

**Pollutant Reduction Plan (PRP)  
and  
Total Maximum Daily Load (TMDL) Plan  
for  
Neshaminy Creek and Little Neshaminy Creek  
in  
Northampton Township  
Bucks County, Pennsylvania**

September 2017

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Northampton Township, Bucks County is submitting this combined Pollutant Reduction Plan (PRP) and Total Maximum Daily Load (TMDL) Plan in accordance with the requirements of *National Pollutant Discharge Elimination System (NPDES) Individual Permit to Discharge Stormwater from Small Municipal Separate Storm Sewer Systems (MS4)*; specifically, in accordance with the *MS4 Requirements Table (Municipal) Anticipated Obligations for Subsequent NPDES Permit Term (Revised 5/9/2017)*. Northampton Township must create a TMDL Plan due to discharges from their MS4 to Neshaminy Creek, which has been listed as impaired for siltation and suspended solids which hereinafter is referred to as sediment as shown in Appendix A. Northampton Township must also create a PRP due to discharges from their MS4 to Neshaminy Creek and Little Neshaminy Creek, which has been listed as impaired for Nutrients, Organic Enrichment/ Low D.O. which the term “nutrients” refers to “Total Phosphorous” (TP) as shown in Appendix A.

The intent of this MS4 PRP and TMDL Plan, which hereinafter is referred to as Plan, is to establish the existing loading of pollutants discharged from the MS4 to Neshaminy Creek and Little Neshaminy Creek, and to present a plan to reduce these pollutants. This Plan is organized to follow the “Required TMDL Plan Elements” presented in the TMDL Plan Instructions included as part of the *Individual NPDES Permit* instruction packages which includes all “Required PRP Elements” presented in the PRP Instructions included as part of the *PAG-13 MS4 General Permit* instruction packages. For the next permit term, that is effective on March 16, 2018, Northampton Township will submit an Individual Application along with this Plan by September 16, 2017 for continued permit coverage. This Plan will be evaluated and updated by Northampton Township on an as-needed basis, based on its effectiveness in long-term and short-term reductions in pollutant loads in discharges from the regulated small MS4. If this occurs, Northampton Township will work with the Department of Environmental Protection (DEP) for review and approval of any revisions or updates.

Each TMDL Plan must include the following Required TMDL Plan Elements:

- Section A: Public Participation
- Section B: Map
- Section C: Pollutants of Concern
- Section D: Existing Load for Pollutants of Concern
- Section E: Wasteload Allocations (WLAs)
- Section F: Analysis of TMDL Objectives
- Section G: Select BMPs to Achieve the Minimum Required Reductions in Pollutant Load
- Section H: Identify Funding Mechanisms
- Section I: Identify Responsible Parties for Operation and Maintenance (O&M) of BMPs

This Plan is organized to follow the above outline of required elements as shown on the following pages. Relevant verbiage from the TMDL Plan and PRP Instructions are reiterated herein for each of the above required TMDL Plan and PRP Elements.

**A. Public Participation**

As part of the preparation of this Plan, public participation is required. Northampton Township shall complete the following public participation measures listed below, and report in the Plan that each was completed.

- The Township shall make a complete copy of the Plan available for public review.
- The Township shall publish, in a newspaper of general circulation in the area, a public notice containing a statement describing the plan, where it may be reviewed by the public, and the length of time the Township will provide for the receipt of comments. The public notice must be published at least 45 days prior to the deadline for submission of the TMDL Plan to DEP. **Include a copy of the public notice with the Plan.**
- The Township shall accept written comments for a minimum of 30 days from the date of public notice. **Include a copy of all written comments received from the public with the Plan.**
- The Township shall accept comments from any interested member of the public at a public meeting or hearing, which may include a regularly scheduled meeting of the governing body of the municipality or municipal authority that is the permittee.
- The Township shall consider and make a record of the consideration of each timely comment received from the public during the public comment period concerning the plan, identifying any changes made to the plan in response to the comment. **Include a copy of the Township’s record of consideration of all timely comments received in the public comment period with the Plan.**

Northampton Township has completed the above-listed Public Participation measures and all required documentation of public participation is included as Appendix B.

- Plan public notice was published in: \_\_\_\_\_
- Date Plan public notice was published in newspaper: \_\_\_\_\_
- Date Plan was made available for public review/comment: \_\_\_\_\_
- End date for receipt of written comments (30 days from the date of public notice): \_\_\_\_\_
- Date Plan comments were accepted at a public meeting: \_\_\_\_\_

## B. Map

Two (2) maps are included, that identify **land uses** and the **storm sewershed boundaries**. The mapped area is associated with the MS4 that discharge to impaired surface waters and/or TMDL waters, and that calculate the storm sewershed drainage area that is subject to the Individual Permit. In addition, the proposed location(s) of structural BMP(s) that will be implemented to achieve the required pollutant load reductions are identified on a map.

The map may be the same as that used to satisfy Minimum Control Measure (MCM) #3 of the PAG-13 General or Individual Permit, with the addition of land use, the storm sewershed boundary, and locations of proposed BMPs, or may be a different map.

The map must be sufficiently detailed to identify the planning area relevant to satisfying TMDL Plan objectives, and to demonstrate that BMPs will be located in appropriate TMDL Planning Areas or storm sewersheds to meet the objectives. For a single MS4, the planning area constitutes the storm sewersheds of all MS4 outfalls within the Township's jurisdiction. Planning Areas may be reduced through parsing. Note that if parsing is done, BMPs implemented within the parsed areas will not count toward achieving pollutant reduction objectives.

**NOTE** – Delineation of storm sewersheds associated with individual MS4 outfalls is typically necessary in order to determine the Planning Area. The MS4 may display the storm sewershed for each MS4 outfall or just the Planning Area, at its discretion.

The mapping requirements of the Individual Permit are provided in Appendix C. The Northampton Township MS4 Map identifies the PRP Planning Area and the TMDL Planning Area, which includes all storm sewershed boundaries, as well as the proposed locations of structural BMPs to be implemented to achieve required pollutant load reductions. For clarity, land uses within the planning areas are shown separately on the Northampton Township MS4 Land Uses (MapShed) Map.

### TMDL Planning Area

Northampton Township has to determine the TMDL Planning Area for the pollutant(s) of concern in the Neshaminy Creek Watershed. Neshaminy Creek watershed is divided into sub-areas which have reference names. Figure 1 shows the location of sub-watersheds as outlined in the *TMDL Assessment for the Neshaminy Creek Watershed in Southeast Pennsylvania*. In this figure, streams shown in red represent the impaired stream segments included in the Section 303(d) list.

