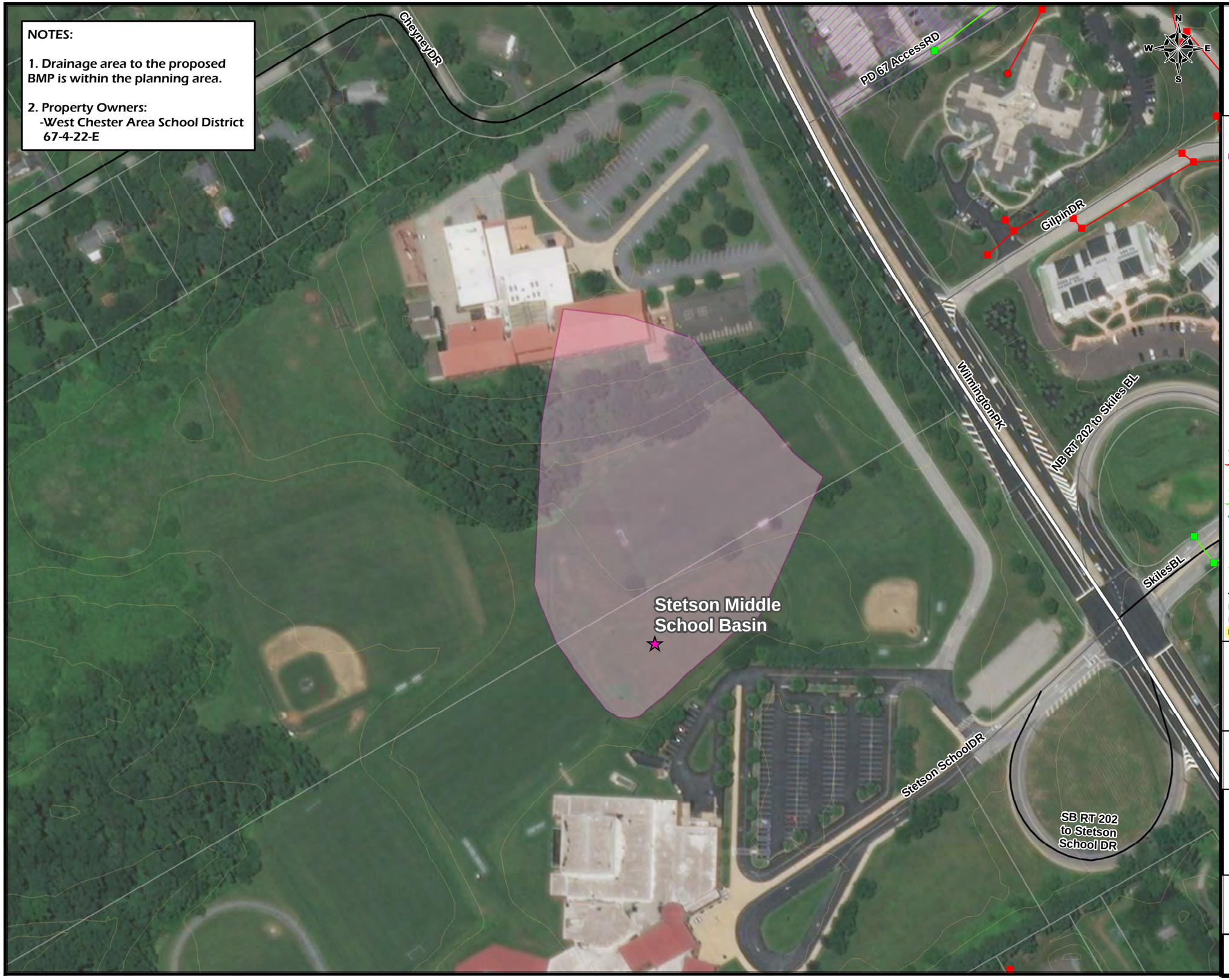
Westtown Township, Chester County, Pennsylvania

MAP UPDATED: March 2019

NOTES:

