CHESAPEAKE BAY POLLUTANT REDUCTION PLAN

Dallas Area Municipal Authority

Prepared by:
T&M Associates
September 14, 2017

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Foreword

This Chesapeake Bay Pollutant Reduction Plan (CBPRP) serves to fulfill the requirements of Appendix D to the PAG-13 for the municipalities of Dallas Borough and Kingston Township, and of Appendix D to the PAI-13 for Dallas Township. This joint plan will be administered by the Dallas Area Municipal Authority (DAMA.)

This plan has been completed using data supplied by the member municipalities, Luzerne County GIS Department, Luzerne County Conservation District, obtained during field visits, and compiled from publicly available data.

The goal of this plan is to provide guidance towards the construction and implementation of stormwater quality Best Management Practices (BMPs) to provide pollutant loading reductions. This document represents a prediction of one route to accomplish its goal. It should be noted that this is a fluid document that will be evaluated and updated yearly as specific proposed locations and types of BMPs are analyzed and designed, as new opportunities for partnership are realized, and as revised regulations and BMPs are developed and implemented.

Section A – Public Participation

LEGAL NOTICES

PUBLIC NOTICE

Dallas Borough, Dallas Township & Kingston Township Joint (Multi-Municipal) MS4 Chesapeake Bay Pollution Reduction Plan

A draft of a Chesapeake Bay Pollution Reduction Plan (CB-PRP) has been written per the requirements of the Commonwealth of Pennsylvania National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) for planning use by Dallas Borough, Dallas Township & Kingston Township, communities which are tributary to the Chesapeake Bay (Susquehanna River). The CB-PRP estimates the pollutant loads generated by existing land cover within the Township and provides a 5-year plan to reduce these loads as the permit requires. The CB-PRP includes detailed mapping of the planning area including land cover, existing Best Management Practices, and proposed Best Management Practices. The calculations for existing pollutant load and plan for future Best Management Practices to achieve the minimum required pollution reductions as well as, identify funding mechanisms and plan long-term operation and maintenance procedures are included.

The above-mentioned municipalities are jointly requesting public comment on the draft CB-PRP prior to submittal of the Notice of Intent to the Pennsylvania Department of Environmental Protection (PADEP) by the September 16, 2017 deadline. A paper copy of the Draft PRP plan will be available for review August 3, 2017 at the following locations:

- Dallas Borough Administration Building, 25 Main St, Dallas, PA 18612
- Dallas Township Office, 2919 SR-309 Hwy, Dallas, PA 18612
- Kingston Township Administration Building, 180 E. Center Street, Shavertown, PA 18708.

The written comment period will remain open for 30 days, until September 2, 2017. The Municipalities will also accept comments at a special presentation and review session to be held at the Kingston Township Administration Building, Supervisors Meeting Room, Rear Level, 180 E. Center Street, Shavertown, PA 18708, on September 5, 2017 at 5 PM. All timely comments received during the public comment period and at the special session will be considered. A copy of all written comments received and a record of consideration will be included with the final CB-PRP to be submitted to PADEP.

Please contact Gregory S. Duncan, P.E., Engineering Consultant, at 610.234.4243 or gduncan@tandmassociates.com with any questions.

Proof of Publication

THE TIMES LEADER

(Under Act of No. 587, approved May 16, 1929)

STATE OF PENNSYLVANIA,
COUNTY OF LUZERNE SS:

Linda Byrnes, being duly sworn according to law, deposes and says that he/she is the bookkeeper of The Times Leader, a daily newspaper published in the City of Wilkes-Barre, County and State aforesaid, by Civitas Media, LLC, that said The Times Leader was established in 1939, and that the printed notice or publication hereto attached is exactly as printed in the regular edition of The Times Leader on the following date(s):

August 1, 2017

PUBLIC NOTICE

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ividuals requiring special assistance to attend the public etings are asked to contact the Dallas Borough administrat-office at 570-675-1389 prior to the meeting.

By order of

and says that The Time Leader is a daily newspaper d that neither the affiant nor The Times Leader is matter of the aforesaid notice of advertisement, in the foregoing statement as to time, place and are true.

Linda Byrnes

Sworn to before me this 1 day
of August, 2017

Renee Sager

COMMONWEALTH OF PE...
NOTARIAL SEAL
Renee Sager, Notary Public
City of Wilkes-Barre
Luzerne County
My Commission Expires 11-14-20...

The following comments and questions were collected during a public comment period that lasted from August 3, 2017 to September 5, 2017, per the conditions of the permit a response to each of the questions/comments are provided herein.

QUESTION: In your report Section A, Public Participation, this section will be completed after the public comment period will be included in the version of the CBPRP submitted to (PADEP) for the permit application. Is that the next piece we're to expect?

ANSWER: Yes. Public comment will become part of the records. In order words, what we submit to DEP will effectively be the finalized report with any edits that came about from your comments as well as a listing of all the comments and answers to those comments or questions.

QUESTION: The abatement of that silt, (with the) sediment, would that also take care of the nutrient loads that we need to reduce?

ANSWER: Yes. The way the compliance methodology is defined, you can meet the (10%) sediment reductions, then implicitly the phosphorus reduction will be meet.

QUESTION: I know there's a program in the state to educate farm owners with the proper use of pesticides and so forth. Did you take that into consideration when you were talking about sediments and the nutrients that our people that are involved in farming has had the opportunity to be educated in that regard?

ANSWER: With regards to the MS4 planning, the formulation of it, the state requires us to take a look at the urbanized area of the municipality, so for the most part, you might notice the shape I'm holding up here (shows urbanized region of Dallas Twp, Dallas Boro and Kingston Twp). Though those are certainly good practices, rural (non-urban) areas are exclude from this analysis.

QUESTION: What percentage of our communities are impervious surfaces off the top of your head?

ANSWER: Approximately 15%

QUESTION: How many feet of streambanks are you talking about restoration of?

ANSWER: 4,770 LF

QUESTION: How many years much the work be conducted over?

ANSWER: The permit period is 5 years. The projects must be completed in 5 years.

QUESTION: Who has to do it and who pays for it?

ANSWER: The permittees themselves are responsible for meeting the reductions and implicitly that would mean paying for them in a five-year period of time once the permit period starts.

QUESTION: What is the expected cost?

ANSWER: It is early in the planning process and there is some potential variability proposed in the plan. However, four to seven million in improvements may be likely.

QUESTION: How is it identified as to the cost per municipality?

ANSWER: There's a varied range of strategies that can be done TO figure out a way to break down which community may own what. An example might be to assess how much wasteload is generated for each community and then determine a weighted average for cost sharing.

QUESTION: I know we got to come up with a schedule for this. Would you use the same approach that you used to determine the projects?

ANSWER: We would suggest focusing on lands that are municipally controlled, those would be the areas that we would hone in on first, but as a parallel path, we would suggest reaching out to HOAs and private property owners to let the other ones go forward.

QUESTION: Is this map divided into the municipalities, Kingston Township, Dallas Township and Dallas Borough that you have displayed or is it not?

ANSWER: The map is cumulative of Urban regions of all three municipalities.

QUESTION: I have one question in regard to Your calculation for the pounds of sediment, you gave us a credit for structures that are already built?

ANSWER: In a way, the initial calculation was what the landform would produce without any sort of stormwater controls. The next

pass would be to calculate how much reduction you would expect from the basins that you saw on the graphic, and then that would be the initial number you would take ten percent of, as being your goal for wasteload reduction.

QUESTION: Basically, if you would, I think a lot of people don't really understand it, what structurally is going to be necessary within the, what, five-year plan did you say?

ANSWER: Much of the cost of "structural" improvements would be as a result of detention basin retrofits and streambank restoration also bioretention and other infiltration practices. …Yes, 5 years.

QUESTION: What about the private basins, legal costs of -- right of way to get into those basins to do the work that you're asking us to do or asking DAMA to do?

ANSWER: The plan provides a "varied path" to compliance. It is not possible at this point determine potential ROW acquisition cost to the municipality or DAMA.

QUESTION: So what's the percentage of privately held basins to publicly held basins on what you've done here?

ANSWER: Slightly less than 98%.

QUESTION: So then has anybody calculated the long-term cost to the municipalities after their – or is that going to be long-term cost to DAMA after you've taken over the private basins and made them public?

ANSWER: As stated before, we're not that far along yet to truly know the future O&M costs. The BMPs would all need to be selected to know that.

QUESTION: They still have developers coming in. Are there things that we can further put on the developers to have them do things now for us in the next five years going forward that can count toward this number that we can require developers to do on our behalf?

ANSWER: It would be suggested to look through your SALDO and Zoning to potentially look to develop language that may help capture improvements that may be beneficial toward these goals (for the municipalities) during the subdivision process.

QUESTION: Is there any type of credit for tree planting or would it be just too minimal to really consider?

ANSWER: Tree planting is a vastly underrated BMP, which can provide not only a benefit for sediment and nutrient reduction, but also can help physically "shade" watercourses. Benefits increase significantly in the calculations if the change in land use goes from Agricultural (or impervious) to woods.

QUESTION: What is a private basin?

ANSWER: A private basin is a stormwater facility that is owned either by a private resident, business or homeowners' association.