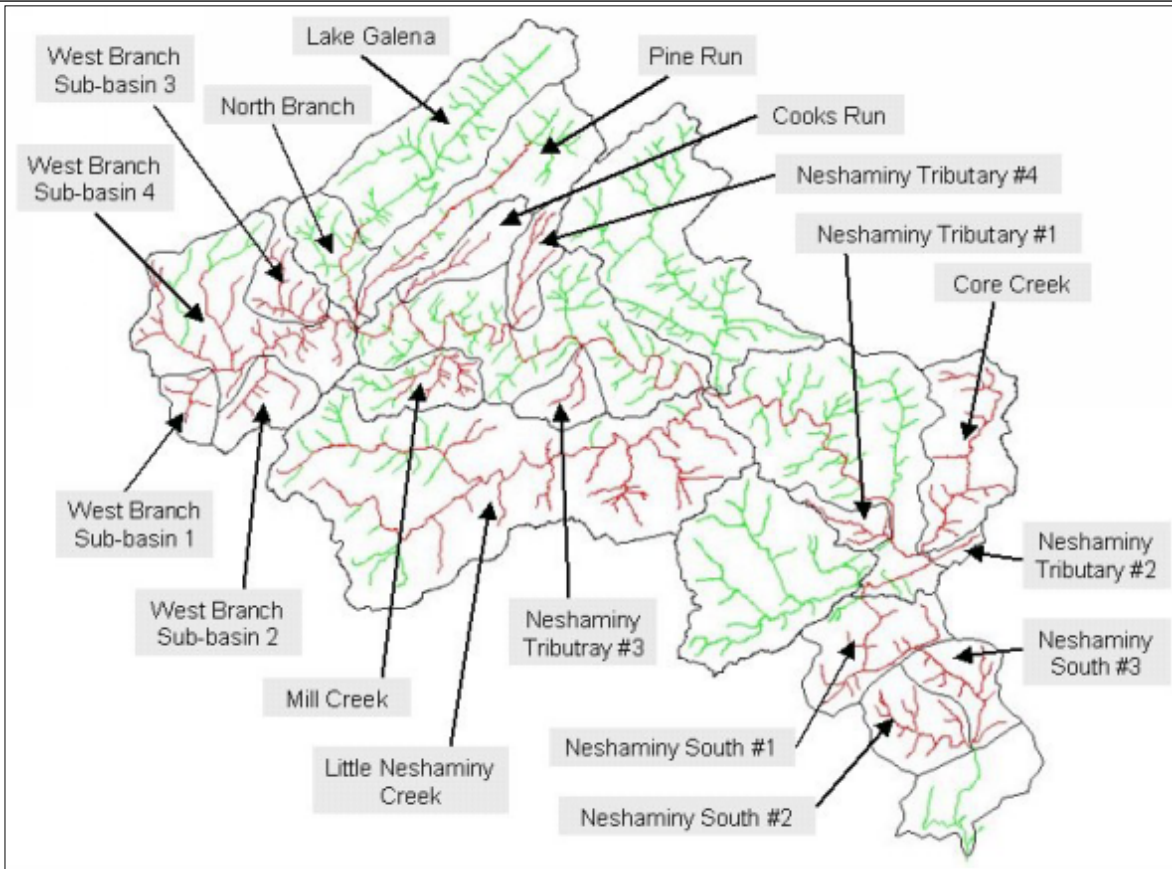


Figure 1: Location of sub-watersheds having nonpoint source-related impairments

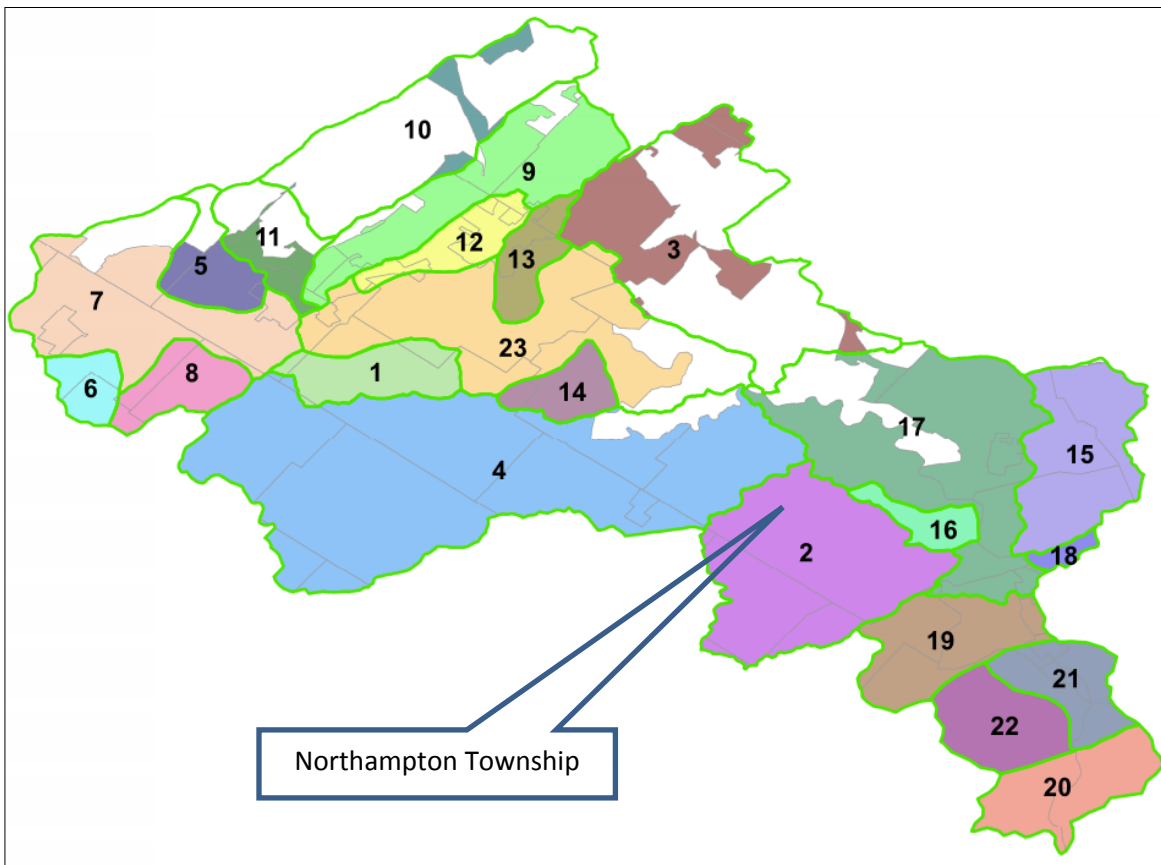


Figure 2: Location of sub-watersheds by reference number



Northampton Township includes areas in sub-watershed reference numbers 2, 4, 16 and 17. Only sub-watersheds 4 and 16 are impaired and have a TMDL Development Plan in the *TMDL Assessment for the Neshaminy Creek Watershed in Southeast Pennsylvania*; therefore, this area is within the TMDL Planning Area. A portion of Northampton Township is within sub-watershed reference number 4 which is known as the Little Neshaminy Creek and sub-watershed reference number 16 which is known as the Neshaminy Tributary #1. Northampton Township land area within the TMDL Planning Area includes Area 4 (Little Neshaminy Creek) which is comprised of 3,987 acres and Area 16 (Neshaminy Creek Tributary #1) which is comprised of 1,279 acres.

### PRP Planning Area

Northampton Township has to determine the PRP Planning Area for the pollutant(s) of concern in the Neshaminy Creek Watershed. The PRP Planning Area accounts for discharges from the MS4 to Neshaminy Creek as a combined storm sewershed for all MS4 outfalls that discharges to impaired waters. The PRP Planning Area includes Areas 2, 4, 16 and 17 shown in Figure 2. Northampton Township land area in the PRP Planning Area includes 16,731 acres.

### Lands Parsed

Northampton Township's permit obligation focuses on the TMDL and PRP Planning Areas with the permitted lands parsed. Parsing Guidelines were utilized in determining the areas for parsing. Land area associated with PennDOT roadways (road and right of ways) may be parsed. Also, land areas in which stormwater runoff does not enter the MS4 may be parsed. The Municipality reserves the right to modify parsed areas in the future. Any modification to parsed areas will be documented in future updates of the Plan.

The total watershed for Neshaminy Creek consists of 49.3 square miles (31,578 acres) according to MapShed. Northampton Township's permit obligation applies only to runoff collected by and discharged from the MS4. The storm sewershed land area that is collected by and discharges from the MS4 to Neshmainy Creek has been delineated using PAMAP data known as Light Detection and Ranging (LiDAR) contours. After parsing, areas of concern are as follows: TMDL Planning Area for Little Neshaminy Creek, TMDL Planning Area for Neshaminy Creek Tributary #1 and PRP Planning Area consisting of 2,113 acres, 1,033 acres and 10,174 acres, respectively. The following table summarizes the TMDL and PRP Planning Areas for Neshaminy Creek:

Table 1: Summary of Planning Areas

<b>Area Description</b>	<b>Acres</b>
Land area of Little Neshaminy Creek Watershed	3,987
Land area that drains to PennDOT roadways	(1,874)
Land area in which stormwater runoff does not enter the MS4	
<b>TMDL Planning Area for Little Neshaminy Creek</b>	<b>2113</b>

<b>Area Description</b>	<b>Acres</b>
Land area of Neshaminy Creek Tributary #1 Watershed	1,279
Land area that drains to PennDOT roadways	(246)
Land area in which stormwater runoff does not enter the MS4	
<b>TMDL Planning Area for Neshaminy Creek Tributary #1</b>	<b>1,033</b>

<b>Area Description</b>	<b>Acres</b>
Land area of Neshaminy Creek Watershed	16,731
Land area that drains to PennDOT roadways	(199)
Land area in which stormwater runoff does not enter the MS4	(6,358)
<b>PRP Planning Area for Neshaminy Creek</b>	<b>10,174</b>

### C. Pollutants of Concern

This Plan must identify the pollutants of concern for each storm sewershed or the overall Planning Area. The term “nutrients” refers to “Total Nitrogen” (TN) and “Total Phosphorus” (TP) unless specifically stated otherwise in DEP’s latest Integrated Report. The terms “sediment,” “siltation,” and “suspended solids” all refer to inorganic solids and are hereinafter referred to as “sediment.” The term, “storm sewershed” is defined in the PAG-13 General Permit as the land area that drains to the municipal separate storm sewer from within the jurisdiction of the MS4 permittee. This term is used in these instructions as well as the term “PRP Planning Area” (or “Planning Area”), which refers to all of the storm sewersheds that an MS4 must calculate existing loads and plan load reductions. Wasteload Allocation (WLA) is another term defined as the portion of a surface water’s loading capacity that is allocated to existing and future point source discharges.

