October 21, 2024

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

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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 (October 2024) to reflect changes in planned projects to remediate issues that have arose with private landowners, funding, and implementation feasibility. Alternative projects have been evaluated and chosen to replace removed projects within their respective plan areas. 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) and will be continued in the 2024 NPDES MS4 Individual Permit renewal.

This document will serve as the single plan for both the TMDL and PRP. This plan was originally prepared and has been updated 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 PRPs, 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 reduction 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 (although more recent Integrated Reports are available, for consistency, the 2014 version will continue to be used). 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)/Stormwater Control Measures (SCMs).

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.

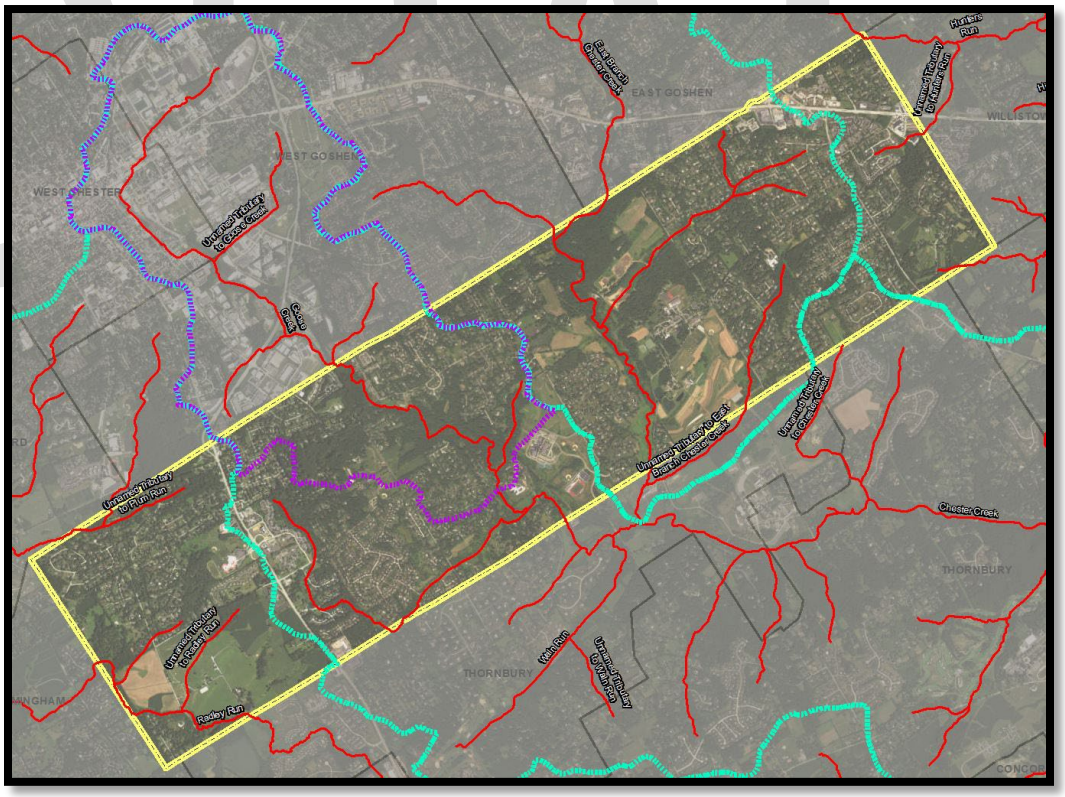
Figure 1: Westtown Township Location Map

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 discharge 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 2023 to reflect a change in the proposed stormwater Best Management Practice (BMP) for the Thorne Drive Basin Retrofit project. The Township completed the required public review period, and a copy of the affidavit of publication in the Daily Local News on August 4, 2023, is included in Appendix A. The PRP was announced at a regular Board of Supervisors meeting on August 7, 2023, and public comments were accepted at a subsequent meeting on August 21, 2023. One comment was received and summarized in Appendix A. Once the 30-day public review period ended, the PRP update was officially accepted on September 5, 2023.

The TMDL-PRP is being updated again in October 2024 to reflect a change in proposed projects to be undertaken to meet the remaining load reductions as required as part of the 5-year MS4 Permit PRP review as required by PADEP. The PRP will be presented to the Board of Supervisors and a public comment period will be conducted. Any comments received during this public comment period will be addressed by the Township and the updated PRP will detail the remaining projects to be completed.

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

1) The land area associated with non-municipal stormwater NPDES permit coverage that exists within the urbanized area of a municipality;
2) Land area associated with PennDOT roadways and the Pennsylvania Turnpike (roads and right of ways);

3) Lands associated with the production area of a Concentrated Animal Feeding Operation that is covered by an NPDES permit;
4) Land areas in which stormwater runoff does not enter the MS4. If an accurate storm sewershed map is developed, these lands may be parsed or excluded as part of that process.

Land areas that have been parsed from the Planning Area during the development of this PRP fall under category #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,	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

	Ridley Creek, Goose Creek	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.

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 two (2) 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 are planned to be installed within a township owned parcel adjacent to the pleasant grove neighborhood.

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 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
SUB-TOTAL:		**97.01**	**19.33**	**7.08**	**13.14**
>2024	Stream Restorations (Pleasant Grove & Radley Run)	3,250 LF	142.80	47.83	88.74
SUB-TOTAL:			**142.80**	**47.83**	**88.74**
TOTAL:		**97.01**	**162.13**		**99.8**

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.

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
	Pleasant Grove Stream Restoration	21.36	71,808.00	7.49	74.93
TOTAL:		**118.37**	**94,306.28**	**5.8**	**91.28**
Middle Brandywine Creek/Upper Brandywine Creek	Crebilly Meadow Conversion	135	22,864.32	13	121.61
	Radley Run Stream Restoration	1.92	11,984.36	6.39	63.95
TOTAL:		**33.96**	**34,848.68**	**18**	**185.56**

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.

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.

Crebilly Farm Meadow Conversion

Located in the southwest corner of Westtown Township, Crebilly Farm is a historic 300-acre property. The farm has been operated as a working farm tending fields of grain crops. Over the last few years an interest from a real estate developer to develop the land was made public and resulted in public outcry. The property is being purchased by the Township via open space funds to prevent the privatized development of the parcel; in turn, 206 acres will be utilized as a passive use park.

For the purposes of this plan 135 acres of active grain agriculture will be converted to natural meadow. Meadow TSS loading reduces the converted area from 185.12 lbs/ac/yr to 17 lbs/ac/yr; thus, this conversion is expected to contribute an annual reduction of 22,864.32 lbs toward meeting the Township's goal.

Detailed BMP Descriptions – Long-Term (> 2024-2026)

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
Crebilly Meadow Conversion	Westtown Township	Open Space Funding	NA	NA	NA
Pleasant Grove Stream Restoration	Westtown Township	Westtown Township	$438,811	$658,217	$548,514
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
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
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

Table 20: Proposed BMP O&M Responsibilities

BMP	Current Owner	Responsible Party for O&M	O&M Responsibilities
			• 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
Crebilly Farm Meadow Conversion	Westtown Township	Westtown Township	• Survey Meadows 2x per year for invasive species. • Mow or prescribed burn annually • Administer spot treatment for invasive species.
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

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 two (2) basin retrofits, and one (1) meadow conversion . 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]