QUESTION: (Regarding homeowners' association allowing retrofits of their basins) What if we can't make them?

ANSWER: I think that's an eventuality that you must expect. I think that's part of also the reason why we're providing more projects than are necessary to hit your mark from the standpoint that we probably very much will run into situations where people are not interested in taking part in the program, so, consequently, we provide a few other paths that can be taken if some HOAs do not want to participate. One incentive might be to offer to take over the O&M of the stormwater facilities after being allowed to retrofit the facility.

QUESTION: We have the ability to go off the list; is that correct?

ANSWER: This is what I refer to as adaptive management. What you're required to do by the state right now is to lay out in black and white what you're going to do to meet the pollution reduction goal. If a different path is taken en route to meeting this goal, it would just need to be noted or reported in subsequent years.

QUESTION: Is there a comprehensive list of activities the municipalities can do to get reduction credit?

ANSWER: Yes. Please reference (search) online: PADEP Stormwater BMP Manual, BMP Effectiveness Values (3800-PM-BCW0100m.)

QUESTION: Did you say we can't take credit for anything that's on the PennDOT right of way?

ANSWER: No. PennDOT areas were excluded from this evaluation as this is their own lands, and they have their own permitting to comply with. Though you may choose to communicate with them to discuss potential future cooperative action.

QUESTION: Is there any rule of thumb used in any other parts to the state to assess the financial responsibility of places like strip malls and parking lots?

ANSWER: Yes. A community or authority may organize a stormwater fee (General discussion of stormwater fees ensues)

QUESTION: Can assuming rights to a wetland on private property be counted towards a municipality's sediment reduction.

ANSWER: No. An existing wetland cannot be counted toward your reduction only if that wetland is expanded or a new wetland is "created" can it be counted for wasteload reduction.

COMMENT: The Planning Area must include any areas outside the 2010 Census Urbanized Area that drain into the MS4.

General NPDES Permit PAG-13, No. 3800-PM-BCWOlOOd (5/2016), defines the term "storm sewershed" as "the land area that drains to an individual MS4 outfall from within the jurisdiction of the MS4 permittee," and the term "combined storm sewershed" as "the drainage areas of all MS4 outfalls that discharge to a specific surface water or to waters within the Chesapeake Bay watershed." (PAG-13, p. 9) The "combined storm sewershed" is synonymous with "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." (Pennsylvania Department of Environmental Protection (PADEP), " Pollutant Reduction Plan (PRP) Instructions," No. 3800-PM-BCWOlOOk Rev. 3/2017 (PRP Instructions), p. 1).

In defining the Planning Area, PADEP's "PRP Development Process Summary" (June 9, 2017) directs the preparer of a PRP to "[i]dentify the Urbanized Area in the municipality that drains to [the relevant] impaired surface waters (as well as any area upgrade or upslope of the UA which drains into the MS4 system, if any)." (PRP Development Process Summary, p. l, No. 3) (emphasis added). The hypothetical example in PADEP's "Statewide MS4 Land Cover Estimates" applies this "UA plus area draining into the MS4" approach:1 "Abbottstown Boro determines that its planning area for a Chesapeake Bay PRP is 500 acres. This includes all of the UA (321 acres) as well as I 79 acres that drain into the MS4 from outside the UA." (Statewide MS4 Land Cover Estimates, p. 1).2 One real-world example applying this same approach is the draft "York County Regional Chesapeake Bay Pollutant Reduction Plan (2018-2023)," in which "the regional CBPRP Planning Area consists of the 2010 Census Urbanized Area for York County and the area that topographically drains into it as delineated using two (2) foot contours. It covers approximately 136,000 acres1-i" (Id., p. 3) (emphasis added).

Thus, the starting point in delineating the CBPRP Planning Area is the Census-based Urbanized Area (UA) plus any additional area outside the UA that drains into the MS4. The Draft CBPRP, however, does not appear to look beyond the boundaries of the UA for additional areas that drain into the MS4. It states that "[t]he planning area assessed in the CBPRP consists of the urbanized areas in Dallas Borough, Dallas Township, and Kingston Township. The areas parsed from the planning area include the land area associated with PennDOT roadways." (Draft CBPRP, p. 4) For the 7,081.68 acres in that planning area,3 the Draft CBPRP then determines the amount of pervious and impervious land using high resolution land cover data. (Draft CBPRP, pp. 4-5 & Tables 2-3). Finally, it multiplies those amounts of pervious and impervious land cover by the appropriate sediment loading rates for Luzerne County in PADEP's "Developed Land Loading Rates for PA Counties" table[4] to calculate a baseline existing pollutant load of 3,190,682.62 pounds of sediment per year. (Draft CBPRP, Table 4, p. 5)

This process fails to account for any additional sediment load coming from any areas beyond the UA that drain into the MS4. If there are no such areas, the final CBPRP should so state. If there are such areas, the planning area must be expanded to include them, and the existing sediment load and 10% sediment load reduction target in the final CBPRP must be revised to account for the additional load coming from them.

RESPONSE: In preparation of this plan the applicant's planner strictly followed guidance/instruction provided in PADEP's "PRP Instructions" (Document: 3800-PM-BCW0100k, Rev. 2/2017). See specifically, P.5, paragraph 4, which states:

NOTE – Delineation of storm sewersheds associated with individual MS4 outfalls is typically necessary in order to determine the PRP Planning Area. The MS4 may display the storm sewershed for each MS4 outfall or just the PRP Planning Area, at its discretion. In cases where there are no local surface water impairments but the entire municipality is located in the Chesapeake Bay watershed, the map can display the entire storm sewershed within the municipality, without distinction between discharges to various local surface waters. ***In addition, a municipality entirely within the Chesapeake Bay watershed with no local surface water impairments may elect to consider the entire urbanized area within its municipality as its PRP Planning Area, and calculate existing loading using that area.***

However, in the case with this application much of the additional land contribution outside of the urban area is of a natural character (forested, meadow) which would not typically be considered a significant wasteload contributor. Although the applicant may choose to revisit this notion of including tributary areas from outside of the urbanized region it was not specifically required by the PRP instructions and; in this case, may not result in identification of areas that would really require best management practices for pollution abatement (e.g. forests, meadows).

COMMENT: The Draft CBPRP appropriately takes a conservative approach that allows for contingencies.

The Draft CBPRP explains that it "takes a conservative approach when proposing BMPs to meet the required reduction in pollutant loading." (Draft CBPRP, p. 18) No single proposed BMP project accounts for more than 17.5% of the estimated total pollutant load reductions. Moreover, "anticipat[ing] that upon more detailed analysis and design some projects may be found infeasible," the Draft CBPRP proposes BMP projects that would achieve sediment load reductions of about 85,000 pounds per year greater than the required amount (id.), a margin more than sufficient to cover the loss of the proposed BMP project with the greatest estimated sediment load reduction (BMP SB17). (Id., Table 7, p. 22). Overall, this conservative approach is sensible and prudent, and DAMA is to be commended for planning ahead for contingencies like discovering obstacles that prevent the implementation of proposed BMP projects, or possible upward adjustment of the sediment load reduction target. See Comment 1, above.

RESPONSE: Comment acknowledged and as with all provided, appreciated.

COMMENT: The final CBPRP should include a BMP implementation schedule.

Appendix D to general NPDES Permit PAG-13 provides that "[t]he BMPs proposed in the CBPRP for the term of General Permit coverage shall be implemented in accordance with the schedule in the CBPRP." (PAG-13, p. 29) The Draft CBPRP contains no schedule for completing the 35 proposed projects listed as the sediment load reduction BMPs. (Draft CBPRP, Tables 6-7, pp. 19-22) The final CBPRP should include such an implementation schedule.

RESPONSE: The CBPRP plan has been updated to include a schedule noting installation deadlines.

Section B – Map

A map of the planning area, impervious and pervious land covers, parsed areas, and proposed project locations is shown in Figure 1, which can be found in Attachment A.

Section C – Pollutants of Concern

The pollutants of concern to municipalities in the Chesapeake Bay watershed are Total Nitrogen (TN), Total Phosphorus (TP), and Total Suspended Solids (TSS.) This CBPRP takes the permitted presumptive approach that assumes that if a 10% reduction in TSS is attained, subsequent reductions of 5% and 3% of TP and TN, respectively, will also be attained without having to be explicitly calculated. Accordingly, this report details projects and changes in programmatic practices that will provide the minimum required reduction of 10% in TSS loading.

Section D – Determine Existing Loading for Pollutants of Concern

The date of the of the development of this CBPRP is August 2017. The planning area assessed in this CBPRP consists of the urbanized areas in Dallas Borough, Dallas Township, and Kingston Township. The areas parsed from the planning area include the land area associated with PennDOT roadways, a total of approximately 140 acres. The pollutant loading rate values for impervious and pervious developed areas in Luzerne County as provided in Attachment B, "Developed Land Loading Rates for PA Counties," of the "PRP Instructions" provided by PADEP were utilized to determine the existing loading for the pollutant of concern. The values are shown in Table 1.