1. Drainage area to the proposed BMP is within the planning area.

2. Property Owners:
   -West Chester Area School District
   67-4-22-E



UPPER BRANDYWINE CREEK PRP
EXISTING BMP

Legend

- Outfalls
- Drainage Area

Stormwater Structures
- Inlet, Township
- Manhole, Township
- Inflow, Township
- Outflow, Township
- Inflow/Outflow, Township
- Riser, Township
- Inlet, State
- Manhole, State
- Inflow, State
- Outflow, State
- Inflow/Outflow, State
- Inlet, Private
- Manhole, Private
- Inflow, Private
- Outflow, Private
- Inflow/Outflow, Private
- Riser, Private

Stormwater Conveyances
- Private, Pipe
- Private, Swale
- State, Pipe
- Township, Pipe
- Township, Swale
- Stream
- Located Surface Waters
- Index Contours

Roads
- Private
- State
- Township

- Parcels
- Township Owned Parcels
- Township Boundary

Stetson Middle School Basin

1 inch = 150 feet

0 75 150 300 Feet

ceg

Westtown Township,
Chester County,
Pennsylvania

MAP UPDATED: March 2019

NOTES:

1. Drainage area to the proposed BMP is within the planning area.

2. Property Owners:
   -Westtown Township
   67-2-1.29

CHESTER CREEK/GOOSE CREEK TMDL/PRP EXISTING BMP

Legend

- Outfalls
- Tyson Park Bioswale Drainage Area

Stormwater Structures
- Inlet, Township
- Manhole, Township
- Inflow, Township
- Outflow, Township
- Inflow/Outflow, Township
- Riser, Township
- Inlet, State
- Manhole, State
- Inflow, State
- Outflow, State
- Inflow/Outflow, State
- Inlet, Private
- Manhole, Private
- Inflow, Private
- Outflow, Private
- Inflow/Outflow, Private
- Riser, Private

Stormwater Conveyances
- Private, Pipe
- Private, Swale
- State, Pipe
- Township, Pipe
- Township, Swale
- Stream
- Located Surface Waters
- 2ft Contours

Roads
- Private
- State
- Township

- Parcels
- Township Owned Parcels
- Township Boundary

Tyson Park Bioswale

1 inch = 175 feet

0 87.5 175 350 Feet

ceg

Westtown Township, Chester County, Pennsylvania

MAP UPDATED: January 2019

NOTES:

1. Drainage area to the proposed BMP is within the planning area.

2. Stream restoration length of approximately 1,600 L.F.

3. Property Owners:
   -Westtown Township
   -67-4M-43.1

Pleasant Grove Stream Restoration

BaywoodRD

BlenheimRD

ConcordRD

CarlyleRD

StreetRD

Tower CourseDR

82 107 6 201 4 200 44 196 81

CHESTER CREEK PRP

Legend

- Outfalls

Stormwater Structures
- Inlet, Township
- Manhole, Township
- Inflow, Township
- Outflow, Township
- Inflow/Outflow, Township
- Riser, Township
- Inlet, State
- Manhole, State
- Inflow, State
- Outflow, State
- Inflow/Outflow, State
- Inlet, Private
- Manhole, Private
- Inflow, Private
- Outflow, Private
- Inflow/Outflow, Private
- Riser, Private

Stormwater Conveyances
- Private, Pipe
- Private, Swale
- State, Pipe
- Township, Pipe
- Township, Swale
- Stream
- Located Surface Waters
- 2ft Contours

Roads
- Private
- State
- Township
- Parcels
- Township Owned Parcels
- Township Boundary

Pleasant Grove Stream Restoration

1 inch = 100 feet

0 50 100 200 Feet

DISCLAIMER:
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.

ceg

Westtown Township, Chester County, Pennsylvania

MAP UPDATED: January 2019

NOTES:

