Willistown Township MS4
Issued for Public Comment
April 16, 2018

Pollution Reduction Plan (PRP)
Report and Strategy Plan

For

Willistown Township, Chester County, Pennsylvania

MS4 Individual Permit Application
2018

Application Due Date Required: June 3, 2018
MS4 Permit Expiration Date: November 30, 2018

Prepared For:
Willistown Township
C/o Mr. David R. Burman
Twp. Mgr.
688 Sugartown Road
Malvern, PA 19319

Prepared By:
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Preamble

1. Background

This report and plan addresses the National Pollutant Discharge Elimination System (NPDES) Individual Permit requirement to discharge stormwater from a Small Municipal Separate Storm Sewer System (MS4) for Willistown Township, Chester County as established by the Pennsylvania Department of Environmental Protection (PADEP). The report, plan, and application content are based on attendance at multiple MS4 seminars, the periodic disbursement of amended and periodic updated program requirements by PADEP and meetings with the Township representatives to meet the application and report application due date June 3, 2018 and MS4 Permitting Expires November 30, 2018.

2. Introduction

2.1. General Information

The Township's current MS4 Permit is under Individual Permit No. PAI130521 for reporting period December 1, 2013 to November 30, 2018. (See Appendix A)

The MS4 Requirements Table (Revised 08-10-2017) (See also Appendix D) for the 2018 permit renewal identifies only a Pollutant Reduction Plan (PRP) requirement per Appendix E and no Total Maximum Daily Load (TMDL) requirements as follows:

Willistown Township MS4 Requirements Table (Municipal)

MS4 Name	NPDES ID	Individual Permit?	Reason	Impaired Downstream Waters or Applicable TMDL Name	Requirement(s)	Other Cause(s) of Impairment
Chester County						
WILLISTOWN TWP	PAI130521	Yes	SP, IP	Ridley Creek	Appendix E-Siltation (5)	Cause Unknown (5), Water/Flow Variability (4c)
				Crum Creek	Appendix E-Excessive Algal Growth, Siltation (5)	Cause Unknown (5), Water/Flow Variability (4c)
				Little Valley Creek	Appendix C-PCB (4a), Appendix B-Pathogens (5), Appendix E-Siltation (5)	Cause Unknown (5), Other Habitat Alterations, Water/Flow Variability (4c)
				Schuylkill River	Appendix C-PCB (4a)	(No cause listed.)
				Valley Creek	Appendix C-PCB (4a), Appendix B-Pathogens (5), Appendix E-Siltation (5)	Cause Unknown (5), Other Habitat Alterations, Water/Flow Variability (4c)
				Hunters Run	Appendix E-Siltation (5)	Cause Unknown (5), Water/Flow Variability (4c)

The 2018 permit renewal requires coverage by an Individual Permit for MS4s with a TMDL requirement and / or PRP requirement. Accordingly, an Individual

Permit renewal application with a PRP is to be prepared and submitted for Willistown Township (See also 2018 MS4 Permit NOI/Application Due Date Report Appendix A).

2.2. MS4 Client/Operator/Applicant Information

The stand-alone application provided by PADEP has been completed with the requested information. Below is an excerpt of some of the general information, see the application form for more details:

Organization: Willistown Township, Chester County
Mailing Address: 688 Sugartown Road, Malvern PA 19355
Client Contact: Mr. David R. Burman, Township Manager
Client ID # / Code: 86424 / MUNI
Current Application Required: PADEP 3800-PM-BCW0200b 1/2017: National Pollutant Discharge Elimination System (NPDES) Individual Permit To Discharge Stormwater from Small Municipal Separate Storm Sewer Systems (Ms4s) Application
Application Due Date: June 3, 2018

3. Annual Reporting Status

3.1. Last Annual Reporting Period Submitted: December 1, 2013 to November 30, 2018

The last NPDES Individual permitting period was approved by PADEP in their letter dated November 27, 2013. (See attached PADEP letter Appendix A.)

4. 2018 Total Maximum Daily Load (TMDL)

4.1. Total Maximum Daily Load (TMDL) Review History: No reduction in TMDL pollutant loads have been or are currently required.