Table 1. Luzerne County Pollutant Loading Rates

Pollutant and Source	Loading Rate (lb/ac/yr)
TP Impervious developed	3.00
TP Pervious Developed	0.98
TSS Impervious developed	1,648.22
TSS Pervious Developed	221.19
TN Impervious Developed	20.43
TN Pervious Developed	19.46

The impervious and pervious developed areas covered by the planning area were derived using the "High-Resolution Land Cover, Commonwealth of Pennsylvania, Chesapeake Bay Watershed and Delaware River Basin, 2013" provided by the University of Vermont Spatial Analysis Laboratory for land-cover mapping and modeling initiatives in the Chesapeake Bay Watershed and Delaware River Basin. Funding for the Chesapeake Bay Watershed portion was provided by the National Park Service and Environmental Protection Agency under a collaborative grant with the Chesapeake Conservancy.

The land covers within the planning area were compiled into impervious and pervious surfaces as shown in Tables 2 and 3.

Table 2. Pervious Land Cover within the Planning Area

Pervious Land Cover	Area (ft^2)	Area (Ac)
Low Vegetation	88,676,059.29	2,035.72
Scrub-Shrub	858,862.65	19.72
Tree Canopy	168,149,021.67	3,860.17
Wetlands (emergent)	1,212,625.55	27.84
Total Pervious	258,896,569.17	5,943.45

Table 3. Impervious Land Cover within the Planning Area

Impervious Land Cover	Area (ft^2)	Area (Ac)
Barren	664,968.94	15.27
Other Impervious Surfaces	20,447,867.96	469.42
Roads	8,162,677.36	187.39
Structures	14,594,774.68	335.05
Tree Canopy Over Other Impervious Surfaces	3,346,482.34	76.82
Tree Canopy Over Roads	1,847,701.39	42.42
Tree Canopy Over Structures	516,774.16	11.86
Total Impervious	49,581,246.83	1,138.23

The existing loading of TSS for the planning area was calculated and tabulated in Table 4.

Table 4. Existing Pollutant Loading of TSS

Pollutant and Source	Loading Rate[1] (lb/ac/yr)	Area[2] (Ac)	Annual Load[3] (lb/yr)	Annual Load (Tn/yr)
TSS Impervious Developed	1,648.22	1,138.23	1,876,051.48	938.03
TSS Pervious Developed	221.19	5,943.45	1,314,631.13	657.32
		Total TSS Load[4]	3,190,682.62	1,595.34

[1] From Table 1

[2] From Tables 2 and 3

[3] Loading Rate (lb/ac/yr) * Area (Ac) = Annual Load (lb/yr)

[4] TSS Impervious Developed Annual Load (lb/yr) + TSS Pervious Developed Annual Load (lb/yr) = Total TSS Load (lb/yr)

In accordance with PA DEP's "PRP Instructions," this plan may take 'credit' for existing structural BMPs to reduce the Total TSS Load estimate. The locations of the existing structural BMPs in the planning area are shown in Figure 2, which can be found in Attachment B. The drainage area treated by each existing BMP was delineated and the amount of pervious and impervious land cover in each drainage area was determined in the same manner as the planning area.

Table 5 provides some required information for existing structural stormwater BMPs within the planning area. The permit number, if any, that authorized installation of the BMP, and the date the BMP was installed is not provided. However, the regulatory era in which the BMP was designed is provided in the "Era Designed" column. The purpose of the information in this column is to show that the BMP was designed for rate control only (BEFORE 2006,) or was designed for water quality and rate control (AFTER 2006) per the regulations of that time. Table 5 also provides the pollutant reduction calculations for each BMP. The TSS capture capability of the BMP is defined in the BMP Effectiveness column. These values were taken from the "BMP Effectiveness Values" table provided by the PA DEP. The total annual credit captured by the existing BMPs equals 195,231.78 lb/yr (97.62 Tn/yr.) Taking the annual credit for existing BMPs into account, the existing TSS load from the planning area is calculated as:

3,190,682.62 lb/yr - 195,231.78 lb/yr = **2,995,450.84 lb/yr (1,497.73 Tn/yr)**

As part of the ongoing MS4 program, inspections of the existing stormwater BMPs will be completed to verify that each BMPS listed above continues to serve the function(s) it was designed for. Any that are found to be unmaintained or operated in any way contrary to their intended design will be removed from the credit calculation, and this plan will be revised to take the changes into account.

Table 5. Existing Structural BMPs

BMP ID	Detailed Description	Era Designed	Latitude	Longitude	Pollutant Reduction Calculation					
					Impervious Area (Ac)	Pervious Area (Ac)	TSS Impervious Loading Rate (lb/Ac/yr)	TSS Pervious Loading Rate (lb/Ac/yr)	BMP Effectiveness	Annual Load Captured[1] (lb/yr)
B1	Dry detention basin for Masonic Village	BEFORE 2006	41.357752	-75.975702	0.59	0.74	1,648.22	221.19	0.1	113.29
B2	Extended dry detention basin for Irem Pavilion	AFTER 2006	41.357961	-75.971727	0.57	0.89	1,648.22	221.19	0.6	681.41
B3_B4	Extended dry detention basins (2) for Misericordia Track	AFTER 2006	41.349945	-75.973699	2.05	6.34	1,648.22	221.19	0.6	2,870.12
			41.349551	-75.974297						
B5	Extended dry detention basin for Misericordia Baseball Field	AFTER 2006	41.347836	-75.970862	0.00	1.11	1,648.22	221.19	0.6	147.29
B6	Dry detention basin for Misericordia	BEFORE 2006	41.347121	-75.971532	1.04	1.05	1,648.22	221.19	0.1	194.23
B7	Dry detention basin for Misericordia Tennis Courts	BEFORE 2006	41.346645	-75.975603	4.27	2.21	1,648.22	221.19	0.1	751.94
B8	Dry detention basin for Misericordia along Lake St	BEFORE 2006	41.342486	-75.970723	5.84	12.61	1,648.22	221.19	0.1	1,241.32
B9	Dry detention basin for Misericordia	BEFORE 2006	41.345169	-75.968582	1.18	0.64	1,648.22	221.19	0.1	209.36

[1] ((Impervious Area (Ac) * TSS Impervious Loading Rate (lb/Ac/yr)) + (pervious Area (Ac) * TSS pervious Loading Rate (lb/Ac/yr))) * BMP Effectiveness = Annual Load Captured (lb/yr)

BMP ID	Detailed Description	Era Designed	Latitude	Longitude	Pollutant Reduction Calculation					
					Impervious Area (Ac)	Pervious Area (Ac)	TSS Impervious Loading Rate (lb/Ac/yr)	TSS Pervious Loading Rate (lb/Ac/yr)	BMP Effectiveness	Annual Load Captured[1] (lb/yr)
B10	Dry detention basin for Payne Printery	BEFORE 2006	41.341652	-75.975368	2.69	5.74	1,648.22	221.19	0.1	571.02
B11_B12	Wet Ponds for the Meadows Center	BEFORE 2006	41.340871 41.34073	-75.968469 -75.970232	6.21	15.30	1,648.22	221.19	0.6	8,171.45
B13	Dry detention basin for Country Club Shopping Center	BEFORE 2006	41.346552	-75.959739	3.51	1.39	1,648.22	221.19	0.1	609.26
B14	Wet Pond for Twin Stacks Center	BEFORE 2006	41.340725	-75.976641	8.22	17.82	1,648.22	221.19	0.6	10,498.19
B15	Dry detention basin for Marlington Ave Subdivision	BEFORE 2006	41.339699	-75.978605	0.88	2.75	1,648.22	221.19	0.1	205.24
B16	Dry detention basin for St. Paul's Lutheran Church	BEFORE 2006	41.34117	-75.995471	0.66	1.75	1,648.22	221.19	0.1	146.78
B17	Extended dry detention basin for Steve Shannon Tire & Auto	AFTER 2006	41.342397	-75.994937	0.87	0.67	1,648.22	221.19	0.6	951.26
B18	Dry detention basin for Dollar General	BEFORE 2006	41.342131	-75.994051	0.99	0.21	1,648.22	221.19	0.1	167.34
B19	Dry detention basin for Luzerne Bank	BEFORE 2006	41.342128	-75.993012	0.87	0.55	1,648.22	221.19	0.1	155.29

[1] ((Impervious Area (Ac) * TSS Impervious Loading Rate (lb/Ac/yr)) + (pervious Area (Ac) * TSS pervious Loading Rate (lb/Ac/yr))) * BMP Effectiveness = Annual Load Captured (lb/yr)