1. Drainage area to the proposed BMP is within the planning area.

2. Property Owners:
   -James & Colleen Brookover,
   James & Katherine McDermott
   -67-4-28.65, 67-4-28.64

Dunvegan Road Basin Retrofit

DunveganRD

JohnAnthonyDR

188

20

UPPER BRANDYWINE CREEK PRP

Legend

- Outfalls
- Dunvegan Road Basin Retrofit

Stormwater Structures
- Inlet, Township
- Manhole, Township
- Inflow, Township
- Outflow, Township
- Inflow/Outflow, Township
- Riser, Township
- Inlet, State
- Manhole, State
- Inflow, State
- Outflow, State
- Inflow/Outflow, State
- Inlet, Private
- Manhole, Private
- Inflow, Private
- Outflow, Private
- Inflow/Outflow, Private
- Riser, Private

Stormwater Conveyances
- Private, Pipe
- Private, Swale
- State, Pipe
- Township, Pipe
- Township, Swale
- Stream
- Located Surface Waters
- 2ft Contours

Roads
- Private
- State
- Township

Parcels
- Township Owned Parcels
- Township Boundary

Dunvegan Road Basin Retrofit

1 inch = 120 feet

0 60 120 240 Feet

ceg

Westtown Township, Chester County, Pennsylvania

MAP UPDATED: January 2019

NOTES:

1. Drainage area to the proposed BMP is within the planning area.

2. Property Owners:
   -Louis & Susan McCray
   Roman Chojnacki, Margaret Uttrodt
   -67-4J-77, 67-4J-74

KimberlyLA

DunveganRD

NewST

JenniferLA

General GreeneDR

94

28

19

5

179

96

29

General Greene Basin B Retrofit

General Greene Basin A Retrofit

UPPER BRANDYWINE CREEK PRP

Legend

- Outfalls
- General Greene Basin B Retrofit Drainage Area
- General Greene Basin A Retrofit Drainage Area

Stormwater Structures
- Inlet, Township
- Manhole, Township
- Inflow, Township
- Outflow, Township
- Inflow/Outflow, Township
- Riser, Township
- Inlet, State
- Manhole, State
- Inflow, State
- Outflow, State
- Inflow/Outflow, State
- Inlet, Private
- Manhole, Private
- Inflow, Private
- Outflow, Private
- Inflow/Outflow, Private
- Riser, Private

Stormwater Conveyances
- Private, Pipe
- Private, Swale
- State, Pipe
- Township, Pipe
- Township, Swale
- Stream
- Located Surface Waters
- 2ft Contours

Roads
- Private
- State
- Township

Parcels
- Township Owned Parcels
- Township Boundary

General Greene Drive Basin A Retrofit

General Greene Drive Basin B Retrofit

1 inch = 167 feet

0 80 160 320 Feet

ceg

Westtown Township, Chester County, Pennsylvania

MAP UPDATED: January 2019

NOTES:

1. Drainage area to the proposed BMP is within the planning area.

2. Stream restoration length of approximately 190 L.F.

3. Property Owners:
   -Brent & Celeste Celek
   -67-4-4.3

Radley Run Stream Restoration

182

183

New ST

Lake DR

UPPER BRANDYWINE CREEK PRP

Legend

- Outfalls

Stormwater Structures
- Inlet, Township
- Manhole, Township
- Inflow, Township
- Outflow, Township
- Inflow/Outflow, Township
- Riser, Township
- Inlet, State
- Manhole, State
- Inflow, State
- Outflow, State
- Inflow/Outflow, State
- Inlet, Private
- Manhole, Private
- Inflow, Private
- Outflow, Private
- Inflow/Outflow, Private
- Riser, Private

Stormwater Conveyances
- Private, Pipe
- Private, Swale
- State, Pipe
- Township, Pipe
- Township, Swale
- Stream
- Located Surface Waters
- 2ft Contours

Roads
- Private
- State
- Township

Parcels
- Township Owned Parcels
- Township Boundary

Radley Run Stream Restoration

1 inch = 150 feet

0 75 150 300 Feet

ceg

Westtown Township, Chester County, Pennsylvania

MAP UPDATED: January 2019

NOTES:

1. Drainage area to the proposed BMP is within the planning area.

2. Property Owners:
   -Westtown Township
   67-1-3.2K

Thorne Drive Basin Retrofit

Little ShilohRD
SpringviewCT
ThorneDR
SageRD
SassafrasCI
BowersDR
ConcordRD
PicketWY