The pollutant(s) of concern for TMDL Plans will be based on the following:

- If a WLA has been established in a TMDL for sediment, the MS4 is expected to develop the TMDL Plan based on the reduction of sediment.
- If WLAs have been established in a TMDL for sediment and nutrients, the MS4 is expected to develop the TMDL Plan based on the reduction of sediment and TP, unless the MS4 chooses to utilize a presumptive approach for TP. DEP will allow MS4s to calculate loads and pollutant reductions based on sediment, under the assumption that the achievement of TMDL Plan objectives for sediment will also achieve the objectives for TP. MS4s must identify use of the presumptive approach in its TMDL Plan if chosen.
- If a WLA has been established in a TMDL for nutrients alone (or surrogates for nutrients such as “excessive algal growth” and “organic enrichment/low D.O.”), the MS4 is expected to develop the TMDL Plan based on the reduction of TP, unless the presumptive approach is chosen, as described above.

For this TMDL Plan, the impaired downstream water is Neshaminy Creek, which has an impairment of sediment. Since the impairment is sediment, a minimum 10% short-term reduction and a minimum 17% (Little Neshaminy Creek) and 71% (Neshaminy Creek Tributary #1) long-term reductions are required. The Plan presents the minimum reduction in loading for sediment as pounds per year (lbs/yr).

For all PRPs, Northampton Township shall calculate existing loading of the pollutant(s) of concern in lbs/year; calculate the minimum reduction in loading in lbs/year; select Best Management Practice(s) (BMP(s)) to reduce loading; and demonstrate that the selected BMPs will achieve the minimum reductions.

For PRPs developed for impaired waters, the pollutant(s) are based on the impairment listing, as provided in the MS4 Requirements Table. If the impairment is based on siltation only, a minimum 10% sediment reduction is required. If the impairment is based on nutrients only or other surrogates for nutrients (e.g., “Excessive Algal Growth” and “Organic Enrichment/Low D.O.”), a minimum 5% TP reduction is required. If the impairment is due to both siltation and nutrients, both sediment (10% reduction) and TP (5% reduction) must be addressed. PRPs may use a presumptive approach in which it is assumed that a 10% sediment reduction will also accomplish a 5% TP reduction. However, MS4s may not presume that a reduction in nutrients will accomplish a commensurate reduction in sediment.

For this PRP, the impaired downstream water is Neshaminy Creek, which has an impairment of nutrients. Since the impairment is nutrients, a minimum 5% reduction is required. The Plan presents the minimum reduction in loading for nutrients as pounds per year (lbs/yr).

## **D. Existing Load for Pollutants of Concern**

Existing loading must be calculated and reported, in pounds per year, for the pollutant(s) of concern in the TMDL Planning Area and PRP Planning Area.

Per the TMDL Instructions, the options for evaluating existing load for TMDL Plans differs from PRPs. TMDL Plans must use: 1) the baseline load established in a TMDL, 2) a load that is distributed from a bulk existing load for a group of MS4s in a TMDL, or 3) a recalculated load as determined using the MapShed model or equivalent. If MapShed or equivalent will be used to estimate existing load, the same model should also be used to estimate future pollutant load for different BMP implementation scenarios to ensure consistency with input parameters between existing and future loading.

Per the PRP Instructions, existing loading must be calculated and reported as of the date of the development of this PRP. There are several possible methods to estimate existing loading, ranging from simplistic to complex. One method to estimate existing loading that is acceptable to DEP is to determine the percent impervious and pervious surface within the urbanized area of the storm sewershed and calculate existing loading by multiplying the developed impervious and developed pervious land areas (acres) by pollutant loading rates (lb/acre/year) ("simplified method"). The MS4 may use loading rates for undeveloped land for areas outside of the urbanized area which flows into the urbanized area. Where structural BMPs are currently in place and are functioning, the existing loading estimate may be reduced to account for pollutant reductions from those BMPs.

Use of DEP's simplified method is not required. Any methodology that calculates existing pollutant loading in terms of lbs. per year, evaluates BMP-based pollutant reductions utilizing the BMP effectiveness values contained in 3800-PM-BCW0100m or Chesapeake Bay Program expert panel reports, uses average annual precipitation conditions, considers both overland flow and stream erosion, and is based on sound science may be considered acceptable.

Whatever tool or approach that is used to estimate existing loading from the PRP Planning Area, the same method must also be used to estimate existing loading to planned BMPs. This avoids errors in percent pollutant removal calculations that would result if different methods were used. Later BMP design efforts will usually apply a more sophisticated method than used in planning to calculate load to a BMP. The design loading may not however be used to alter the assumed pollutant reduction by the BMP unless the PRP is revised to apply the more sophisticated method to the load from the storm sewershed as a whole.

For both the TMDL Plans and PRPs, MS4s may claim a “credit” for constructed structural BMPs implemented prior to development of the TMDL Plan/PRP to reduce existing loading estimates, assuming those BMPs continue to be maintained and are functioning as designed. In order to claim such credit, identify all such structural BMPs in Section D of the TMDL Plan/PRP along with the following information:

- Detailed description of the BMP;
- Latitude and longitude coordinates for that BMP;
- Location of the BMP on the storm sewershed map;
- The permit number, if any, that authorized installation of the BMP;
- Calculations demonstrating the pollutant reduction achieved by the BMP;
- The date the BMP was installed and a statement that the BMP continues to serve the function(s) it was designed for; and
- The operation and maintenance (O&M) activities of the BMP and O&M frequencies, and party(ies) who are responsible for O&M.

The MS4 may optionally submit design drawings of the BMP for previously installed or future BMPs with the TMDL Plan and/or PRP. Northampton Township did not claim “credit” for any existing BMPs in the Neshaminy Creek Watershed.

In modeling the existing load, the software program known as MapShed was utilized in the development of this Plan to determine the source areas and the total load of sediment and nutrients based on the existing land uses. MapShed is a customized GIS interface that is used to create input data for an enhanced version of the Generalized Watershed Loading Functions – Enhanced (GWLF-E) watershed model originally developed at Cornell University. MapShed was improved by Dr. Barry Evans and his group at PSIEE using AVGWLF, a GIS-based watershed modeling tool that uses hydrology, land cover, soils, topography, weather, pollutant discharges, and other critical environmental data to model sediment and nutrient transport within a watershed.

The MapShed model must be run five (5) times; once for the Total Watershed, a second time for the Total TMDL Planning Area, a third for the TMDL Planning Area for Little Neshaminy Creek, a fourth time for TMDL Planning Area for Neshaminy Creek Tributary #1 and a fifth for the PRP Planning Area. MapShed was run for the total watershed to properly account for downstream channel impacts and include impaired waters identified in the MS4 Requirements Table. The output from MapShed GWLF-E Existing Loads for the Total Watershed, TMDL Planning Areas and PRP Planning Area are in Appendix D. Below is the output from MapShed displaying the source area and existing loading for the portion of the MS4 that drains to the Neshaminy Creek:

Table 2: Summary of Sediment Loading

	<b>Existing Sediment Loading (lb/yr)</b>	<b>Existing Nutrient (TP) Loading (lb/yr)</b>
Neshaminy Creek Watershed Total Watershed (49.3 sq. miles)	31,884,150	9,748
Total TMDL Planning Area (3,146 acres)	3,393,851	N/A
TMDL Planning Area for Little Neshaminy Creek (2,113 acres)	2,213,764	N/A
TMDL Planning Area for Neshaminy Creek Tributary #1 (1,033 acres)	1,168,133	N/A
PRP Planning Area (10,174 acres)	N/A	3,487

The impairment for the PRP is nutrients in which a minimum 5% reduction is required. The impairment for the TMDL Plan is sediment in which a minimum 10% short-term reduction, a minimum 17% (Little Neshaminy Creek) and 71% (Neshaminy Creek Tributary #1) long-term reductions are required. Table 3 is a summary of the reduction requirements:

Table 3: Summary of Reduction Requirements

	<b>Neshaminy Creek PRP Nutrients</b>	<b>Neshaminy Creek TMDL Sediment Short Term Reduction</b>	<b>Little Neshaminy Creek TMDL Sediment Long Term Reduction</b>	<b>Neshaminy Creek Tributary #1 TMDL Sediment Long Term Reduction</b>
Existing Load (lb/yr)	3,487	3,393,851	2,213,764	1,168,133
Percent Reduction	5%	10%	17%	71%
Required Reduction (lb/yr)	174	339,385	376,340	829,374
<b>Proposed Load (lb/yr)</b>	<b>3,313</b>	<b>3,054,466</b>	<b>1,837,424</b>	<b>338,759</b>

The date the existing loading was calculated / the date of development of this TMDL Plan and PRP is July 7, 2017.

## E. Wasteload Allocations (WLAs)

For TMDLs with specific WLA(s), report the specific WLA(s) established for the MS4(s). For TMDLs with bulk WLA(s), delineate the portion of the WLA(s) that are specific to the MS4 UNLESS all MS4s identified in a TMDL develop a joint TMDL Plan.