5. 2018 Pollutant Reduction Plan (PRP)

5.1. MS4 Mapping – Outfall & Urbanized Area and Aerial Maps of 2018

5.2. Urbanized Area: The Urbanized Area of the Willistown Township has been updated is based on the 2010 U.S. Census, which covers greater area than compared to the 2000 Urbanized Area as shown on previous Outfall Map of 2017. (See Appendices B & C)

5.3. Outfalls & Storm Sewer Lines: All Township owned and maintained MS4 outfall locations and storm sewer have been updated as provided by Willistown Township's Geographical Information System (GIS) database or other provided information, which they had located. All outfalls have also been renumbered or

labeled then on previously submitted mapping per Willistown Township revised designations. Storm sewer lines shown are mostly those shown as the last upstream location from outfalls as provided by Willistown Township. No field survey has been done by Yerkes Associates, Inc. *a cirilli company* to verify or confirm outfall and storm sewer line locations. Note: in some cases an outfall location is an unknown at this time, but has been assumed to discharge to the nearest water source and has been included in the sewershed calculations. Designation CCMRP (Crum Creek Mill Road Park) is the discharge from the Mill Road Park basin.

5.3.1. Watersheds: Watersheds have been refined and updated from the original GIS as necessary to follow the topography more accurately.

5.3.2. Sewersheds: (Designated with SS on mapping) Only sewersheds to all outfall locations within the Urbanized Area have been shown and labeled to reduce map clutter. Sewershed identification has been coordinated to coincide with the final outfall location label.

5.3.3. Outfalls: (Designated with RC [Ridley Creek], CC [Crum Creek] or RC [Ridley Creek] & Outfall No. or label on mapping) In order to further reduce map clutter, only the most downstream outfalls within any sewershed and within the Urbanized Area have been labeled. Note: Structures are either designated as EW (Endwall), HW (Headwall), UNK (Unknown) or as labeled specifically.

5.3.4. General: In addition to the above, the map has been updated to note the locations of impairments as per the MS4 Requirement Table (See Appendix D); additional notes have been added and other GIS data and other information updated as needed. A second outfalls and aerial map has also been provided. (See Appendix C)

5.4. PRP Area

5.4.1. Affective Area: The area of the PRP is within the Willistown Township Urbanized Area portions of the Ridley Creek, Crum Creek and Little Valley Creek Watersheds.

5.4.2. Streams vs. MS4 Requirements Table: The following streams are affected in the PRP designated area: Ridley Creek, Crum Creek, Little Valley Creek, Valley Creek, and Hunters Run. The sewershed areas for each watershed leading to their respective streams are as listed in the tabulation of Existing Loading Without Accounting for Any BMP's table (See Appendix H). Little Valley Creek leads to Valley Creek, and no portion of Valley Creek is within Willistown Township. Therefore Willistown Township has no direct discharges into Valley Creek. Any pollutant reductions in Little Valley Creek Watershed will contribute to Valley Creek's pollutant reduction. Hunters Run is within the Ridley

Creek watershed and leads to Ridley Creek, and is considered as part of the overall pollutant load to Ridley Creek and Ridley Creek Watershed.

5.4.3. PRP Calculations Methodology to Determine Minimum Load Reduction Required

5.4.3.1. Source: The PRP plan was prepared using WikiWatershed Analysis and the Simplified Method as outlined in the Pollution Reduction Plan: A Methodology (PRP:AM) (See Appendix E), as endorsed as a valid methodology by the Pennsylvania Department of Protection of Pennsylvania (PADEP). Spreadsheets by this office have been generated and used are based on the PRP:AM.

5.4.3.2. Mapping: During this section refer to the Outfall & Urbanized Area Map, MS4 Program – 2017 and/or the Outfall & Aerial Map, MS4 Program - 2017 for locations of the outfall sewershed areas. (See Appendix C) Maps contain all notes regarding source data material used to generate them.