CHESTER CREEK/GOOSE CREEK TMDL/PRP

Legend

- Outfalls
- Thorne Drive Basin Drainage Area

Stormwater Structures
- Inlet, Township
- Manhole, Township
- Inflow, Township
- Outflow, Township
- Inflow/Outflow, Township
- Riser, Township
- Inlet, State
- Manhole, State
- Inflow, State
- Outflow, State
- Inflow/Outflow, State
- Inlet, Private
- Manhole, Private
- Inflow, Private
- Outflow, Private
- Inflow/Outflow, Private
- Riser, Private

Stormwater Conveyances
- Private, Pipe
- Private, Swale
- State, Pipe
- Township, Pipe
- Township, Swale
- Stream
- Located Surface Waters
- 2ft Contours

Roads
- Private
- State
- Township

- Parcels
- Township Owned Parcels
- Township Boundary

Thorne Drive Basin Retrofit

1 inch = 150 feet

0 75 150 300 Feet

ceg

Westtown Township, Chester County, Pennsylvania

MAP UPDATED: January 2019

NOTES:

1. Drainage area to the proposed BMP is within the planning area.

2. Property Owners:
   -Westtown Township
   67-1-4.75

CHESTER CREEK/GOOSE CREEK TMDL/PRP

Legend

- Outfalls
- Sage Road Basin Drainage Area

Stormwater Structures
- Inlet, Township
- Manhole, Township
- Inflow, Township
- Outflow, Township
- Inflow/Outflow, Township
- Riser, Township
- Inlet, State
- Manhole, State
- Inflow, State
- Outflow, State
- Inflow/Outflow, State
- Inlet, Private
- Manhole, Private
- Inflow, Private
- Outflow, Private
- Inflow/Outflow, Private
- Riser, Private

Stormwater Conveyances
- Private, Pipe
- Private, Swale
- State, Pipe
- Township, Pipe
- Township, Swale
- Stream
- Located Surface Waters
- 2ft Contours

Roads
- Private
- State
- Township

- Parcels
- Township Owned Parcels
- Township Boundary

Sage Road Basin Retrofit

1 inch = 200 feet

0 100 200 400 Feet

DISCLAIMER:
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.

ceg

Westtown Township, Chester County, Pennsylvania

MAP UPDATED: January 2019

NOTES:

1. Drainage area to the proposed BMP is within the planning area.

2. Property Owners:
   -Wild Goose Farms HOA
   67-4D-76

CHESTER CREEK/GOOSE CREEK TMDL/PRP

Legend

- Outfalls
- Wild Goose Farms Basin B Drainage Area
- Wild Goose Farms Basin A Drainage Area

Stormwater Structures
- Inlet, Township
- Manhole, Township
- Inflow, Township
- Outflow, Township
- Inflow/Outflow, Township
- Riser, Township
- Inlet, State
- Manhole, State
- Inflow, State
- Outflow, State
- Inflow/Outflow, State
- Inlet, Private
- Manhole, Private
- Inflow, Private
- Outflow, Private
- Inflow/Outflow, Private
- Riser, Private

Stormwater Conveyances
- Private, Pipe
- Private, Swale
- State, Pipe
- Township, Pipe
- Township, Swale
- Stream
- Located Surface Waters
- 2ft Contours

Roads
- Private
- State
- Township

- Parcels
- Township Owned Parcels
- Township Boundary

Wild Goose Farms Basin A Retrofit

Wild Goose Farms Basin B Retrofit

1 inch = 200 feet

0 100 200 400 Feet

DISCLAIMER:
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.