**Sediment Reduction for Little Neshaminy Creek:** The allocation of sediment among contributing sources in Little Neshaminy Creek was done by reducing each source equally on a percentage basis. The Baseline Load, MS4 Allocation and Percent Required Reduction numbers were taken from the *TMDL Assessment for the Neshaminy Creek Watershed in Southeast Pennsylvania* as prepared by the EPA. Calculating the WLA can be done as follows:

$$(MS4 \text{ Load Reduction}) = (MS4 \text{ Baseline Load}) - (MS4 \text{ Allocation})$$

$$(WLA) = (\text{Existing Sediment Load}) - (\text{Allocated Sediment Load})$$

$$WLA = 8,369,480 \text{ lb/year} - 6,937,351 \text{ lb/year}$$

$$WLA = 1,432,129 \text{ lb/year}$$

$$(\text{Percent Required Reduction}) = (MS4 \text{ Load Reduction}) / (MS4 \text{ Baseline Load})$$

$$\% \text{ Reduction} = (WLA) / (\text{Existing Sediment Load})$$

$$17\% = WLA / 8,369,480 \text{ lb/year}$$

$$WLA = 1,432,129 \text{ lb/year}$$

The TMDL Planning Area is the delineation of the MS4 land area(s) to be used to calculate an Adjusted MS4 Baseline, MS4 Allocation, and required Load Reduction using the following Adjustment Equation.

$$\text{Adjustment Ratio} = \frac{\left( \begin{array}{l} \text{Actual Contributing land area (acres)} \\ \text{as delineated by the Municipality} \end{array} \right)}{\left( \begin{array}{l} \text{Land area (acres) used by EPA to} \\ \text{calculate the EPA TMDL Allocation} \end{array} \right)}$$

The Northampton Township TMDL Planning Area in the Neshaminy Creek watershed was calculated to be 2,113 acres. The TMDL Report assigned Little Neshaminy Creek an area of 27,262 acres.

$$\text{Adjustment Ratio} = 2,113/27,262 = 7.8\%$$

$$\text{Adjusted MS4 WLA} = \text{Adjustment Ratio} \times (\text{TMDL Report WLA})$$

$$\text{Adjusted MS4 WLA} = 7.8\% \times 1,432,129 \text{ lb/year}$$

$$\text{Adjusted MS4 WLA} = 111,706 \text{ lbs/year}$$

The WLA assigned Little Neshaminy Creek for Northampton Township is 111,706 lbs/year.



**Sediment Reduction for Neshaminy Creek Tributary #1:** The allocation of sediment among contributing sources in Neshaminy Creek Tributary #1 was done by reducing each source equally on a percentage basis. The Baseline Load, MS4 Allocation and Percent Required Reduction numbers were taken from the *TMDL Assessment for the Neshaminy Creek Watershed in Southeast Pennsylvania* as prepared by the EPA. Calculating the WLA can be done as follows:

$$(MS4 \text{ Load Reduction}) = (MS4 \text{ Baseline Load}) - (MS4 \text{ Allocation})$$

$$(WLA) = (\text{Existing Sediment Load}) - (\text{Allocated Sediment Load})$$

$$WLA = 721,215 \text{ lb/year} - 209,543 \text{ lb/year}$$

$$WLA = 511,672 \text{ lb/year}$$

$$(\text{Percent Required Reduction}) = (MS4 \text{ Load Reduction}) / (MS4 \text{ Baseline Load})$$

$$\% \text{ Reduction} = (WLA) / (\text{Existing Sediment Load})$$

$$71\% = WLA / 721,215 \text{ lb/year}$$

$$WLA = 511,672 \text{ lb/year}$$

The TMDL Planning Area is the delineation of the MS4 land area(s) to be used to calculate an Adjusted MS4 Baseline, MS4 Allocation, and required Load Reduction using the following Adjustment Equation.

$$\text{Adjustment Ratio} = \frac{\left( \begin{array}{l} \text{Actual Contributing land area (acres)} \\ \text{as delineated by the Municipality} \end{array} \right)}{\left( \begin{array}{l} \text{Land area (acres) used by EPA to} \\ \text{calculate the EPA TMDL Allocation} \end{array} \right)}$$

The Northampton Township TMDL Planning Area in the Neshaminy Creek watershed was calculated to be 1,033 acres. The TMDL Report assigned Neshaminy Creek Tributary #1 an area of 1,331 acres.

$$\text{Adjustment Ratio} = 1,033/1,331 = 77.6\%$$

$$\text{Adjusted MS4 WLA} = \text{Adjustment Ratio} \times (\text{TMDL Report WLA})$$

$$\text{Adjusted MS4 WLA} = 77.6\% \times 511,672 \text{ lb/year}$$

$$\text{Adjusted MS4 WLA} = 397,057 \text{ lbs/year}$$

The WLA assigned Neshaminy Creek Tributary #1 for Northampton Township is 397,057 lbs/year.

## **F. Analysis of TMDL Objectives**

MS4s must present a long-term reduction by demonstrating the pollutant load reduction required to meet the WLA(s), in lbs/yr, and percentage of existing load and present a short-term reduction by choosing one of the following objectives that will be pursued for the subsequent permit term, i.e., either 1) achieve the WLA(s) or 2) reduce existing load by 10% (sediment) or 5% (TP), as well as the pollutant load reduction, in lbs/yr.

### Long-Term Reduction

Northampton Township is required to reduce 111,706 lbs/year of sediment from the Little Neshaminy Creek per the TMDL Study. The percent reduction per the TMDL Study is 17% for the Little Neshaminy.

Northampton Township is required to reduce 397,057 lbs/year of sediment from the Neshaminy Creek Tributary #1 per the TMDL Study. The percent reduction per the TMDL Study is 71% for the Neshaminy Creek Tributary #1.

### Short-Term Reduction

Northampton Township is required reduce 339,385 lbs/year of sediment which meets the required 10% reduction.

## **G. Select BMPs to Achieve the Minimum Required Reductions in Pollutant Load**

Per the PRP Instructions, identify the minimum required reductions in pollutant loading. Applicants must propose the implementation of BMP(s) or land use changes within the PRP Planning Area that will result in meeting the minimum required reductions in pollutant loading within the Planning Area. These BMP(s) must be implemented within 5 years of DEP's approval of coverage under the PAG-13 General Permit or an individual permit, and may be located on either public or private property. If the applicant is aware of BMPs that will be implemented by others (either in cooperation with the applicant or otherwise) within the Planning Area that will result in net pollutant loading reductions, the applicant may include those BMPs within its PRP.

Opportunities for BMP installation vary across a municipality, and for that reason MS4s with multiple PRP obligations need not propose BMPs to address each impairment listed in the Table during the permit term. The existing loading must be calculated for the entire PRP Planning Area which drains to impaired waters, but pollutant controls to be installed during the subsequent permit term may be located such that they reduce the load in one sub-watershed by less than 10% and by more than 10% in another (as long as the overall amount of lbs. reduced constitutes 10% of the existing loading for the entire PRP Planning Area).

MS4s may propose and take credit for only those BMPs that are not required to meet regulatory requirements or otherwise go above and beyond regulatory requirements. For example, a BMP that was installed to meet Chapter 102 NPDES permit requirements for stormwater associated with construction activities may not be used to meet permit term minimum pollutant reductions unless the MS4 can demonstrate that the BMP exceeded regulatory requirements; if this is done, the MS4 may take credit for only those reductions that will occur as a result of exceeding regulatory requirements.

Per the TMDL Plan Instructions, this section must be divided into two parts if the MS4 determines it will be unable to achieve the WLA(s) in the subsequent permit term: 1) short-term reductions for the permit term, and 2) long-term reductions to meet the WLA(s). If an MS4 determines it will be able to achieve the WLA(s) during the permit term, only the information presented below for short-term reductions is necessary.

For both TMDL Plans and PRPs, historic street sweeping practices should not be considered in calculating credit for future practices. All proposed street sweeping practices may be used for credit if the minimum standard is met for credit (see 3800-PM-BCW0100m). In other words, if sweeping was conducted 1/month and will be increased to 25/year in the future, the MS4 does not need to use the "net reduction" resulting from the increased sweeping; it may take credit for the full amount of reductions from 25/year sweeping.

The names and descriptions of BMPs and land uses reported in the PRP should be in accordance with the Chesapeake Bay Program Model. The names and descriptions are available through CAST (log into [www.casttool.org](http://www.casttool.org), select "Documentation," select "Source Data" and see worksheets named "Land Use Definitions" and "BMP Definitions").

#### Short-Term Reductions for the Permit Term

Specific BMP(s), their location(s) and estimated date(s) of implementation must be identified along with calculations demonstrating that the TMDL objective will be achieved. The analysis should be similar to the examples presented in the PRP Instructions (see Attachments C and D therein). The number, type and location of BMPs may be modified following DEP's approval of the TMDL Plan, and the process for modifying TMDL Plans will be specified in the individual permit.