BMP ID	Detailed Description	Era Designed	Latitude	Longitude	Pollutant Reduction Calculation					
					Impervious Area (Ac)	Pervious Area (Ac)	TSS Impervious Loading Rate (lb/Ac/yr)	TSS Pervious Loading Rate (lb/Ac/yr)	BMP Effectiveness	Annual Load Captured[1] (lb/yr)
B20	Extended dry detention basin for Turkey Hill Mini Market	AFTER 2006	41.342635	-75.992874	0.48	1.52	1,648.22	221.19	0.6	680.73
B21	Dry detention basin for Yalick Farms	BEFORE 2006	41.340405	-75.987649	6.32	13.12	1,648.22	221.19	0.1	1,331.13
B22	Dry detention basin for Yalick Farms	BEFORE 2006	41.33886	-75.989053	2.61	4.35	1,648.22	221.19	0.1	525.97
B23	Wet Pond for Overbrook Farms	BEFORE 2006	41.320399	-75.95446	8.17	86.15	1,648.22	221.19	0.6	19,514.47
B24	Dry detention basin for Overbrook Farms	BEFORE 2006	41.320267	-75.951648	1.74	19.79	1,648.22	221.19	0.1	724.11
B25	Dry detention basin for Overbrook Farms	BEFORE 2006	41.320984	-75.952313	0.21	2.15	1,648.22	221.19	0.1	82.14
B26	Dry detention basin for A&A Auto	BEFORE 2006	41.327584	-75.947135	2.51	7.56	1,648.22	221.19	0.1	580.33
B27	Dry detention basin behind Monro Muffler Brake	BEFORE 2006	41.333231	-75.954557	2.41	6.15	1,648.22	221.19	0.1	532.95
B28	Extended dry detention basin for DSD Baseball Field	AFTER 2006	41.342955	-75.950188	9.99	4.53	1,648.22	221.19	0.6	10,479.18
B29_B30	Dry detention basins (2) for Saddle Ridge	BEFORE 2006	41.339425	-75.927015	5.33	20.57	1,648.22	221.19	0.1	1,333.01

[1] ((Impervious Area (Ac) * TSS Impervious Loading Rate (lb/Ac/yr)) + (pervious Area (Ac) * TSS pervious Loading Rate (lb/Ac/yr))) * BMP Effectiveness = Annual Load Captured (lb/yr)

BMP ID	Detailed Description	Era Designed	Latitude	Longitude	Pollutant Reduction Calculation					
					Impervious Area (Ac)	Pervious Area (Ac)	TSS Impervious Loading Rate (lb/Ac/yr)	TSS Pervious Loading Rate (lb/Ac/yr)	BMP Effectiveness	Annual Load Captured[1] (lb/yr)
B31	Dry detention basin for Woodbine Rd Subdivision	BEFORE 2006	41.337378	-75.923587	5.89	9.51	1,648.22	221.19	0.1	1,181.11
B32	Dry detention basin for Woodbine Rd Subdivision	BEFORE 2006	41.334618	-75.92378	0.79	2.73	1,648.22	221.19	0.1	191.28
B33	Dry detention basin for Ondish Hills	BEFORE 2006	41.333544	-75.939487	4.04	7.64	1,648.22	221.19	0.1	835.71
B34	Dry detention basin for Ondish Hills	BEFORE 2006	41.334959	-75.934884	1.01	0.48	1,648.22	221.19	0.1	177.55
B35	Dry detention basin for Ondish Hills	BEFORE 2006	41.332832	-75.938869	0.04	0.92	1,648.22	221.19	0.1	27.44
B36	Wet Pond for Frontier Communications	BEFORE 2006	41.359071	-75.965986	12.10	7.39	1,648.22	221.19	0.6	12,947.86
B37	Underground dry detention for Applewood Manor	BEFORE 2006	41.370871	-75.941714	2.32	4.85	1,648.22	221.19	0.1	489.29
B38	Dry detention basin for Country Club Shopping Center	BEFORE 2006	41.347439	-75.959422	0.35	0.03	1,648.22	221.19	0.1	57.76
B39	Dry detention basin for CH Waltz	BEFORE 2006	41.34534	-75.961846	0.83	0.35	1,648.22	221.19	0.1	144.76

[1] ((Impervious Area (Ac) * TSS Impervious Loading Rate (lb/Ac/yr)) + (pervious Area (Ac) * TSS pervious Loading Rate (lb/Ac/yr))) * BMP Effectiveness = Annual Load Captured (lb/yr)

BMP ID	Detailed Description	Era Designed	Latitude	Longitude	Pollutant Reduction Calculation					
					Impervious Area (Ac)	Pervious Area (Ac)	TSS Impervious Loading Rate (lb/Ac/yr)	TSS Pervious Loading Rate (lb/Ac/yr)	BMP Effectiveness	Annual Load Captured[1] (lb/yr)
B40	Dry detention basin for Dallas Fire & Ambulance	BEFORE 2006	41.344083	-75.961877	0.54	0.08	1,648.22	221.19	0.1	90.09
B41_B42_B43_B44_B45	Dry detention basins (5) for Masonic Village	BEFORE 2006	41.3523	-75.973454	4.59	5.42	1,648.22	221.19	0.1	876.28
			41.3525	-75.974108						
			41.352799	-75.97436						
			41.353177	-75.973711						
			41.353645	-75.972851						
B46	Underground dry detention basin for Coates Reprographics	BEFORE 2006	41.35214	-75.97486	1.39	0.27	1,648.22	221.19	0.1	235.31
B47	Dry detention basin for Misericordia parking lot	BEFORE 2006	41.347476	-75.970295	1.70	0.65	1,648.22	221.19	0.1	293.91
B48	Dry detention basin for Sisters of Mercy parking lot	BEFORE 2006	41.341473	-75.967902	0.22	0.09	1,648.22	221.19	0.1	38.69
B49	Dry detention basin for Sisters of Mercy parking lot	BEFORE 2006	41.340287	-75.968049	0.23	0.15	1,648.22	221.19	0.1	41.43
B50	Dry detention basin for Village at Greenbriar	BEFORE 2006	41.341989	-76.003488	1.98	1.44	1,648.22	221.19	0.1	358.51
B51	Dry detention basin for St. Paul's Lutheran Church	BEFORE 2006	41.340748	-75.997998	1.38	0.80	1,648.22	221.19	0.1	246.01

[1] ((Impervious Area (Ac) * TSS Impervious Loading Rate (lb/Ac/yr)) + (pervious Area (Ac) * TSS pervious Loading Rate (lb/Ac/yr))) * BMP Effectiveness = Annual Load Captured (lb/yr)

BMP ID	Detailed Description	Era Designed	Latitude	Longitude	Pollutant Reduction Calculation					
					Impervious Area (Ac)	Pervious Area (Ac)	TSS Impervious Loading Rate (lb/Ac/yr)	TSS Pervious Loading Rate (lb/Ac/yr)	BMP Effectiveness	Annual Load Captured[1] (lb/yr)
B52_B53_B54	Wet Ponds for Newberry Estates	BEFORE 2006	41.326541	-75.956046	50.99	159.51	1,648.22	221.19	0.6	71,593.45
			41.326237	-75.953025						
			41.326148	-75.951897						
B55	Underground dry detention basin for Connors	BEFORE 2006	41.327919	-75.946752	0.45	0.01	1,648.22	221.19	0.1	74.38
B56	Dry detention basin for Parker Self Storage	BEFORE 2006	41.33077	-75.943041	1.32	0.04	1,648.22	221.19	0.1	217.63
B57_B58_B59	Extended dry detention basins (3) for Dorchester Development and Geisinger Medical Facility	AFTER 2006	41.330712	-75.9493	5.60	2.47	1,648.22	221.19	0.6	5,863.59
			41.33168	-75.949985						
			41.331527	-75.948897						
B60	Extended dry detention basin for Pulverman	AFTER 2006	41.335522	-75.941696	1.38	1.65	1,648.22	221.19	0.6	1,579.20
B61	Dry detention basin for Maplewood Heights	BEFORE 2006	41.333731	-75.933949	3.03	10.29	1,648.22	221.19	0.1	727.20
B62	Dry detention basin for Ondish Rd Subdivision	BEFORE 2006	41.334246	-75.928256	1.08	2.12	1,648.22	221.19	0.1	225.51
B63	Dry detention basin for Kingston Township municipal building	BEFORE 2006	41.32781	-75.931732	0.53	3.33	1,648.22	221.19	0.1	161.69

[1] ((Impervious Area (Ac) * TSS Impervious Loading Rate (lb/Ac/yr)) + (pervious Area (Ac) * TSS pervious Loading Rate (lb/Ac/yr))) * BMP Effectiveness = Annual Load Captured (lb/yr)

BMP ID	Detailed Description	Era Designed	Latitude	Longitude	Pollutant Reduction Calculation					
					Impervious Area (Ac)	Pervious Area (Ac)	TSS Impervious Loading Rate (lb/Ac/yr)	TSS Pervious Loading Rate (lb/Ac/yr)	BMP Effectiveness	Annual Load Captured[1] (lb/yr)
B64	Rain garden for Kingston Township PW Garage	AFTER 2006	41.328347	-75.929533	0.23	0.08	1,648.22	221.19	0.55	216.64
B65	Dry detention basin on E Center St	BEFORE 2006	41.32809	-75.92502	1.26	16.19	1,648.22	221.19	0.1	565.04
B66	Dry detention basin on Harris Hill Rd	BEFORE 2006	41.325603	-75.922632	0.15	2.05	1,648.22	221.19	0.1	69.70
B67	Dry detention basin for Echo Valley MHP	BEFORE 2006	41.324886	-75.928519	1.57	9.54	1,648.22	221.19	0.1	470.27
B68	Dry detention basin for Echo Valley MHP	BEFORE 2006	41.322169	-75.927583	3.32	15.65	1,648.22	221.19	0.1	892.91
B69	Dry detention basin for Echo Valley MHP	BEFORE 2006	41.322106	-75.922412	5.33	6.54	1,648.22	221.19	0.1	1,022.39
B70	Dry detention basin for The Church of Jesus Christ	BEFORE 2006	41.328022	-75.913663	0.97	0.42	1,648.22	221.19	0.1	169.09
B71	Dry detention basin for Windsor Farms	BEFORE 2006	41.327255	-75.911829	3.89	2.26	1,648.22	221.19	0.1	691.40
B72	Dry detention basin for Windsor Farms	BEFORE 2006	41.327964	-75.908333	6.97	6.46	1,648.22	221.19	0.1	1,290.89
B73	Wet Pond for Sunrise Estates	BEFORE 2006	41.327457	-75.909452	1.07	13.56	1,648.22	221.19	0.6	2,861.05