ceg

Westtown Township, Chester County, Pennsylvania

MAP UPDATED: January 2019

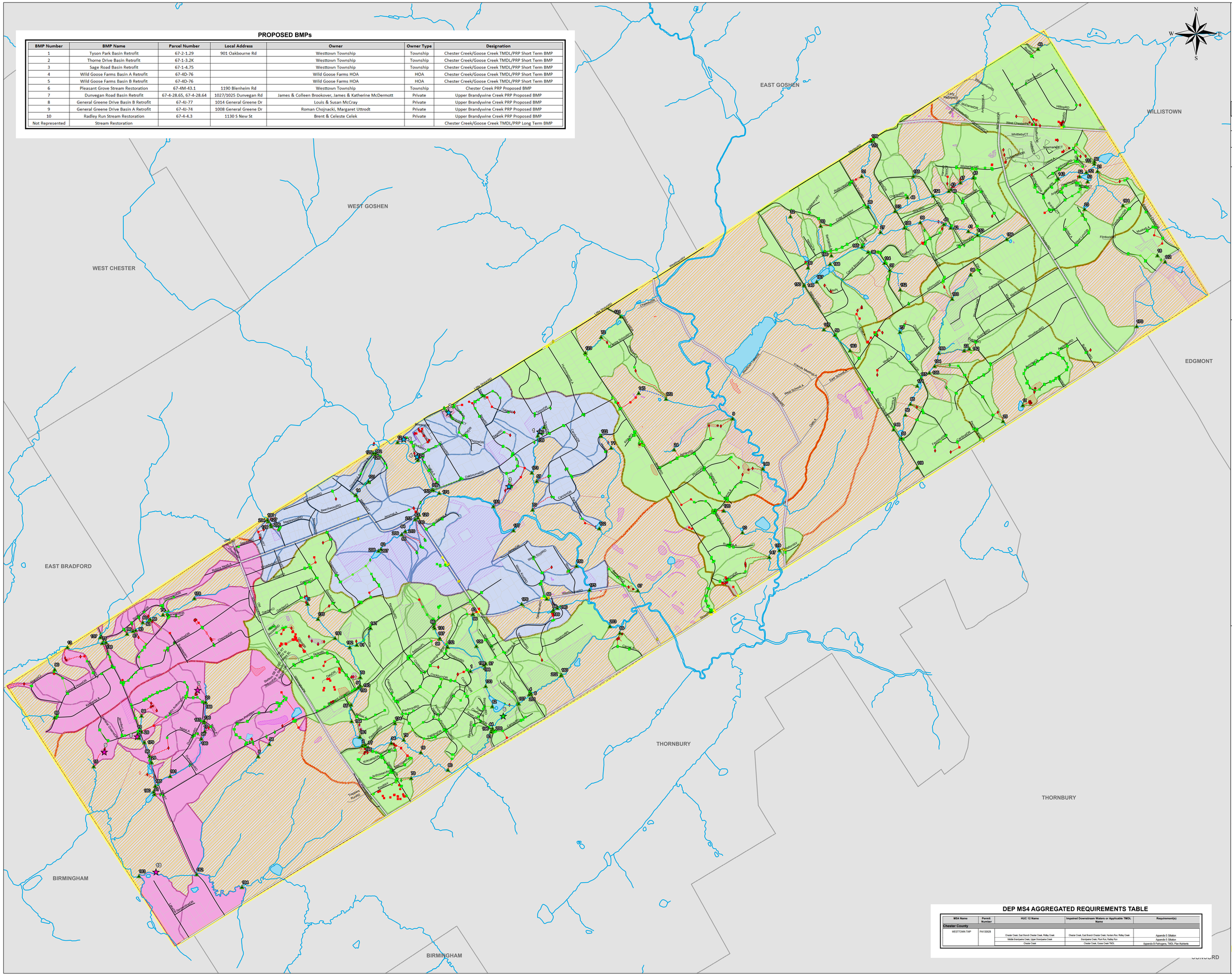
APPENDIX E

Storm Sewershed/Planning Area Map

Cedarville Engineering Group, LLC
Pottstown, Pennsylvania | Pensacola, Florida
P: 610-705-4500 E: info@CedarvilleEng.com
CedarvilleEng.com