Northampton Township plans to achieve the nutrient and sediment reductions by designing, constructing, operating and maintaining Best Management Practices (BMPs). Northampton Township needs to determine the minimum nutrient and sediment loadings (lbs/yr) that must be reduced within five (5) years following DEP's approval of coverage. The impairment for the PRP is nutrients in which a minimum 5% reduction is required and the impairment for the TMDL Plan is sediment in which a minimum 10% short-term reduction and a minimum 17% (Little Neshaminy Creek) and 71% (Neshaminy Creek Tributary #1) long-term reductions are required. The following describes the analysis of BMPs proposed by the Township to reduce nutrients and sediment:

**BMP Infiltration Basins:** The Township currently maintains 86 basins. The Township has selected 15 basins within the TMDL areas to focus on for the required reductions. The selected basins currently treat runoff from 581 acres (235 hectare). The Township proposes to retrofit the existing basins to add infiltration practices. In MapShed, the sediment BMP effectiveness value is determined to be 85% and the total phosphorous is determined to be 78%. Per the BMP Effectiveness Values from DEP (3800-PM-BCW0100m 5/2016), infiltration practices have a BMP Efficiency Value of 95% for sediment and 85% for Total Phosphorus. Therefore, the MapShed efficiency rates are acceptable. The BMP Effectiveness Values are in Appendix E-1. The following outlines the procedure in determining the loading reduction from retrofitting the basins:

First, the drainage areas to proposed BMP locations were delineated using LiDAR contours. There are 15 BMPs proposed and the drainage area for the BMP sewershed totals 581 acres (235 hectare). This BMP sewershed was then converted into GIS data for use in the MapShed program. This information was then put into MapShed and the land use information from these BMP drainage areas is utilized in the BMP Data function in GWLF-E. The proposed BMP Data was entered into the Urban Scenario BMP Editor to include the proposed BMP type and area treated, which is included in Appendix E-2.

A MapShed model run was performed using the 15 BMP drainage areas as “urban areas” to ascertain their land use information. Please note that per discussions with Dr. Barry Evans, it was determined that the best way to model the Total Watersheds, TMDL Planning Area, PRP Planning Area and the BMP watersheds in the MapShed program was as urban areas. The proposed model run yielded the basin loading with the BMPs as 31,190,637 lbs of sediment and 9,476 lbs of phosphorus. The output from MapShed GWLF-E Proposed Loads for the Total Watershed is in Appendix E-3.

The existing model run of Total Watersheds yielded the existing sediment loading of the entire watershed as 31,884,150 lbs and existing phosphorus loading of the entire watershed as 9,748 lbs. The difference between these two numbers yields the Total Watershed load reduction resulting from the proposed BMP, which are 693,513 lbs of sediment and 272 lbs of phosphorus.

Recall the existing model run for the PRP Planning Area yielded the phosphorus loading of 3,487 lbs/year, 5% of which must be removed by BMPs (174 lbs/year). Recall the existing model run for the Short Term Reduction TMDL Planning Area yielded the sediment loading of 3,393,851 lbs/year, 10% of which must be removed by BMPs (339,385 lbs/year). The WLA assigned to Little Neshaminy Creek is 111,706 lbs/year and Neshaminy Creek Tributary #1 is 397,057 lbs/year. The proposed total load reduction will be 693,513 lbs of sediment and 272 lbs of phosphorus which meets and/or exceeds the minimum required reduction in pollutant loading and WLA.

#### Long-Term Reductions to Meet the WLA(s)

In this section of the TMDL Plan (where applicable), the MS4 must present, at a minimum, a conceptual plan for how the WLA(s) will be achieved, long-term. This section may be less detailed than the section addressing short-term reductions, but nonetheless should describe a feasible plan toward achieving the WLA(s). Calculations are not required, but are recommended. An estimate on the number of years it will take the MS4 to achieve the WLA(s) should be reported based on the preliminary analysis.

The WLA assigned to Little Neshaminy Creek is 111,706 lbs/year and Neshaminy Creek Tributary #1 is 397,057 lbs/year of sediment. The proposed total load reduction will be 693,513 lbs of sediment which meets and/or exceeds the minimum required reduction in pollutant loading and WLA. Therefore, the long-term reductions will be met in the permit term.

The estimated date of implementation is prior to the end of the permit term. All selected BMPs will be analyzed and evaluated to determine which ones will be considered to meet the minimum reductions. Table 4 is a summary of the proposed BMPs under consideration, including location, type, area treated, and sediment removed:

Table 4: Summary of BMPs

<b>SELECTED BMP</b>	<b>BMP LOCATION</b>	<b>AREA TREATED BY BMP (acre)</b>	<b>ESTIMATED SEDIMENT LOADING REDUCTION (lbs/yr)</b>
Basin 1	Misty Meadow Dr.	43.9	43,149
Basin 2	Upper Holland & Holland	98.8	91,069
Basin 3	Paddock Way	67.9	52,104
Basin 4	Rocking Horse Way	38.5	25,722
Basin 5	Hatboro/Syracuse North	20.3	15,708
Basin 6	Hatboro/Syracuse South	67.1	60,202
Basin 7	Hatboro/Kings	17.4	13,863
Basin 8	Aspen Dr.	39.2	7,606
Basin 9	Hampton Dr.	31.3	26,626
Basin 10	Eisenhard Dr.	47.4	29,053
Basin 11	Hatboro/Orthodox South	34.8	19,436
Basin 12	Clover Rd.	11	9,577
Basin 13	Cherokee Rd.	14.7	14,386
Basin 14	Hatboro/Orthodox North	28	21,839
Basin 15	Silo Hill Dr.	28.1	24,223

The following table summarizes the sediment and phosphorus loads and required sediment and phosphorus reduction for the Neshaminy Creek and Little Neshaminy Creek Planning Areas. Also, included is a summary of the proposed BMPs contemplated to achieve the required sediment and phosphorus load reductions.

Table 5: MS4 PRP Summary

<b>DESCRIPTION</b>	<b>SEDIMENT VALUE</b>	<b>PHOSPHORUS VALUE</b>	<b>UNIT</b>
Existing Pollutant Load	31,884,150	9,748	lb/year
Proposed Pollutant Load with BMPs	31,190,637	9,476	lb/year
Minimum Required Reduction for PRP Planning Area	N/A	174	lb/year
Minimum Required Short-Term Reduction	339,385	N/A	lb/year
Minimum Required Reduction for Little Neshaminy Creek	111,706	N/A	lb/year
Minimum Required Reduction for Neshaminy Tributary #1	397,057	N/A	lb/year
Proposed Pollutant Load Reduction from BMPs	693,513	272	lb/year

## H. Identify Funding Mechanisms

Prior to approving coverage DEP will evaluate the feasibility of implementation of an applicant's TMDL Plan and PRP. Part of this analysis includes a review of the applicant's proposed method(s) by which BMPs will be funded. Applicants must identify all project sponsors and partners, and probable funding sources for each BMP. DEP does not expect that guaranteed sources are identified in the TMDL Plan and PRP, but does expect that applicants propose their preferred funding options with alternatives, in the event the preferred options do not materialize.

Funding sources for the proposed BMP projects outlined in this TMDL Plan and PRP include the following:

- MS4 General Fund
- MS4 Dedicated Stormwater Fund
- Bond
- Developer Cooperation
- MS4 Stormwater Fee
- Grant Funding
- PennVest Low-Interest Loan

Northampton Township will be working in the following five years (i.e., during the permit term) to determine the best funding source for each proposed BMP project, as each project is undertaken.



## I. Identify Responsible Parties for Operation and Maintenance (O&M) of BMPs

Once implemented, the BMPs must be maintained in order to continue producing the expected pollutant reductions. Applicants must identify the following for each selected BMP:

- The parties responsible for ongoing O&M;
- The activities involved with O&M for each BMP; and
- The frequency at which O&M activities will occur.

MS4 permittees will need to identify actual O&M activities in Annual MS4 Status Reports submitted under the Individual Permit. Table 6 lists the required information.