[1] ((Impervious Area (Ac) * TSS Impervious Loading Rate (lb/Ac/yr)) + (pervious Area (Ac) * TSS pervious Loading Rate (lb/Ac/yr))) * BMP Effectiveness = Annual Load Captured (lb/yr)

BMP ID	Detailed Description	Era Designed	Latitude	Longitude	Pollutant Reduction Calculation					
					Impervious Area (Ac)	Pervious Area (Ac)	TSS Impervious Loading Rate (lb/Ac/yr)	TSS Pervious Loading Rate (lb/Ac/yr)	BMP Effectiveness	Annual Load Captured[1] (lb/yr)
B74	Dry detention basin for Subdivision on Ivy Dr	BEFORE 2006	41.323309	-75.912386	2.84	4.69	1,648.22	221.19	0.1	572.54
B75_B76	Dry detention basins (2) for Cross Creek Community Church and SUNOCO	BEFORE 2006	41.320648	-75.914155	7.77	21.31	1,648.22	221.19	0.1	1,751.51
			41.320897	-75.913604						
B77	Dry detention basin for Back Mountain Harvest Assembly	BEFORE 2006	41.318327	-75.916501	1.35	1.51	1,648.22	221.19	0.1	256.73
B78	Dry detention basin near Division St	BEFORE 2006	41.314309	-75.935855	13.79	92.26	1,648.22	221.19	0.1	4,313.76
B79	Dry detention basin for Lantern Hill subdivision	BEFORE 2006	41.304648	-75.936467	4.62	20.41	1,648.22	221.19	0.1	1,213.21
B80	Dry detention basin for Lantern Hill subdivision	BEFORE 2006	41.301737	-75.939983	5.60	26.71	1,648.22	221.19	0.1	1,514.47
B81	Extended dry detention basin for DSD High School	AFTER 2006	41.338296	-75.95055	13.71	5.24	1,648.22	221.9	0.6	14,256.89
B82	Dry detention basin for Homes at the end of Howard Dr	BEFORE 2006	41.330748	-75.980768	1.44	4.70	1,648.22	221.9	0.1	341.13

[1] ((Impervious Area (Ac) * TSS Impervious Loading Rate (lb/Ac/yr)) + (pervious Area (Ac) * TSS pervious Loading Rate (lb/Ac/yr))) * BMP Effectiveness = Annual Load Captured (lb/yr)

BMP ID	Detailed Description	Era Designed	Latitude	Longitude	Pollutant Reduction Calculation					
					Impervious Area (Ac)	Pervious Area (Ac)	TSS Impervious Loading Rate (lb/Ac/yr)	TSS Pervious Loading Rate (lb/Ac/yr)	BMP Effectiveness	Annual Load Captured[1] (lb/yr)
B83	Dry detention basin for Yalick Farms	BEFORE 2006	41.34163	-75.986857	2.39	10.10	1,648.22	221.9	0.1	617.72
									Total Annual Credit (lbs/yr)	195,231.78

[1] ((Impervious Area (Ac) * TSS Impervious Loading Rate (lb/Ac/yr)) + (pervious Area (Ac) * TSS pervious Loading Rate (lb/Ac/yr))) * BMP Effectiveness = Annual Load Captured (lb/yr)

The O&M for the existing BMP types is as follows:

Dry Detention Basins and Dry Extend Detention Basins

Maintenance is necessary to ensure proper functionality of the extended detention basin and should take place on a quarterly basis. A basin maintenance plan should be developed which includes the following measures:

- All basin structures expected to receive and/or trap debris and sediment should be inspected for clogging and excessive debris and sediment accumulation at least four times per year, as well as after every storm greater than 1 inch.
- Structures include basin bottoms, trash racks, outlets structures, riprap or gabion structures, and inlets.
- Sediment removal should be conducted when the basin is completely dry. Sediment should be disposed of properly and once sediment is removed, disturbed areas need to be immediately stabilized and revegetated.
- Mowing and/or trimming of vegetation should be performed as necessary to sustain the system, but all detritus should be removed from the basin.
- Vegetated areas should be inspected annually for erosion.
- Vegetated areas should be inspected annually for unwanted growth of exotic/invasive species.
- Vegetative cover should be maintained at a minimum of 95 percent. If vegetative cover has been reduced by 10%, vegetation should be reestablished.

Wet Pond/Retention Basin

Maintenance is necessary to ensure proper functionality of the wet pond and maintenance should include the following measures:

During the first growing season or until established, vegetation should be inspected every 2 to 3 weeks. Wet Ponds should be inspected at least 4 times per year and after major storms (greater than 2

inches in 24 hours) or rapid ice breakup. Inspections should access the vegetation, erosion, flow channelization, bank stability, inlet/outlet conditions, embankment, and sediment/debris accumulation. The pond drain should also be inspected and tested 4 times per year. Problems should be corrected as soon as possible. Wet Pond and buffer vegetation may need support (watering, weeding, mulching, replanting, etc.) during the first 3 years. Undesirable species should be carefully removed and desirable replacements planted if necessary.

Once established, properly designed and installed Wet Ponds should require little maintenance. Vegetation should maintain at least an 85 percent cover of the emergent vegetation zone and buffer area. Annual harvesting of vegetation may increase the nutrient removal of wet ponds; if performed it should generally be done in the summer so that there is adequate regrowth before winter. Care should be taken to minimize disturbance, especially of bottom sediments, during harvesting. The potential disturbance from harvesting may outweigh its benefits unless the WP receives a particularly high nutrient load or discharges to a nutrient sensitive waterbody. Sediment should be removed from the forebay before it occupies 50 percent of the forebay, typically every 5 to 10 years.

Raingardens

Raingardens require regular maintenance as follows:

- While vegetation is being established, pruning and weeding may be required.
- Detritus may also need to be removed every year.
- Perennial plantings may be cut down at the end of the growing season.
- Mulch should be re-spread when erosion is evident and be replenished as needed. Once every 2 to 3 years, the entire area may require mulch replacement.
- Raingardens should be inspected at least 2 times per year for sediment buildup, erosion, vegetative conditions, etc. Trees and shrubs should be inspected twice per year.
- During periods of extended drought, raingardens may require watering.

Section E – Select BMPs to Achieve the Minimum Required Reductions in Pollutant Loading

The minimum required reduction for the member municipalities is 10% of the existing TSS Pollutant load.

2,995,450.84 lbs/yr * 10% = **299,545.08 lbs/yr**

Tables 6 and 7 shows the proposed BMPS to meet the required reduction. This plan takes a conservative approach when proposing BMPs to meet the required reduction in pollutant loading. This plan proposes more than the minimum required reduction, as well as; BMPs with moderate effectiveness, that could possibly be replaced by BMPs with greater effectiveness should a more detailed investigation and design provide justification. The total annual reduction of TSS from the proposed projects equals 384,543.13 lb/yr (192.27 Tn/yr.) This is greater than the minimum required reduction, however; it is anticipated that upon more detailed analysis and design some projects may be found infeasible.

In addition, Street sweeping and inlet cleaning will be implemented programmatically, but the estimated pollutant reductions from these BMPs have not been calculated for this plan. Street sweeping will be performed on all streets in the planning area to the maximum extent practicable per year. Only those streets that are swept 25 times per year will be counted. All inlets in the planning area will be cleaned at least twice a year. The amount of material collected from both BMPs will be documented and pollutant reduction will be claimed using the methods outlined in the Expert Panel Report and BMP Effectiveness Table.