PROPOSED BMPs

BMP Number	BMP Name	Parcel Number	Local Address	Owner	Owner Type	Designation
1	Tyson Park Basin Retrofit	67-2-1.29	901 Oakbourne Rd	Westtown Township	Township	Chester Creek/Goose Creek TMDL/PRP Short Term BMP
2	Thorne Drive Basin Retrofit	67-1-3.2K		Westtown Township	Township	Chester Creek/Goose Creek TMDL/PRP Short Term BMP
3	Sage Road Basin Retrofit	67-1-4.75		Westtown Township	Township	Chester Creek/Goose Creek TMDL/PRP Short Term BMP
4	Wild Goose Farms Basin A Retrofit	67-4D-76		Wild Goose Farms HOA	HOA	Chester Creek/Goose Creek TMDL/PRP Short Term BMP
5	Wild Goose Farms Basin B Retrofit	67-4D-76		Wild Goose Farms HOA	HOA	Chester Creek/Goose Creek TMDL/PRP Short Term BMP
6	Pleasant Grove Stream Restoration	67-4M-43.1	1190 Blenheim Rd	Westtown Township	Township	Chester Creek PRP Proposed BMP
7	Dunvegan Road Basin Retrofit	67-4-28.65, 67-4-28.64	1027/1025 Dunvegan Rd	James & Colleen Brookover, James & Katherine McDermott	Private	Upper Brandywine Creek PRP Proposed BMP
8	General Greene Drive Basin B Retrofit	67-4J-77	1014 General Greene Dr	Louis & Susan McCray	Private	Upper Brandywine Creek PRP Proposed BMP
9	General Greene Drive Basin A Retrofit	67-4J-74	1008 General Greene Dr	Roman Chojnacki, Margaret Uttrodt	Private	Upper Brandywine Creek PRP Proposed BMP
10	Radley Run Stream Restoration	67-4-4.3	1130 S New St	Brent & Celeste Celek	Private	Upper Brandywine Creek PRP Proposed BMP
Not Represented	Stream Restoration					Chester Creek/Goose Creek TMDL/PRP Long Term BMP



DEP MS4 AGGREGATED REQUIREMENTS TABLE

MS4 Name	Permit Number	HUC 12 Name	Impaired Downstream Waters or Applicable TMDL Name	Requirement(s)
Chester County				
WESTTOWN TWP	PAI130928	Chester Creek, East Branch Chester Creek, Ridley Creek	Chester Creek, East Branch Chester Creek, Hunters Run, Ridley Creek	Appendix E-Siltation
		Middle Brandywine Creek, Upper Brandywine Creek	Brandywine Creek, Plum Run, Radley Run	Appendix E-Siltation
		Chester Creek	Chester Creek, Goose Creek TMDL	Appendix B-Pathogens, TMDL Plan-Nutrients

NOTES:
1. Land cover data is derived from the National Land Cover Database 2011 (NLCD 2011).
2. The entire Township is within the 2010 Urbanized Area.

DISCLAIMER:
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.

Date: 1/17/2019

DRAWN BY: AR

1 inch = 700 feet

0 700 1,400 Feet

CEG CEDARVILLE

Westtown Township
TMDL/POLLUTANT REDUCTION PLAN
PLANNING AREA MAP
CHESTER COUNTY, PA

Legend

- Outfalls

BMPs
- Chester Creek PRP Proposed BMP
- Chester Creek/Goose Creek TMDL/PRP Short Term BMP
- Upper Brandywine Creek PRP Proposed BMP

Planning Area
- East Branch
- Goose Creek
- Plum Run; Radley Run; Upper Brandywine

Parsed Areas
- PennDOT
- Private/Other

Stormwater Structures
- Inlet, Township
- Manhole, Township
- Inflow, Township
- Outflow, Township
- Inflow/Outflow, Township
- Riser, Township
- Inlet, State
- Manhole, State
- Inflow, State
- Outflow, State
- Inflow/Outflow, State
- Inlet, Private
- Manhole, Private
- Inflow, Private
- Outflow, Private
- Inflow/Outflow, Private
- Riser, Private

Stormwater Conveyances
- Private, Pipe
- Private, Swale
- State, Pipe
- Township, Pipe
- Township, Swale