5.4.3.3. WikiWatershed: WikiWatershed was used in each case to analyze the sewershed areas for each outfall location shown in Tables 1a. Due to the fact, at the time, importing the sewershed areas was not compatible. It was ascertained that by manually recreating the outline of sewershed that there may be variations in the results. In order to minimize the error in manually retracing the sewershed areas, three passes were taken to get an average results for each land use. The only exception is SSCC83 (Sewershed Crum Creek Outfall No. 83) (near Buttonwood Road) due the small sewershed area, where the area was de minimis. It has been indicated on the mapping but not included in the total sediment loading for the Crum Creek Watershed. The average values were generated in a spreadsheet (See Appendix F) and linked to the Load Rate Calculations Spreadsheet for each watershed.

5.4.3.4. Loading Rate Calculations Spreadsheet: The Loading Rate Calculations Spreadsheet (LRCS) (See Appendix G) was developed as outlined in the PRP:AM for each sewershed designation used. The actual value of each sewershed is listed on the table, and final area acreages rounded to match the actual areas to as close as possible.

5.4.3.4.1. Table 1b: Final Averages from WikiWatersheds, as described above, are entered here. (% impervious values per PRP:AM, page 3.) Final impervious and pervious values are calculated and then tabulated.

5.4.3.4.2. Table 2: Developed Land Loading Rate: The Developed Land Loading Rate for Chester County values were from PADEP, Attachment B, PRP Instructions, 03/2017. (See Appendix E)

5.4.3.4.3. Table 3a: Total Suspended Solids (TSS): This table calculates the tabulated values from Tables 1 & 2 to tabulate the Sediment loading Rate for each sewershed area.

5.4.3.4.4. Tables for Total Phosphorus (TP) and Total Nitrogen (TN): It was expressed in the seminars and as noted in the PRP Instructions (03/2017) that if 10% sediment loading reduction is achieved the TP of 5%, and TN of 3% will also be achieved. Therefore these further calculations were not required.

5.4.3.5. Existing Loading Without Accounting for BMP's: The Existing Loading Without Accounting for BMP's (ELWAB) spreadsheet (See Appendix H) is tabulated from the values generated in the LRCS. Additionally provided is the minimum 10% reduction to be achieved and amount reduction provided, and final provided percentage.

5.4.4. PRP Calculations Methodology to Determine Minimum Load Reduction Required

5.4.4.1. Simplified Method: The Simplified Method has been used, as outlined in the PRP:AM and in accordance with the PADEP MS4 BMP (Best Management Practice) Effectiveness Values.

5.4.4.2. Parsing vs. Without Parsing Results: All PennDOT roadways have been parsed out. In a few cases this divides some sewersheds in two, which discharge to a single outfall location. One of those sewersheds are in Little Valley Creek Watershed SSLVC1a (Sewershed Little Valley Creek Outfall No. 1a) and SSLVC1b (Sewershed Little Valley Creek Outfall No. 1b) to Outfall LVC1 (Little Valley Creek Outfall No. 1). The remaining two sewersheds are in the Ridley Creek Watershed and are SSRC24a (Sewershed Ridley Creek Outfall 24a) & SSRC24b (Sewershed Ridley Creek Outfall 24b) to Outfall RC25 (Ridley Creek Outfall 25), and SSRC25a (Sewershed Ridley Creek Outfall 25a) & SSRC25b (Sewershed Ridley Creek Outfall 25b) to Outfall RC25 (Ridley Creek Outfall 25).

6. Proposed Load Reductions with BMP's Per Watershed

6.1. BMP's Proposed for Each Watershed (See Appendix J)

6.1.1. Ridley Creek:

6.1.1.1. Rita Reves Park: A Basin Retrofit to a Bioretention / Raingarden w/underdrain C/D Soils that discharges to Garett Mill Road culvert to Ridley Creek.

6.1.1.2. Inlet Sediment Filter Bags: To be installed at 9 locations along Cratin Lane, Smedley Drive, Dutton Mill Road, and Fox Run Lane that lead to outfalls discharging via tributaries to Ridley Creek.

Reduction Required: 10,427 lb/yr*
Reduction Met: 14,728 lb/yr*

6.1.2. Crum Creek:

6.1.2.1. Greentree Park: Basin Retrofit to a Bioretention / Raingarden w/underdrain C/D Soils that lead to outfall discharge via overland drainage to tributary to Crum Creek.