Table 6. Proposed Retrofit and Forest Buffer Projects

BMP ID	Detailed Description	Latitude	Longitude	Pollutant Reduction Calculation					
				Impervious Area (Ac)	Pervious Area (Ac)	TSS Impervious Loading Rate (lb/Ac/yr)	TSS Pervious Loading Rate (lb/Ac/yr)	BMP Effectiveness	Annual Load Captured[1] (lb/yr)
B7	Retrofit dry detention basin for Misericordia Tennis courts to Extended dry detention basin or better	41.346645	-75.975603	4.27	2.21	1,648.22	221.19	0.5	3,759.72
B8	Retrofit dry detention basin for Misericordia along Lake St to Extended dry detention basin or better	41.342486	-75.970723	5.84	12.61	1,648.22	221.19	0.5	6,206.61
B13	Retrofit dry detention basin for Country Club Shopping Center to Extended dry detention or better	41.346552	-75.959739	3.51	1.39	1,648.22	221.19	0.5	3,046.30
B38	Retrofit dry detention basin for Country Club Shopping Center to Extended dry detention or better	41.347439	-75.959422	0.35	0.03	1,648.22	221.19	0.5	288.82
B63	Retrofit dry detention basin for Kingston Township municipal building to Extended dry detention or better	41.32781	-75.931732	0.53	3.33	1,648.22	221.19	0.5	808.46
B75	Retrofit dry detention basin for Cross Creek Community Church to Extended dry detention or better	41.320648	-75.914155	7.77	21.31	1,648.22	221.19	0.5	8,757.54
B79	Retrofit dry detention basin for Lantern Hill subdivision to Extended dry detention or better	41.304648	-75.936467	4.62	20.41	1,648.22	221.19	0.5	6,066.03
B80	Retrofit dry detention basin for Lantern Hill subdivision to Extended dry detention or better	41.301737	-75.939983	5.60	26.71	1,648.22	221.19	0.5	7,572.33
P1	Install extended dry detention basin or better at Dallas Borough Park	41.336466	-75.97068	8.13	33.24	1,648.22	221.19	0.6	12,453.12
P2	Install extended dry detention basin or better at Dallas Borough owned parcel	41.33793	-75.970162	2.99	6.09	1,648.22	221.19	0.6	3,760.33
P3	Install extended dry detention basin or better at Dallas Township Park	41.338522	-75.96041	0.86	5.88	1,648.22	221.19	0.6	1,628.37

[1] ((Impervious Area (Ac) * TSS Impervious Loading Rate (lb/Ac/yr)) + (pervious Area (Ac) * TSS pervious Loading Rate (lb/Ac/yr))) * BMP Effectiveness = Annual Load Captured (lb/yr)

BMP ID	Detailed Description	Latitude	Longitude	Pollutant Reduction Calculation					
				Impervious Area (Ac)	Pervious Area (Ac)	TSS Impervious Loading Rate (lb/Ac/yr)	TSS Pervious Loading Rate (lb/Ac/yr)	BMP Effectiveness	Annual Load Captured[1] (lb/yr)
P4	Install extended dry detention basin or better at Dallas Township Park	41.338019	-75.960066	9.47	24.13	1,648.22	221.19	0.6	12,566.03
P5	Install vegetated open channels or better throughout neighborhood and next to Valentine's	41.334072	-75.955941	11.06	37.22	1,648.22	221.19	0.5	13,228.31
P6	Install vegetated open channels or better throughout neighborhood	41.337228	-75.947258	18.57	40.12	1,648.22	221.19	0.5	19,743.81
P7	Install extended dry detention basin or better at Dallas Borough Park	41.331007	-75.963535	0.17	0.43	1,648.22	221.19	0.6	222.81
P8	Install vegetated open channel or better along Old Carvertown Rd	41.317141	-75.917536	0.78	2.15	1,648.22	221.19	0.5	881.21
P9	Install Forest Buffer along Trib 63042 to Toby Creek from Hildebrandt Rd to PA-309	41.34456	-75.9589	0.08	1.71	1,648.22	221.19	0.5	251.91
P11	Install Forest Buffer along Trib 63043 to Toby Creek through Irem Country Club	41.35498	-75.971094	0.19	6.75	1,648.22	221.19	0.5	899.66
P13	Install extended dry detention or better in Deer Meadows subdivision	41.33185	-75.97421	13.16	39.23	1,648.22	221.19	0.6	18,224.19
P14	Install extended dry detention or better in Deer Meadows subdivision	41.329995	-75.973593	5.20	21.57	1,648.22	221.19	0.6	8003.99
P15	Install Forest Buffer along Unnamed Trib to Toby Creek	41.320542	-75.922664	0.02	22.75	1,648.22	221.19	0.5	2,535.82
P18	Replace Kingston Township Park's Parking Lot with Permeable Paving	41.327975	-75.929985	0.55	0.22	1,648.22	221.19	0.55	521.70
P19	Install extended dry detention or better on Dallas Township Building Parcel	41.348099	-75.960408	0.48	0.43	1,648.22	221.19	0.6	526.94
P20	Install extended dry detention or better on Dallas School District/ Back Mountain Little League Property	41.347154	-75.962664	0.20	1.04	1,648.22	221.19	0.6	337.58

[1] ((Impervious Area (Ac) * TSS Impervious Loading Rate (lb/Ac/yr)) + (pervious Area (Ac) * TSS pervious Loading Rate (lb/Ac/yr))) * BMP Effectiveness = Annual Load Captured (lb/yr)

BMP ID	Detailed Description	Latitude	Longitude	Pollutant Reduction Calculation					
				Impervious Area (Ac)	Pervious Area (Ac)	TSS Impervious Loading Rate (lb/Ac/yr)	TSS Pervious Loading Rate (lb/Ac/yr)	BMP Effectiveness	Annual Load Captured[1] (lb/yr)
P21	Install extended dry detention or better on Dallas School District/ Back Mountain Little League Property	41.344100	-75.962435	2.29	3.74	1,648.22	221.19	0.6	2,760.02
P22	Install vegetated open channels or better throughout neighborhood	41.347686	-75.992466	15.65	41.27	1,648.22	221.19	0.5	17,461.90
P23	Install vegetated open channels or better throughout neighborhood	41.337405	-75.979695	4.72	9.79	1,648.22	221.19	0.5	4,975.02
P24	Install vegetated open channels or better throughout neighborhood	41.334651	-75.936373	12.79	22.03	1,648.22	221.19	0.5	12,977.02
								Total Annual Reduction (lb/yr)	170,465.53

[1] ((Impervious Area (Ac) * TSS Impervious Loading Rate (lb/Ac/yr)) + (pervious Area (Ac) * TSS pervious Loading Rate (lb/Ac/yr))) * BMP Effectiveness = Annual Load Captured (lb/yr)

Table 7. Proposed Streambank Restoration Projects

BMP ID	Detailed Description	Begin Latitude	Begin Longitude	End Latitude	End Longitude	Pollutant Reduction Calculation		
						Restoration Length (ft)	BMP Effectiveness (lb/ft/yr)	Annual Load Prevented[1] (lb/yr)
SB9	Streambank Restoration on Trib 63042 to Toby Creek from Hildebrandt Rd to PA-309	41.344955	-75.958656	41.343966	-75.958748	350.00	44.88	15,708.00
SB10	Stream daylighting and restoration on Trib 63043 to Toby Creek through Irem Country Club	41.353634	-75.964977	41.352902	-75.966135	400.00	44.88	17,952.00
SB11	Streambank Restoration on Trib 63043 to Toby Creek through Irem Country Club	41.355110	-75.970558	41.354580	-75.971527	330.00	44.88	14,810.40
SB12	Streambank Restoration on Toby Creek through Meadows Complex	41.341114	-75.971796	41.340727	-75.970853	400.00	44.88	17,952.00
SB15	Streambank restoration on Unnamed Tributary to Toby Creek	41.321182	-75.921111	41.319146	-75.924373	1,400.00	44.88	62,832.00
SB16	Streambank restoration on Unnamed Tributary to Toby Creek	41.313074	-75.918667	41.314186	-75.918100	390.00	44.88	17,503.20
SB17	Streambank restoration on Unnamed Tributary to Toby Creek	41.338852	-75.959926	41.336042	-75.96165	1,500.00	44.88	67,320.00
							Total Annual Reduction (lb/yr)	214,077.60

[1] Restoration Length (ft) * BMP Effectiveness (lb/ft/yr) = Annual Load Prevented (lb/yr)

Section F – Identify Funding Mechanisms

The proposed BMPs will be funded through a combination of grant and financing programs available at the time of each project, and a stormwater fee to be administered by the Dallas Area Municipal Authority. Project partners include private landowners, non-profit organizations, authorities, and government entities. The following is a list of current funding sources for the types of BMPs currently proposed:

Pennsylvania Infrastructure Investment Authority (PENNVEST) and Pennsylvania Department of Environmental Protection | Green Initiatives

PENNVEST actively funds green initiatives that promote and encourage environmental responsibility and enhance water quality. Solutions include riparian buffers, rain gardens, and floodplain and wetland restorations.

URL: http://www.pennvest.pa.gov/Information/Funding-Programs/Pages/default.aspx

Contact: Brion Johnson | bjohnson@pa.gov | 717-783-6798 or Steven Anspach | sanspach@pa.gov | 717-783-6589

Department of Community & Economic Development | Commonwealth Financing Authority (CFA)

The DCED-CFA was established as an independent agency of the Commonwealth to administer Pennsylvania's economic stimulus packages. DCED-CFA holds fiduciary responsibility over a variety of funding sources some of which provide funding for stormwater and stormwater-related projects, including:

- Watershed Restoration and Protection Program (riparian buffers, stream restorations, water quality basins, floodplain restoration)
- Greenways, Trails and Recreation Program (installation of green infrastructure at parks)
- Local Share Account programs

URL: http://dced.pa.gov/programs-funding/

Contact: http://dced.pa.gov/download/regional-contact-information/?wpdmdl=61870

Department of Conservation and Natural Resources | Community Conservation Partnerships Program (C2P2)

DCNR grants can be used green/sustainable park, riparian buffers, and implementing recommendations of Rivers Conservation Plans.