- Pre-2003 Basins
- Existing PCSM BMPs

Roads
- Private
- State
- Township

- Stream
- Located Surface Waters
- Waterbodies

- HUC12 Boundaries
- Subwatersheds

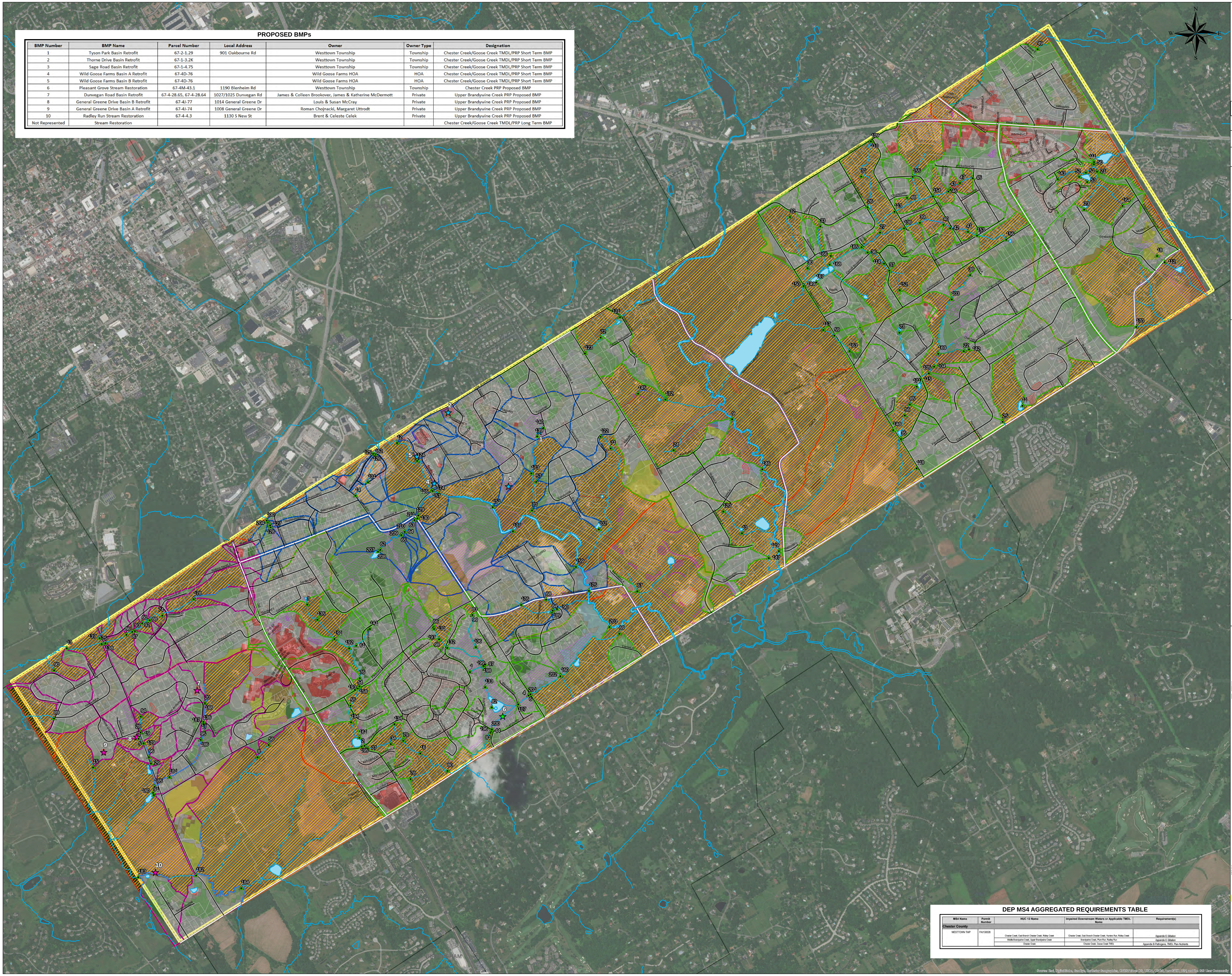
- Parcels
- Township Owned Parcels

- Township Boundary

APPENDIX F

Land Cover Map

Cedarville Engineering Group, LLC
Pottstown, Pennsylvania | Pensacola, Florida
P: 610-705-4500 E: info@CedarvilleEng.com
CedarvilleEng.com