Table 6: Operation and Maintenance of BMPs

<b>NAME OF BMP</b>	<b>LOCATION OF BMP</b>	<b>OWNER/ RESPONSIBLE PARTY</b>	<b>O&amp;M ACTIVITY &amp; FREQUENCY</b>
Basin 1	Misty Meadow Dr.	Northampton Township	Per PA BMP Manual (latest revision)
Basin 2	Upper Holland & Holland	Northampton Township	Per PA BMP Manual (latest revision)
Basin 3	Paddock Way	Hills at Northampton Comm Assn	Per PA BMP Manual (latest revision)
Basin 4	Rocking Horse Way	Hills at Northampton Comm Assn	Per PA BMP Manual (latest revision)
Basin 5	Hatboro/Syracuse North	Northampton Township	Per PA BMP Manual (latest revision)
Basin 6	Hatboro/Syracuse South	Northampton Township	Per PA BMP Manual (latest revision)
Basin 7	Hatboro/Kings	Northampton Township	Per PA BMP Manual (latest revision)
Basin 8	Aspen Dr.	Westwynd HOA	Per PA BMP Manual (latest revision)
Basin 9	Hampton Dr.	Northampton Township	Per PA BMP Manual (latest revision)
Basin 10	Eisenhard Dr.	Northampton Township	Per PA BMP Manual (latest revision)
Basin 11	Hatboro/Orthodox South	Northampton Township	Per PA BMP Manual (latest revision)
Basin 12	Clover Rd.	Northampton Township	Per PA BMP Manual (latest revision)
Basin 13	Cherokee Rd.	Northampton Township	Per PA BMP Manual (latest revision)
Basin 14	Hatboro/Orthodox North	Northampton Township	Per PA BMP Manual (latest revision)
Basin 15	Silo Hill Dr.	Northampton Township	Per PA BMP Manual (latest revision)

## J. General Information for TMDL Plans

**Terms:** The term “nutrients” refers to “Total Phosphorus” (TP) unless specifically stated otherwise in DEP’s latest Integrated Report. The terms “sediment,” “siltation,” and “suspended solids” all refer to inorganic solids and are hereinafter referred to as “sediment.”

The term “storm sewershed” is defined in the PAG-13 General Permit as the land area that drains to the municipal separate storm sewer from within the jurisdiction of the MS4 permittee. This term is used in these instructions as well as the term, “TMDL Planning Area” (or “Planning Area”) which refers to all the storm sewersheds that an MS4 must calculate existing loads and plan load reductions for.

The term “baseline load” is used in these instructions to refer to the pollutant load discharged by an MS4 as reported in a TMDL. A baseline load can be revised by 1) conducting a new modeling effort that utilizes the land use/land cover information from the original TMDL and 2) by considering the reductions achieved through structural BMPs installed prior to approval of a TMDL that were not considered during development of the TMDL.

The term “existing load” refers to the pollutant load that the MS4 estimates is draining to impaired waters from the Planning Area at the time of TMDL Plan submission. The existing load will be the same as the baseline load (regardless of whether or not the baseline load is revised) unless the MS4 accounts for reductions from structural BMPs installed between the date of TMDL approval and TMDL Plan submission.

**Pollutant(s) of Concern:** The pollutant(s) of concern for TMDL Plans will be based on the following:

- If a WLA has been established in a TMDL for sediment, the MS4 is expected to develop the TMDL Plan based on the reduction of sediment.
- If WLAs have been established in a TMDL for sediment and nutrients, the MS4 is expected to develop the TMDL Plan based on the reduction of sediment and TP, unless the MS4 chooses to utilize a presumptive approach for TP. DEP will allow MS4s to calculate loads and pollutant reductions based on sediment, under the assumption that the achievement of TMDL Plan objectives for sediment will also achieve the objectives for TP. MS4s must identify use of the presumptive approach in its TMDL Plan if chosen.
- If a WLA has been established in a TMDL for nutrients alone (or surrogates for nutrients such as “excessive algal growth” and “organic enrichment/low D.O.”), the MS4 is expected to develop the TMDL Plan based on the reduction of TP, unless the presumptive approach is chosen, as described above.

**TMDL Plan Objectives:** There are two objectives for a TMDL Plan:

1. Long-Term Reduction – plan for the reduction of pollutant load(s) to achieve the WLA(s) in the TMDL.

The TMDL Plan must describe a general plan as to how WLA(s) will ultimately be achieved.

2. Short-Term Reduction – plan for the short-term reduction of pollutant load(s) that will be achieved within the subsequent NPDES permit term (i.e., the 5-year permit term resulting from DEP’s issuance of a permit in response to the receipt of the MS4’s next submission of an individual permit application).

MS4s must achieve at least one of the following objectives within the 5-year permit term: 1) the WLA(s) in the TMDL, or 2) if the WLA(s) cannot be achieved, a load reduction of at least 10% for sediment and/or 5% for TP, compared to the existing load for these pollutants at the time of TMDL Plan submission. A load reduction of at least 10% for sediment may be used as the objective in lieu of a 5% reduction in TP under the presumptive approach.

**NOTE** – The presumptive approach cannot be used to assume that meeting TMDL Plan objectives for nutrients will result in meeting objectives for sediment.

**NOTE** – The minimum required reduction to be to be accomplished during the permit term is based on the existing pollutant load at the time of TMDL Plan submission, not at the time of the original TMDL approval. If an MS4 can demonstrate to DEP’s satisfaction in its TMDL Plan that it has already achieved the WLA(s) of the applicable TMDL(s), the MS4 will not be required to implement further pollutant load reductions during the subsequent permit term.

**Existing Pollutant Load(s):** The estimation or determination of existing loads for TMDL Plans is different than the estimation of existing loads for PRPs. MS4s have two options in establishing the existing pollutant load(s) for pollutant(s) of concern for TMDL Plans:

1. MS4s may report the existing load(s) specified in the TMDL (i.e., the TMDL “baseline load”). The baseline load(s) may be represented in the TMDL as either:
  - Load(s) that are specific to the MS4 (i.e., the load is listed in a table within the TMDL with the name of the MS4 identified); or
  - Load(s) that are not specific to the MS4 (i.e., are represented in the TMDL as bulk/aggregate load(s) for all MS4s in the TMDL watershed), in which the MS4 will need to distribute its individual load(s) UNLESS a collaborative TMDL Plan is developed with all other MS4s identified in the TMDL.

For TMDLs with bulk/aggregate WLA(s) for a group of MS4s, the distribution of baseline load(s) and WLA(s) must be conducted in a way that ensures the pollutant reduction requirements in the TMDL are met.

2. MS4s may choose to calculate existing load(s) for a TMDL Plan through a new modeling effort using the MapShed model developed by the Pennsylvania State University ([www.mapshed.psu.edu](http://www.mapshed.psu.edu)) or a comparable, or more robust, continuous simulation model. Any new modeling effort must focus on the TMDL Planning Area and account for overland flow as well as downstream channel and bank erosion; therefore, modeling must be done at a scale that allows for the quantification of both impacts. **New modeling must utilize the same land use/land cover information that was used to develop the TMDL or other quality assured land use/land cover data from the time of TMDL approval.** DEP recommends that prior to and/or during any new modeling effort that MS4s contact DEP’s Bureau of Clean Water, Water Quality Division, TMDL Section at (717) 787-5017 for guidance.

If a combined PRP and TMDL Plan is developed (see Section I.F), in which the PRP and TMDL Planning Areas are combined into one Planning Area, the existing loads for the Planning Area may only be derived using a new modeling effort (Option 2 above).

**NOTE** – If an MS4 is aware of the date(s) of data collection in support of TMDL development, land use/land cover information from this date rather than the TMDL approval date may be used.

**NOTE** – MapShed, or any other watershed model where channel erosion is explicitly modeled, should be run on a minimum of ~10 mi<sup>2</sup> area to properly account for downstream impacts and include impaired waters identified in the MS4 Requirements Table. Aggregation of these waters up to approximately the 12-digit HUC scale for modeling purposes is acceptable. Modeling may not be done at the individual storm sewer watershed or municipal scale where the extent of downstream impact is not included in load calculation.

**NOTE** – CAST/BayFAST may be used for remodeling efforts, as they apply loading information derived from the Chesapeake Bay Watershed Model; however, watershed/site-specific land use/land cover information must be substituted for defaults in load calculations at all scales (e.g., Planning Area and BMP-treated area), and any requirements in these instructions pertaining to “simplified method” loading calculations also apply to TMDL Plans/PRPs developed using CAST/BayFAST if delivered loads/loading rates are used.

**NOTE** – Baseline loads in older TMDLs typically did not account for load reductions from urban stormwater BMPs existing at the time of TMDL preparation. In such cases, MS4s may consider structural BMPs installed prior to the TMDL approval date in estimating existing loads. MS4s may also consider the load reductions achieved through structural BMPs installed after the TMDL was approved. Prior to the TMDL approval date, load reductions associated with structural BMPs installed under Chapter 102 NPDES permits may be credited in full. After the TMDL approval date, load reductions associated with structural BMPs installed under Chapter 102 NPDES permits may be credited only to the extent that the BMPs produce a net load reduction (see example below). Existing BMPs that are used to reduce the existing load(s) must be documented as functional (see Section II.D).

**NOTE** – MS4s that calculate existing load(s) through a new modeling effort will need to plan for the same percent reduction in pollutant loads as prescribed by the TMDL.

**BMP Effectiveness:** All MS4s must use the BMP effectiveness values contained within DEP’s BMP Effectiveness Values document (3800-PM-BCW0100m) or Chesapeake Bay Program expert panel reports for BMPs listed in those resources when determining pollutant load reductions in TMDL Plans, except as otherwise approved by DEP. For example, PRPs/TMDL Plans may also apply thoroughly vetted mechanistic models with self-contained BMP modules (e.g. Storm Water Management Model (SWMM), WinSLAMM) to demonstrate achievement of reduction targets. Application of these data intensive models could allow for a streamlining of the planning and design phases of the stormwater control process that may provide future cost savings as municipalities move toward implementation of the plan. Such resources must be documented in the TMDL Plan, and must reflect both overland flow and in-stream erosion components.