URL: http://www.dcnr.state.pa.us/brc/grants/

Contact: http://www.dcnr.state.pa.us/brc/aboutus/index.htm?tab=RegionalOffices#RegionalOffices

Department of Environmental Protection | Growing Greener Watershed Protection Grants

Funding for protection and restoration of Pennsylvania's water resources, including stream restorations and installation of stormwater BMPs in urban areas.

URL: http://www.dep.pa.gov/Citizens/GrantsLoansRebates/Growing-Greener/Pages/default.aspx

Contact: DEP Grants Center | GrowingGreener@pa.gov | 717-705-5400

Department of Transportation | Transportation Alternatives – Set Aside Grants

Funds stormwater projects that decrease the negative impact of stormwater runoff from roads, including detention and sediment basins and stream channel stabilization.

URL: https://spportal.dot.pa.gov/Planning/AppReg/TAP/Pages/default.aspx

Contact: Chris Metka | CMetka@pa.gov | 717-787-8065

Section G – Identify Responsible Parties for Operation and Maintenance (O&M) of BMPs

The member municipalities, private landowners, and Dallas Area Municipal Authority are the responsible parties for O&M of proposed BMPs.

O&M activities for the proposed BMPs are as follows:

Dry Extend Detention Basins

Maintenance is necessary to ensure proper functionality of the extended detention basin and should take place on a quarterly basis. A basin maintenance plan should be developed which includes the following measures:

- All basin structures expected to receive and/or trap debris and sediment should be inspected for clogging and excessive debris and sediment accumulation at least four times per year, as well as after every storm greater than 1 inch.
- Structures include basin bottoms, trash racks, outlets structures, riprap or gabion structures, and inlets.
- Sediment removal should be conducted when the basin is completely dry. Sediment should be disposed of properly and once sediment is removed, disturbed areas need to be immediately stabilized and revegetated.
- Mowing and/or trimming of vegetation should be performed as necessary to sustain the system, but all detritus should be removed from the basin.
- Vegetated areas should be inspected annually for erosion.
- Vegetated areas should be inspected annually for unwanted growth of exotic/invasive species.
- Vegetative cover should be maintained at a minimum of 95 percent. If vegetative cover has been reduced by 10%, vegetation should be reestablished.

Forest Buffer

The riparian buffer is subject to many threats, including:

- Browsing
- Invasion by exotic species
- Competition for nutrients by adjacent herbaceous vegetation
- Human disturbance

Proper awareness of these issues is critical to ensure the long-term effectiveness of a restored riparian buffer.

The most critical period during buffer establishment is maintenance of the newly planted trees during canopy closure, typically the first 3 to 5 years. Ongoing maintenance practices are necessary for both small seedlings and larger plant materials. Maintenance and monitoring plans should be prepared for the specific site and caretakers need to be advised of required duties during the regular maintenance period.

Maintenance measures that should be performed regularly:

Watering

- Plantings need deep regular watering during the first growing season, either natural watering via rainfall, or planned watering, via caretaker.
- Planting in the fall increases the likelihood of sufficient rain during planting establishment.

Mulching

- Mulch will assist in moisture retention in the root zone of plantings, moderate soil temperature, provide some weed suppression, and retard evaporation
- Use coarse, organic mulch that is slow to decompose in order minimize repeat application
- Apply 2-4 inch layer, leaving air space around tree trunk to prevent fungus growth.
- Use combination of woodchips, leaves, and twigs that are stockpiled for six months to a year.

Weed control

- Weed competition limits buffer growth and survival, therefore weeds should be controlled by either herbicides, mowing, or weed mats:

  Herbicides

  This is a short-term maintenance technique (2-3 years) that is generally considered less expensive and more flexible than mowing, and will result in a quicker establishment of the buffer. Herbicide use is regulated by the PA Department of Agriculture. Proper care should be taken to ensure that proximity to water features is considered.

  Mowing

  Mowing controls the height of the existing grasses, yet increases nutrient uptake, therefore competition for nutrients will persist until the canopy closure shades out lower layers. A planting layout similar to a grid format will facilitate ease of mowing yet yield an unnaturally spaced community. Mowing may result in strikes on the trunk unless protective measures are utilized. Mowing should occur twice each growing season. Mower height should be set between 8 –12 inches.

  Weed Mats

  Weed mats are geo-textile fabrics that are used to suppress weed growth around newly planted vegetation by providing shade and preventing seed deposition. Weed mats are installed after planting, and should be removed once the trees have developed a canopy that will naturally shade out weeds.

Deer damage

- Deer will browse all vegetation within reach, generally between 5-6 feet above the ground
- Approaches to minimize damage include: 1) selecting plants that deer do not prefer (ex. Paper Birch, Beech, Ash, Common Elderberry) 2) homemade deer repellants 3) tree shelters

Tree shelters

- Repair broken stakes
- Tighten stake lines
- Straighten leaning tubes
- Clean debris from tube
- Remove netting as tree grows
- Remove when tree is approximately 2 inches wide

Invasive Plants

- Monitor restoration sight regularly for any signs of invasive plants.
- Choice of control method is based on a variety of considerations, but falls into three general categories:
    - Mechanical
    - Mechanical with application of herbicide
    - Herbicide

Special Maintenance Considerations

Riparian buffer restoration sites should be monitored to maximize wildlife habitat and water quality benefits, and to discover emerging threats to the project. During the first four years, the new buffer should be monitored four times annually (February, May, August, and November are recommended) and inspected after any severe storm. Repairs should be made as soon as possible. Depending on restoration site size, the buffer area should be sampled to approximate survival rate. Data derived should consider survival of the planted material and natural regeneration to determine if in-fill planting should occur to supplement plant density. Survival rates of at least 70% are deemed to be successful. Calculate percent survival by the following equation:

(# of live plants / # of installed plants) 100 = % survival

Vegetated Channel

Maintenance activities to be done annually and within 48 hours after every major storm event (> 1 inch rainfall depth):

- Inspect and correct erosion problems, damage to vegetation, and sediment and debris accumulation (address when > 3 inches at any spot or covering vegetation)
- Inspect vegetation on side slopes for erosion and formation of rills or gullies, correct as needed
- Inspect for pools of standing water; dewater and discharge to an approved location and restore to design grade
- Mow and trim vegetation to ensure safety, aesthetics, proper swale operation, or to suppress weeds and invasive vegetation; dispose of cuttings in a local composting facility; mow only when swale is dry to avoid rutting
- Inspect for litter; remove prior to mowing
- Inspect for uniformity in cross-section and longitudinal slope, correct as needed
- Inspect swale inlet (curb cuts, pipes, etc.) and outlet for signs of erosion or blockage, correct as needed

Maintenance activities to be done as needed:

- Plant alternative grass species in the event of unsuccessful establishment
- Reseed bare areas; install appropriate erosion control measures when native soil is exposed or erosion channels are forming
- Rototill and replant swale if draw down time is more than 48 hours
- Inspect and correct check dams when signs of altered water flow (channelization, obstructions, erosion, etc.) are identified
- Water during dry periods, fertilize, and apply pesticide only when absolutely necessary

Most of the above maintenance activities are reasonably within the ability of individual homeowners. More intensive swales (i.e. more substantial vegetation, check dams, etc.) may warrant more intensive maintenance duties and should be vested with a responsible agency. A legally binding and enforceable maintenance agreement between the facility owner and the local review authority might be warranted to ensure sustained maintenance execution. Winter conditions also necessitate additional maintenance concerns, which include the following:

- Inspect swale immediately after the spring melt, remove residuals (e.g. sand) and replace damaged vegetation without disturbing remaining vegetation.
- If roadside or parking lot runoff is directed to the swale, mulching and/or soil aeration/manipulation may be required in the spring to restore soil structure and moisture capacity and to reduce the impacts of deicing agents.
- Use nontoxic, organic deicing agents, applied either as blended, magnesium chloride-based liquid products or as pretreated salt.
- Use salt-tolerant vegetation in swales.

Permeable Pavement

The primary goal of pervious pavement maintenance is to prevent the pavement surface and/or underlying infiltration bed from being clogged with fine sediments. To keep the system clean throughout the year and prolong its life span, the pavement surface should be vacuumed biannually with a commercial cleaning unit. **Pavement washing systems or compressed air units are not recommended.** All inlet structures within or draining to the infiltration beds should also be cleaned out biannually.

Planted areas adjacent to pervious pavement should be well maintained to prevent soil washout onto the pavement. If any washout does occur it should be cleaned off the pavement immediately to prevent

further clogging of the pores. Furthermore, if any bare spots or eroded areas are observed within the planted areas, they should be replanted and/or stabilized at once. Planted areas should be inspected on a semiannual basis. All trash and other litter that is observed during these inspections should be removed.

Superficial dirt does not necessarily clog the pavement voids. However, dirt that is ground in repeatedly by tires can lead to clogging. Therefore, trucks or other heavy vehicles should be prevented from tracking or spilling dirt onto the pavement. Furthermore, all construction or hazardous materials carriers should be prohibited from entering a pervious pavement lot.