PROPOSED BMPs

BMP Number	BMP Name	Parcel Number	Local Address	Owner	Owner Type	Designation
1	Tyson Park Basin Retrofit	67-2-1.29	901 Oakbourne Rd	Westtown Township	Township	Chester Creek/Goose Creek TMDL/PRP Short Term BMP
2	Thorne Drive Basin Retrofit	67-1-3.2K		Westtown Township	Township	Chester Creek/Goose Creek TMDL/PRP Short Term BMP
3	Sage Road Basin Retrofit	67-1-4.75		Westtown Township	Township	Chester Creek/Goose Creek TMDL/PRP Short Term BMP
4	Wild Goose Farms Basin A Retrofit	67-4D-76		Wild Goose Farms HOA	HOA	Chester Creek/Goose Creek TMDL/PRP Short Term BMP
5	Wild Goose Farms Basin B Retrofit	67-4D-76		Wild Goose Farms HOA	HOA	Chester Creek/Goose Creek TMDL/PRP Short Term BMP
6	Pleasant Grove Stream Restoration	67-4M-43.1	1190 Blenheim Rd	Westtown Township	Township	Chester Creek PRP Proposed BMP
7	Dunvegan Road Basin Retrofit	67-4-28.65, 67-4-28.64	1027/1025 Dunvegan Rd	James & Colleen Brookover, James & Katherine McDermott	Private	Upper Brandywine Creek PRP Proposed BMP
8	General Greene Drive Basin B Retrofit	67-4J-77	1014 General Greene Dr	Louis & Susan McCray	Private	Upper Brandywine Creek PRP Proposed BMP
9	General Greene Drive Basin A Retrofit	67-4J-74	1008 General Greene Dr	Roman Chojnacki, Margaret Uttrodt	Private	Upper Brandywine Creek PRP Proposed BMP
10	Radley Run Stream Restoration	67-4-4.3	1130 S New St	Brent & Celeste Celek	Private	Upper Brandywine Creek PRP Proposed BMP
Not Represented	Stream Restoration					Chester Creek/Goose Creek TMDL/PRP Long Term BMP

DEP MS4 AGGREGATED REQUIREMENTS TABLE

MS4 Name	Permit Number	HUC 12 Name	Impaired Downstream Waters or Applicable TMDL Name	Requirement(s)
Chester County				
WESTTOWN TWP	PAI130528	Chester Creek, East Branch Chester Creek, Ridley Creek	Chester Creek, East Branch Chester Creek, Hunters Run, Ridley Creek	Appendix E-Siltation
		Middle Brandywine Creek, Upper Brandywine Creek	Brandywine Creek, Plum Run, Radley Run	Appendix E-Siltation
		Chester Creek	Chester Creek, Goose Creek TMDL	Appendix B-Pathogens, TMDL Plan-Nutrients

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

NOTES:
1. Land cover data is derived from the National Land Cover Database 2011 (NLCD 2011).
2. The entire Township is within the 2010 Urbanized Area.

DISCLAIMER:
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.

Date: 1/17/2019

DRAWN BY: AR

1 inch = 700 feet

0 700 1,400 Feet

CEG CEDARVILLE

Westtown Township

TMDL/POLLUTANT REDUCTION PLAN LAND COVER MAP

CHESTER COUNTY, PA

Legend

Outfalls

BMPs
- Chester Creek PRP Proposed BMP
- Chester Creek/Goose Creek TMDL/PRP Short Term BMP
- Upper Brandywine Creek PRP Proposed BMP

Planning Area
- East Branch
- Goose Creek
- Plum Run; Radley Run; Upper Brandywine

Parsed Areas
- PennDOT
- Private/Other

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- Grasssland/Herbaceous
- 81- Hay/Pasture
- 82- Cultivated Crops
- 90- Woody Wetlands
- 95- Emergent Herbaceous Wetlands

- Pre-2003 Basins
- Existing PCSM BMPs

Roads
- Private
- State
- Township

- Stream
- Located Surface Waters
- Waterbodies

- HUC12 Boundaries
- Subwatersheds

- Parcels
- Township Owned Parcels

- Township Boundary