6.1.2.2. Mill Road Park: Basin Retrofit to a Bioretention / Raingarden w/underdrain C/D Soils that lead to outfall discharge via tributary to Crum Creek.

6.1.2.3. Eisenhower Road: Stream Bank Restoration along Crum Creek.

6.1.2.4. Inlet Sediment Filter Bags: Installed at 3 locations along Callery Way that lead to outfalls discharging to stream along Eisenhower Road.

Reduction Required: 33,923 lb/yr*
Reduction Met: 34,651 lb/yr*

6.1.3. Little Valley Creek:

6.1.3.1. Inlet Sediment Filter Bags: Installed at 4 locations along Industrial Boulevard and 4 locations along Jaqueline Drive that lead to outfalls discharging to tributary to Little Valley Creek.

Reduction Required: 6,354 lb/yr*
Reduction Met: 10,643 lb/yr*

7. BMP Design Parameters

(Sample design / installation, and is subject to final design.)

7.1. Existing Basin Retrofit to a Bioretention / Raingarden with Under Drain Construction

- **7.1.1.** Percolation test basin for suitable infiltration.
- **7.1.2.** Excavate bottom of Existing basin to within 1 foot above of the final proposed infiltration bottom.
- **7.1.3.** Install temporary sediment control BMP's.
- **7.1.4.** Enlarge or regrade Basin to if necessary to capture larger drainage area.
- **7.1.5.** Complete site grading and immediately stabilize.
- **7.1.6.** Once all upstream areas from basin are permanently stabilized, construct complete basin outlet structure and underdrain. Provide E&S protection so that drainage is prohibited from entering construction area.
- **7.1.7.** Stabilize grading within the limit of disturbance except within the Retrofit Bioretention / Raingarden Basin area.
- **7.1.8.** Excavate bioretention area to proposed invert depth and scarify the soil surface.
- **7.1.9.** Backfill Bioretention Basin with amended soils. Overfilling is recommended to account for settlement. Light hand tamping is acceptable if necessary.
- **7.1.10.** Plant vegetation according to planting plan.
- **7.1.11.** Mulch and install erosion protection at surface flow entrances where necessary.
- **7.1.12.** Provide Operation, Maintenance and Inspections on at least an annual basis.
- **7.1.13.** See Sample Details Appendix J

7.2. Inlet Sediment Filter Bags

(Based on ADA FlexStorm Inlet Filter or approved equal.)

- **7.2.1.** Remove the grate from the casting or concrete drainage structure.
- **7.2.2.** Clean the ledge (lip) of the casting frame or drainage structure to ensure it is free of stone and dirt. Drop in the Inlet Filter through the clear opening and be sure the suspension hangers rest firmly on the inside ledge (lip) of the casting.
- **7.2.3.** Replace the grate and confirm it is elevated no more than 1/8”, which is the thickness of the steel hangers.
- **7.2.4.** For Curb Box Inlet Filters: Insert Inlet Filter as described above, pull the rear curb guard flap up and over the open curb box until tight, align magnets to ensure firm attachment to the top portion of the curb box casting. If the curb back opening is not magnetic, slide a typical rock sack or 2 x 4 through the 2-ply rear curb box flap to create a dam which will direct runoff into the sediment bag.
- **7.2.5.** Provide Operation, Maintenance and Inspections on at least a quarterly/year basis.
- **7.2.6.** See Sample Details Appendix J

7.3. Stream Stabilization

(Based on PADEP GP-3 Bank Rehabilitation and Projection Vegetative Stabilization Details and other sources.)