Special Maintenance Considerations:

- Prevent Clogging of Pavement Surface with Sediment
    - Vacuum pavement 2 or 3 times per year
    - Maintain planted areas adjacent to pavement
    - Immediately clean any soil deposited on pavement
    - Do not allow construction staging, soil/mulch storage, etc. on unprotected pavement surface
    - Clean inlets draining to the subsurface bed twice per year

Winter Maintenance

Winter maintenance for a pervious parking lot may be necessary but is usually less intensive than that required for a standard impervious surface. By its very nature, a pervious pavement system with subsurface aggregate bed has superior snow melting characteristics than standard pavement. The underlying stone bed tends to absorb and retain heat so that freezing rain and snow melt faster on pervious pavement. Therefore, ice and light snow accumulation are generally not as problematic.

However, snow will accumulate during heavier storms. Abrasives such as sand or cinders should not be applied on or adjacent to the pervious pavement. Snow plowing is fine, provided it is done carefully (i.e. by setting the blade slightly higher than usual, about an inch). Salt is acceptable for use as a deicer on the pervious pavement, though nontoxic, organic deicers, applied either as blended, magnesium chloride-based liquid products or as pretreated salt, are preferable.

Repairs

Potholes in the pervious pavement are unlikely; though settling might occur if a soft spot in the subgrade is not removed during construction. For damaged areas of less than 50 square feet, a declivity could be patched by any means suitable with standard pavement, with the loss of porosity of that area being insignificant. The declivity can also be filled with pervious mix. If an area greater than 50 sq. ft. needs repair, approval of patch type should be sought from either the engineer or owner. Under no circumstance should the pavement surface ever be seal coated. Any required repair of drainage structures should be done promptly to ensure continued proper functioning of the system.

Actual BMP O&M activities will be recorded and documented in the Annual MS4 Status Reports submitted under the general and individual permits.

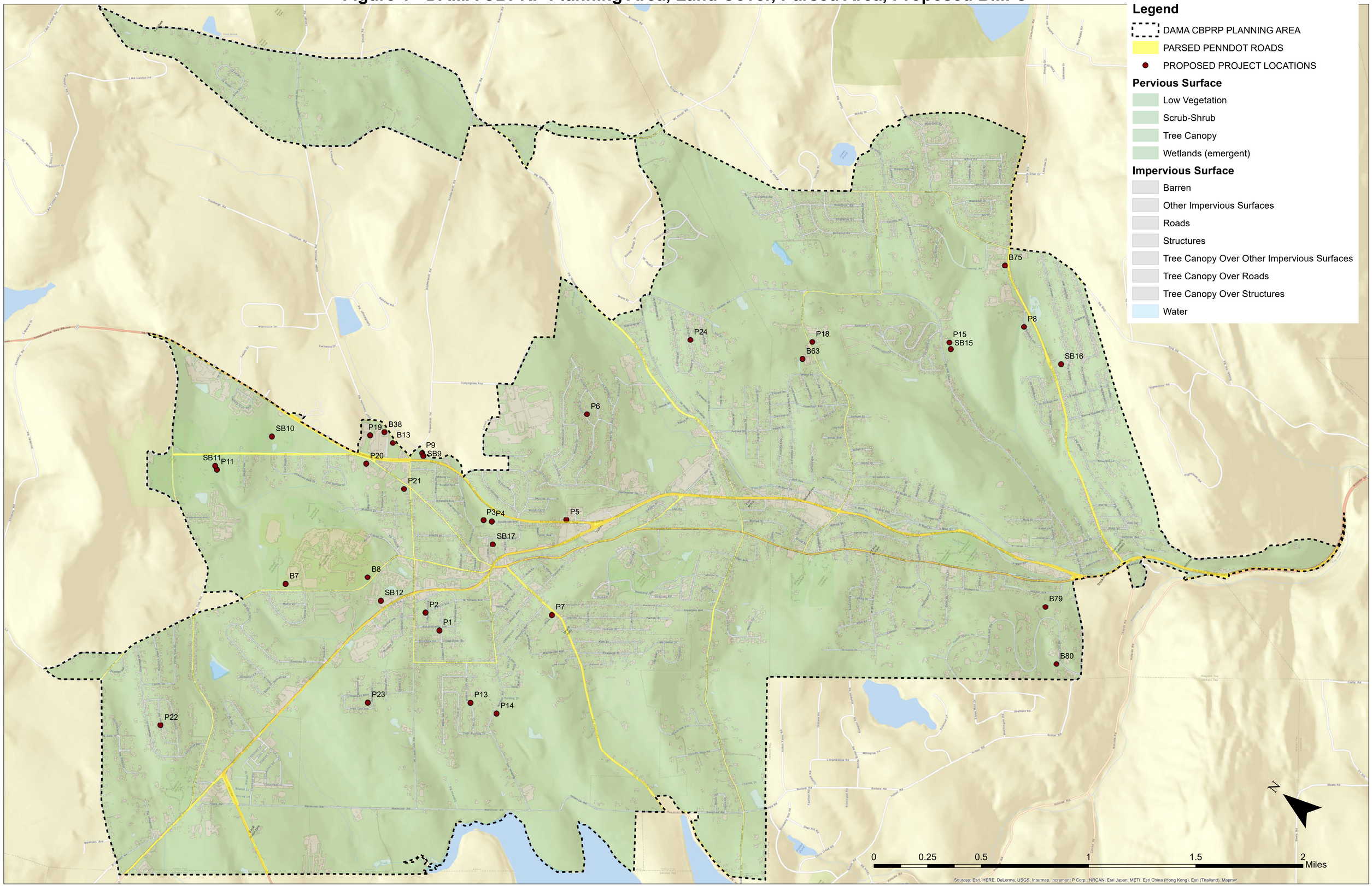
Implementation Schedule

BMP ID	Detailed Description	Proposed Implementation
IC	Inlet Cleaning of all inlets in the urbanized area at least 2 times per year	Year 1-5
SS	Street Sweeping of roads with AST Sweepers at least 25 times per year	Year 1-5
B63	Retrofit dry detention basin for Kingston Township municipal building to Extended dry detention or better	Year 1
P1	Install extended dry detention basin or better at Dallas Borough Park	Year 1
P2	Install extended dry detention basin or better at Dallas Borough owned parcel	Year 1
P3	Install extended dry detention basin or better at Dallas Township Park	Year 1
P4	Install extended dry detention basin or better at Dallas Township Park	Year 1
P7	Install extended dry detention basin or better at Dallas Borough Park	Year 1
P19	Install extended dry detention or better on Dallas Township Building Parcel	Year 1
P5	Install vegetated open channels or better throughout neighborhood and next to Valentine's	Year 2
P6	Install vegetated open channels or better throughout neighborhood	Year 2
P8	Install vegetated open channel or better along Old Carvertown Rd	Year 2
P18	Replace Kingston Township Park's Parking Lot with Permeable Paving	Year 2
P22	Install vegetated open channels or better throughout neighborhood	Year 2
P23	Install vegetated open channels or better throughout neighborhood	Year 2
P24	Install vegetated open channels or better throughout neighborhood	Year 2
B7	Retrofit dry detention basin for Misericordia Tennis courts to Extended dry detention basin or better	Year 2
B8	Retrofit dry detention basin for Misericordia along Lake St to Extended dry detention basin or better	Year 2
B75	Retrofit dry detention basin for Cross Creek Community Church to Extended dry detention or better	Year 2
P20	Install extended dry detention or better on Dallas School District/ Back Mountain Little League Property	Year 2
P21	Install extended dry detention or better on Dallas School District/ Back Mountain Little League Property	Year 2
B79	Retrofit dry detention basin for Lantern Hill subdivision to Extended dry detention or better	Year 3-5

B80	Retrofit dry detention basin for Lantern Hill subdivision to Extended dry detention or better	Year 3-5
P9	Install Forest Buffer along Trib 63042 to Toby Creek from Hildebrandt Rd to PA-309	Year 3-5
P11	Install Forest Buffer along Trib 63043 to Toby Creek through Irem Country Club	Year 3-5
P13	Install extended dry detention or better in Deer Meadows subdivision	Year 3-5
P14	Install extended dry detention or better in Deer Meadows subdivision	Year 3-5
P15	Install Forest Buffer along Unnamed Trib to Toby Creek	Year 3-5
SB9	Streambank Restoration on Trib 63042 to Toby Creek from Hildebrandt Rd to PA-309	Year 3-5
SB10	Stream daylighting and restoration on Trib 63043 to Toby Creek through Irem Country Club	Year 3-5
SB11	Streambank Restoration on Trib 63043 to Toby Creek through Irem Country Club	Year 3-5
SB12	Streambank Restoration on Toby Creek through Meadows Complex	Year 3-5
SB15	Streambank restoration on Unnamed Tributary to Toby Creek	Year 3-5
SB16	Streambank restoration on Unnamed Tributary to Toby Creek	Year 3-5
SB17	Streambank restoration on Unnamed Tributary to Toby Creek	Year 3-5
B13	Retrofit dry detention basin for Country Club Shopping Center to Extended dry detention or better	Year 3-5
B38	Retrofit dry detention basin for Country Club Shopping Center to Extended dry detention or better	Year 3-5

Attachment A

Figure 1 - DAMA CBPRP Planning Area, Land Cover, Parsed Area, Proposed BMPs



Attachment B

Figure 2 - DAMA CBPRP Planning Area and Existing BMPs