**NOTE** - Calculation of sediment load reductions for PRP/TMDL Plan purposes using the *Expert Panel to Define Removal Rates for Individual Stream Restoration Projects* report should be done as follows:

- Where existing sediment loads are calculated using the Chesapeake Bay loading rates (i.e., the “simplified method” referred to in DEP’s PRP Instructions, 3800-PM-BCW0100k), the Sediment Delivery Ratio (SDR) of 0.181 must be applied and the effectiveness value contained in Table 3 of the Expert Panel Report applies (44.88 lb/ft/yr TSS). The effectiveness values in document 3800-PM-BCW0100m implicitly apply the SDR; thus, sediment load reductions calculated from stream restoration projects must be consistent.

Alternately, sediment reduction from streambank restoration projects when existing loads are calculated using the simplified method may be estimated using the Protocols outlined in Section 5 of the report and must then apply the 0.181 SDR along with the 50% efficiency uncertainty factor.

- Where existing sediment loads were calculated using modeling at a local watershed scale, the default rate to be used is 115 lb/ft/yr. This default rate comes from a convergence of MapShed modeled streambank erosion loads from a group of urbanized watersheds, the 248 lb/ft/yr default edge-of-field (EOF) rate in the Expert Panel Report with the 50% efficiency uncertainty factor specified for the Protocols applied, and field data that was collected following the BANCS methodology where projects have been implemented and load reductions calculated using the Protocols.
- Alternately, sediment reduction from streambank restoration projects when existing loads are calculated using modeling at a local scale may be estimated using the Protocols outlined in Section 5 of the report and must then apply the 50% efficiency uncertainty factor.

**NOTE** – Use of default effectiveness values (44.88 lb/ft/yr and 115 lb/ft/yr) will be accepted for the subsequent permit term. It is recommended that the data required to complete load calculations using the Protocols be collected during the design phase for use in subsequent load reduction calculations.

**NOTE** - Desktop MapShed users may not use the streambank restoration or street sweeping components included in the MapShed BMP editor for pollutant reduction calculations. Pollutant reductions associated with streambank restoration projects must use the methods described above; whereas, reductions from street sweeping must be calculated in accordance with the *Recommendations of the Expert Panel to Define Removal Rates for Street and Storm Drain Cleaning Practices* or the BMP Effectiveness Values document.

**NOTE** – If BMP effectiveness values are updated in DEP’s BMP Effectiveness Values document or in Chesapeake Bay Program expert panel reports between the time the PRP is approved and the time the final report is developed to document compliance with the permit, those updated effectiveness values may optionally be used.

**Combining Planning Obligations:** MS4s with multiple TMDL Plan development obligations may develop one TMDL Plan for submission to DEP, if desired. If this is done, MS4s may elect to address each TMDL water separately or in combination. If done in combination, unless specifically restricted in the TMDL, the MS4 has flexibility when locating BMPs between the TMDL Planning Areas. If the MS4 elects to meet the percent reduction requirements (10% sediment or 5% TP) in lieu of meeting the WLA(s) within the first permit term, it may elect to reduce pollutants by a greater percentage in one TMDL Planning Area over another, as long as the overall reduction for the planning effort achieves the percent reduction requirements.

MS4s may also combine TMDL Plans with PRPs, and the same flexibility is provided as discussed above. In addition, where TMDL Plans demonstrate: 1) WLA(s) have been achieved, or 2) WLA(s) will be achieved during the permit term, or 3) sediment and/or TP will be reduced by 10% and/or 5% during the permit term within the TMDL Planning Area, this satisfies all PRP requirements for any impaired waters within the watershed of the TMDL waters for the subsequent NPDES permit term. As stated in Section I.D, where TMDL and PRP Planning Areas are combined, existing loads must be determined based on a new modeling effort.

**Offsets.** An MS4 may propose stormwater pollutant reduction BMPs outside of the TMDL and/or PRP Planning Area for possible approval as offsets toward meeting TMDL and/or PRP load reduction requirements. Unless approved otherwise by DEP, such projects must be located within the jurisdiction of the developer of the TMDL Plan and/or PRP, and treat or manage stormwater that would drain to the impaired waters of interest under a TMDL Plan or PRP. In all cases where offsets are proposed, an individual permit is required.

Examples of projects where offsets may be approved by DEP include but are not limited to a reduction of impervious areas outside of the Planning Area and BMPs at agricultural operations that are outside of the planning area but within the drainage area of the impaired waters of interest. DEP may grant offsets for the amount (lbs) of pollutants expected to be reduced after baseline and regulatory requirements are met. For the purpose of TMDL Plans and PRPs, baseline requirements are, in general, load reduction requirements established in TMDLs for sectors that do not require NPDES permits. For example, if a TMDL specifies that a sediment load reduction of 80% is necessary from the unregulated or non-urban stormwater sector in order to meet water quality standards, DEP may approve offsets for a reduction in impervious area outside of the planning area for the amount (lbs) of sediment removed after the 80% reduction requirement is met. Where published load reduction requirements are inapplicable or unavailable, DEP's Bureau of Clean Water will establish the baseline. MS4s that are seeking approval for offsets are encouraged to contact DEP during the development phase of plans in order to understand the amount of offsets that may be approved in an individual permit for a proposed project.

An operation and maintenance (O&M) plan as well as assurances for ongoing O&M must be submitted as an attachment to any TMDL Plan and/or PRP proposing the implementation of BMPs for offsets. Permittees must report actual O&M activities on Annual MS4 Status Reports to continue receiving approval for the use of offsets.

**BMP Selection:** MS4s may select BMPs from the Pennsylvania Stormwater Best Management Practices Manual (363-0300-002), BMPs recognized by the EPA Chesapeake Bay Program, or other BMPs where the pollutant reduction efficiency is known or may be determined. Land use changes are not BMPs but may be used to demonstrate pollutant load reductions. For land use changes and BMPs implemented within a TMDL Planning Area as part of an NPDES permit requirement (e.g., post-construction stormwater management BMPs for Chapter 102 NPDES permits), pollutant load reduction credit may be claimed based on an analysis of pre- and post-construction or land use conditions, where the credit is a demonstrated net decrease in pollutant load. BMP effectiveness values must be consistent with sources identified in section I.E of these instructions.

**NOTE** – Street sweeping may be proposed as a BMP for pollutant loading reductions if 1) street sweeping is not the only method identified for reducing pollutant loading, and 2) the BMP effectiveness values contained in 3800-PM-BCW0100m or Chesapeake Bay Program expert panel reports are utilized.

**Submission of TMDL Plan:** Attach one copy of the TMDL Plan with the individual permit application that is submitted to the regional office of DEP responsible for reviewing the application. In addition, one copy of the TMDL Plan (not the application) must be submitted to DEP's Bureau of Clean Water (BCW). BCW prefers electronic copies of TMDL Plans, if possible. Email the electronic version of the TMDL Plan, including map(s) (if feasible), to [RA-EPPAMS4@pa.gov](mailto:RA-EPPAMS4@pa.gov). If the MS4 determines that submission of an electronic copy is not possible, submit a hard copy to: PA Department of Environmental Protection, Bureau of Clean Water, 400 Market Street, PO Box 8774, Harrisburg, PA 17105-8774.

**TMDL Plan Implementation and Final Report:** Under the Individual Permit, the permittee must achieve the required pollutant load reductions within 5 years following DEP's issuance of the permit, and must submit a report demonstrating compliance with the minimum pollutant load reductions as an attachment to the first Annual MS4 Status Report that is due following expiration of the permit.

For example, if DEP issues a permit to a permittee on June 1, 2018, the required pollutant load reductions must be implemented by June 1, 2023 and the final report documenting the BMPs that were implemented (with appropriate calculations) must be attached to the annual report that is due September 30, 2023.

## K. General Information for PRPs

**Terms:** The term “nutrients” refers to “Total Nitrogen” (TN) and “Total Phosphorus” (TP) unless specifically stated otherwise in DEP’s latest Integrated Report. The terms “sediment,” “siltation,” and “suspended solids” all refer to inorganic solids and are hereinafter referred to as “sediment.” The term, “storm sewershed” is defined in the PAG-13 General Permit as the land area that drains to the municipal separate storm sewer from within the jurisdiction of the MS4 permittee. This term is used in these instructions as well as the term, “PRP Planning Area” (or “Planning Area”), which refers to all of the storm sewersheds that an MS4 must calculate existing loads and plan load reductions for.

**Pollutants of Concern and Required Reductions:** For all PRPs, MS4s shall calculate existing loading of the pollutant(s) of concern, in lbs/year; calculate the minimum reduction in loading, in lbs/year; select BMP(s) to reduce loading; and demonstrate that the selected BMP(s) will achieve the minimum reductions.