7.3.1. Must be mostly vegetative. Rip-rap or gabions maybe used where necessary to stabilize, but sections cannot count towards load reduction.
7.3.2. Engineering analysis and design of stream required.
7.3.3. Clean steam of any debris.
7.3.4. Stream may require bypass pumping and temporary coffer dam.
7.3.5. Begin at the base of the embankment or below the low water line.
7.3.6. Excavate stream and stream bank where necessary. Realign steam if required.
7.3.7. Install any check dams associated with stream bank armoring. Armoring may be completely underneath embankment to get additional credit. (Discuss with PADEP)
7.3.8. Tamp stakes in a row across embankment if necessary.
7.3.9. Back fill embankment install vegetative features and/or seeding and apply erosion control matting.
7.3.10. Install landscape plantings along a permeant buffer area outside the embankment. Typically buffer area should be 35 ft. each side of stream. Lesser buffer zone should be discussed with PADEP.
7.3.11. See Sample Details and Photos Appendix A.
7.3.12. See “Considerations of Stream Restoration Projects in Pennsylvania for eligibility as an MS4 Best Management Practice, June 22, 2017”, Appendix B
7.3.13. Provide Operation, Maintenance and Inspections on at least an annual basis.

* See Appendix I

8. Order of Magnitude Cost Estimate for Proposed BMP's

WATERSHED	PROPOSED BMP	Quantity	Unit Cost(1)	Sub Unit Total Costs
Ridley Creek	Rita Reves Park Retrofit to a Bioretention / Raingarden w/UD (1)	1	$ 20,000	$ 20,000
	Basin Operation, Inspection and Maintenace Annually 10%	1	$ 2,000	$ 2,000
	Inlet Sediment Filter Bags (ISFB) per Inlet (1)	9	$ 100	$ 900
	Labor cost per Inlet	9	$ 200	$ 1,800
	ISFB Operation, Inspection and Maintenace Quarterly/Inlet	36	$ 100	$ 3,600
	Ridley Creek Watershed Construction OM Cost Estimate Total			**$ 28,300**
	Engineering Cost 15% Construction(5)	1	$ 4,245	$ 4,245
	Ridley Creek Watershed Sub Cost Estimate Total			**$ 32,545**
Crum Creek	Greentree Park Retrofit to a Bioretention / Raingarden w/UD (1), (4)	1	$ 20,000	$ 20,000
	Mill Road Park Retrofit to a Bioretention / Raingarden w/UD (1)	1	$ 20,000	$ 20,000
	Basins Operation, Inspection and Maintenace Annually 10%	2	$ 2,000	$ 4,000
	Stream Restoration per Linear Foot (1)	400	$ 250	$ 100,000
	Stream Res. Operation, Inspection and Maintenace Annually 10%	1	$ 10,000	$ 10,000
	Inlet Sediment Filter Bags (ISFB) per Inlet (1)	3	$ 100	$ 300
	Labor cost per Inlet	3	$ 200	$ 600
	ISFB Operation, Inspection and Maintenace Quarterly/Inlet	12	$ 100	$ 1,200
	CrumCreek Watershed Construction Cost Estimate Total			**$ 156,100**
	Engineering Cost 15% Construction(5)	1	$ 23,415	$ 23,415
	CrumCreek Watershed Sub Cost Estimate Total			**$ 179,515**
Little Valley Creek	Inlet Sediment Filter Bags (ISFB) per Inlet (1)	4	$ 100	$ 400
	Labor cost per Inlet	4	$ 200	$ 800
	ISFB Operation, Inspection and Maintenace Quarterly/Inlet	16	$ 100	$ 1,600
	Little Valley Creek Construction Cost Estimate Total			**$ 2,800**
	Engineering Cost 15% Construction(5)	1	$ 420	$ 420
	Little Valley Creek Sub Cost Estimate Total			**$ 3,220**
	Total All Watersheds MS4 BMP's Cost Estimated(2)			**$ 215,280.00**
	Total Annual O&M MS4 BMP's Cost Estimated(2&3)			**$ 22,400**

Notes:

1. BMP Cost Estimates includes installation (labor, equipment, etc.) except Inlet Sediment Filter Bags labor costs are separated out.
2. This Cost Estimate is based on conceptual information and subject to change based on completed engineering and final bidding.
3. Replacement costs not included.
4. The current Greentree Park project final costs may affect Total Cost Estimate.
5. Engineering Sediment Removal Analysis Post-Construction may be required by PADEP and is not inlcuded.