For PRPs developed for impaired waters (Appendix E), the pollutant(s) are based on the impairment listing, as provided in the MS4 Requirements Table. If the impairment is based on siltation only, a minimum 10% sediment reduction is required. If the impairment is based on nutrients only or other surrogates for nutrients (e.g., “Excessive Algal Growth” and “Organic Enrichment/Low D.O.”), a minimum 5% TP reduction is required. If the impairment is due to both siltation and nutrients, both sediment (10% reduction) and TP (5% reduction) must be addressed. PRPs may use a presumptive approach in which it is assumed that a 10% sediment reduction will also accomplish a 5% TP reduction. However, MS4s may not presume that a reduction in nutrients will accomplish a commensurate reduction in sediment.

**Existing Pollutant Loading:** Existing loading must be calculated and reported for the portion of the Planning Area which drains to impaired waters as of the date of the development of the PRP. MS4s may not claim credit for street sweeping and other non-structural BMPs implemented in the past. If structural BMPs were implemented prior to development of the PRP and continue to be operated and maintained, the MS4 may claim pollutant reduction credit in the form of reduced existing loading.

Each impairment identified on the MS4 Requirements Table (“Table”) must be addressed in a PRP document. The Table listings for each MS4 are different because they reflect local conditions, which is why an MS4 must carefully interpret the information on the Table.

**NOTE –** An MS4 may not reduce its obligations for achieving permit term pollutant load reductions through previously installed BMPs. An MS4 may use all BMPs installed prior to the date of the load calculation to reduce its estimate of existing pollutant loading. For example, if a rain garden was installed ten years ago and is expected to remove 100 lbs of sediment annually, and the overall annual loading of sediment in the storm sewershed is estimated to be 1,000 lbs without specifically addressing the rain garden, an MS4 may not claim that the rain garden satisfies its obligations to reduce sediment loading by 10%. The MS4 may, however, use the rain garden to demonstrate that the existing load is 900 lbs instead of 1,000 lbs, and that 90 lbs rather than 100 lbs needs to be reduced during the term of permit coverage.

**NOTE -** MapShed, or any other watershed model where channel erosion is explicitly modeled, should be run on a minimum of ~10 mi<sup>2</sup> area to properly account for downstream channel impacts and include impaired waters identified in the MS4 Requirements Table. Aggregation of these waters up to approximately the 12-digit HUC scale for modeling purposes is acceptable. Modeling may not be done at the individual storm sewershed or municipal scale where the extent of downstream impact is not included in load calculation.

**BMP Effectiveness:** All MS4s must use the BMP effectiveness values contained within DEP's BMP Effectiveness Values document (3800-PM-BCW0100m) or Chesapeake Bay Program expert panel reports for BMPs listed in those resources when determining pollutant load reductions in PRPs, except as otherwise approved by DEP. An example of other approaches that may be approved by DEP include the use of thoroughly vetted mechanistic models with self-contained BMP modules (e.g., Storm Water Management Model (SWMM), WinSLAMM) to demonstrate achievement of reduction targets. Application of these data intensive models could allow for a streamlining of the planning and design phases of BMPs that may provide future cost savings as municipalities move toward implementation of the plan. Such resources must be documented in the PRP, and must reflect both overland flow and in-stream erosion components.

**NOTE** - Calculation of sediment load reductions for PRP purposes using the *Expert Panel to Define Removal Rates for Individual Stream Restoration Projects* report should be done as follows:

- Where existing sediment loads are calculated using the Chesapeake Bay loading rates (i.e., the "simplified method" illustrated in Attachments C and D), the Sediment Delivery Ratio (SDR) of 0.181 must be applied and the effectiveness value contained in Table 3 of the Expert Panel Report applies (44.88 lb/ft/yr TSS). The effectiveness values in document 3800-PM-BCW0100m implicitly apply the SDR; thus, sediment load reductions calculated from stream restoration projects must be consistent.

Alternately, sediment reduction from streambank restoration projects when existing loads are calculated using the simplified method may be estimated using the Protocols outlined in Section 5 of the report and must then apply the 0.181 SDR along with the 50% efficiency uncertainty factor.

- Where existing sediment loads were calculated using modeling at a local watershed scale, the default rate to be used is 115 lb/ft/yr. This default rate comes from a convergence of MapShed modeled streambank erosion loads from a group of urbanized watersheds, the 248 lb/ft default edge-of-field (EOF) rate in the Expert Panel Report with the 50% efficiency uncertainty factor specified for the Protocols applied, and field data were collected following the BANCS methodology where projects have been implemented and load reductions calculated using the Protocols.

Alternately, sediment reduction from streambank restoration projects when existing loads are calculated using modeling at a local scale may be estimated using the Protocols outlined in Section 5 of the report and must then apply the 50% efficiency uncertainty factor.

**NOTE** – Use of default effectiveness values (44.88 lb/ft/yr and 115 lb/ft/yr) will be accepted for the subsequent permit term. It is recommended that the data required to complete load calculations using the Protocols be collected during the design phase for use in subsequent load reduction calculations.

**NOTE** – Desktop MapShed users may not use the streambank restoration or street sweeping components included in the MapShed BMP editor for pollutant reduction calculations. Pollutant reductions associated with streambank restoration projects must use the methods described above; whereas, reductions from street sweeping must be calculated in accordance with the *Recommendations of the Expert Panel to Define Removal Rates for Street and Storm Drain Cleaning Practices* or the BMP Effectiveness Values Table.

**NOTE** – If BMP effectiveness values are updated in DEP's BMP Effectiveness Values document or in Chesapeake Bay Program expert panel reports between the time the PRP is approved and the time the final report is developed to document compliance with the permit, those updated effectiveness values may optionally be used.

**Combining PRPs:** If an MS4 discharges stormwater to local surface waters that drain to the Chesapeake Bay watershed (Appendix D) that are also impaired for nutrients and/or sediment (Appendix E), separate or combined PRPs may be submitted, at the MS4's discretion.



For MS4s within the Chesapeake Bay watershed who are submitting combined PRPs to address both Appendices D and E, it is recommended that permittees focus on the impaired local surface waters first, and then determine if the BMPs proposed in the Planning Area(s) for locally impaired waters will be sufficient to meet the overall pollutant reduction requirements for the Planning Area for the Chesapeake Bay. In general, PRPs that include both local impaired waters (Appendix E) and Chesapeake Bay watershed (Appendix D) must address the local impaired waters (i.e., credit cannot generally be claimed under Appendix E for BMPs implemented outside of the Planning Area of the local impaired waters).

**BMP Selection:** MS4s may propose and take credit for only those BMPs that are not required to meet regulatory requirements or otherwise go above and beyond regulatory requirements. For example, a BMP that was installed to meet Chapter 102 NPDES permit requirements for stormwater associated with construction activities may not be used to meet permit term minimum pollutant reductions unless the MS4 can demonstrate that the BMP exceeded regulatory requirements; if this is done, the MS4 may take credit for only those reductions that will occur as a result of exceeding regulatory requirements.

**NOTE** – Street sweeping may be proposed as a BMP for pollutant loading reductions if 1) street sweeping is not the only method identified for reducing pollutant loading, and 2) the BMP effectiveness values contained in 3800-PM-BCW0100m or Chesapeake Bay Program expert panel reports are utilized.

**Offsets:** DEP may authorize the use of offsets toward meeting PRP load reduction requirements, if an individual permit application is submitted. Please refer to DEP's TMDL Plan Instructions (3800-PMBCW0200d) for additional information.

**Submission of PRP:** Attach one copy of the PRP with the NOI or individual permit application that is submitted to the regional office of DEP responsible for reviewing the NOI or application. In addition, one copy of the PRP (not the NOI or application) must be submitted to DEP's Bureau of Clean Water (BCW). BCW prefers electronic copies of PRPs, if possible. Email the electronic version of the PRP, including map(s) (if feasible), to [RA-EPPAMS4@pa.gov](mailto:RA-EPPAMS4@pa.gov). If the MS4 determines that submission of an electronic copy is not possible, submit a hard copy to: PA Department of Environmental Protection, Bureau of Clean Water, 400 Market Street, PO Box 8774, Harrisburg, PA 17105-8774.

**PRP Implementation and Final Report:** Under the PAG-13 General Permit, the permittee must achieve the required pollutant load reductions within 5 years following DEP's approval of coverage under the General Permit, and must submit a report demonstrating compliance with the minimum pollutant load reductions as an attachment to the first Annual MS4 Status Report that is due following completion of the 5th year of General Permit coverage.

For example, if DEP issues written approval of coverage to a permittee on June 1, 2018, the required pollutant load reductions must be implemented by June 1, 2023 and the final report documenting the BMPs that were implemented (with appropriate calculations) must be attached to the annual report that is due September 30, 2023.