9. Descriptions of Proposed MS4 BMPS per PaDEP BMP Effectiveness Values Table

9.1.1.1. Bioretention – Raingarden (C/D soils w/ underdrain)*

Sediment Removal Effective Value 55%

An excavated pit backfilled with engineered media, topsoil, mulch, and vegetation. These are planting areas installed in shallow basins in which the storm water runoff is temporarily ponded and then treated by filtering through the bed components, and through biological and biochemical reactions within the soil matrix and around the root zones of the plants. This BMP has an underdrain and is in C or D soil.

9.1.1.2. Stream Restoration*

Sediment 44.88 lbs/ft/yr

An annual mass nutrient and sediment reduction credit for qualifying stream restoration practices that prevent channel or bank erosion that otherwise would be delivered downstream from an actively enlarging or incising urban stream. Applies to 0 to 3rd order streams that are not tidally influenced. If one of the protocols is cited and pounds are reported, then the mass reduction is received for the protocol.

9.1.1.3. Storm Sewer System Solids Removal (Inlet Sediment Filter Bag)*

Total Nitrogen (TN) = 0.0027 for sediment, 0.0111 for organic matter
Total Phosphorus (TP) = 0.0006 for sediment, 0.0012 for organic matter
Sediment = 1 – TN and TP concentrations

This BMP (also referred to as “Storm Drain Cleaning”) involves the collection or capture and proper disposal of solid material within the storm system to prevent discharge to surface waters. Examples include catch basins, stormwater inlet filter bags, end of pipe or outlet solids removal systems and related practices. Credit is authorized for this BMP only when proper maintenance practices are observed (i.e., inspection and removal of solids as recommended by the system manufacturer or other available guidelines). The entity using this BMP for pollutant removal credits must demonstrate that they have developed and are implementing a standard operating procedure for tracking the material removed from the sewer system. Locating such BMPs should consider the potential for backups onto roadways or other areas that can produce safety hazards.

Storm Sewer System Solids Removal Determination Criteria

To determine pollutant reductions for this BMP, these steps must be taken:

1) Measure the weight of solid/organic material collected (lbs). Sum the total weight of material collected for an annual period. Note – do not include refuse, debris and floatables in the determination of total mass collected.

2) Convert the annual wet weight captured into annual dry weight (lbs) by using site-specific measurements (i.e., dry a sample of the wet material to find its weight) or by using default factors of 0.7 (material that is predominantly wet sediment) or 0.2 (material that is predominantly wet organic matter, e.g., leaf litter).

3) Multiply the annual dry weight of material collected by default or site-specific pollutant concentration factors. The default concentrations are shown in the BMP Effectiveness Values columns. Alternatively, the material may be sampled (at least annually) to determine site-specific pollutant concentrations.

DEP will allow up to 50% of total pollutant reduction requirements to be met through this BMP. The drainage area treated by this BMP may be no greater than 0.5 acre unless it can be demonstrated that the specific system proposed is capable of treating stormwater from larger drainage areas. For planning purposes, the sediment removal efficiency specified by the manufacturer may be assumed, but no higher than 80%.

*See PRP Simplified Method BMP Analysis Appendix E

10. Conclusion

10.1. This report was prepared as required by PADEP via the MS4 application process.

10.2. This application, due to changes in the MS4 regulations is now being submitted under an Individual Permit.

10.3. This annual report will be submitted on or before June 3, 2018 for the November 30, 2018 deadline, unless otherwise notified by PADEP.

10.4. 2018 MS4 TMDL reductions are not required for this application.

10.5. The 2018 PRP Individual Permit Application has been submitted and meets the reduction criteria.

10.6. BMP's may be located on either public or private property. This proposal is to be done within municipal owned or operated locations.

10.7. During the review process we will endeavor to work with PADEP to finalize the MS4 application after review comments have been received.

11. **Implementation:** Upon completion of review comments and then from the date of written approval by PADEP of this report, implementation of the proposed BMP's must begin to take place over the following 5-year period, and will allow for funding, and actual design.

12. **Public Comment:** This report has been issued, as of the date of this report, for public comments and will be updated upon receipt of any comments.