NPDES Stormwater Discharges from MS4

West Chester Borough
Brandywine Creek
Blackhorse Run
Plum Run
Taylor Run

Pollutant Reduction Plan

Prepared For:

West Chester Borough

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MS4 Pollutant Reduction Plan

West Chester Borough

Chester County, Pennsylvania

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West Chester Borough, Chester County is submitting this Pollutant Reduction Plan (PRP) in accordance with the requirements of the *National Pollutant Discharge Elimination System (NPDES) Individual Permit to Discharge Stormwater Discharges 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 3/5/2018)*. West Chester Borough must create a PRP due to discharges from their MS4 to Brandywine Creek, Blackhorse Run, Plum Run and Taylor Run, which have been listed as impaired for Siltation (see Appendix A).

The intent of this MS4 PRP is to establish the existing loading of pollutants discharged from the MS4 to Brandywine Creek, Blackhorse Run, Plum Run and Taylor Run, and to present a plan to reduce these pollutants. This MS4 PRP is organized to follow the 3800-PM-BCW0100k Rev. 3/2017 *National Pollutant Discharge Elimination System (NPDES) Stormwater Discharges from Small Municipal Separate Storm Sewer Systems Pollutant Reduction Plan (PRP) Instructions* included as part of the *PAG-13 MS4 General Permit* package. This PRP may be evaluated and updated by West Chester Borough on an as-needed basis, based on its effectiveness in reducing pollutant loads in discharges from the regulated small MS4. If this occurs, West Chester Borough will work with the Department of Environmental Protection (DEP) for review and approval of any revisions or updates.

Each MS4 PRP must include the following Required PRP Elements:

Section A: Public Participation
Section B: Map
Section C: Pollutants of Concern
Section D: Determine Existing Loading for Pollutants of Concern
Section E: Select BMPs to Achieve the Minimum Required Reductions in Pollutant Loading
Section F: Identify Funding Mechanisms
Section G: Identify Responsible Parties for Operation and Maintenance (O&M) of BMPs

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

A. Public Participation

As part of the preparation of this MS4 PRP, public participation is required. West Chester Borough shall complete the following public participation measures listed below, and report in the PRP that each was completed.

- The Borough shall make a complete copy of the PRP available for public review.

- The Borough 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 Borough 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 PRP to DEP. Include a copy of the public notice with the PRP.

- The Borough 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 PRP.

- The Borough 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 Borough 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 Borough's record of consideration of all timely comments received in the public comment period with the PRP.

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

- PRP public notice was published in: Daily Local News
- Date PRP public notice was published in newspaper: July 10, 2017
- Date PRP was made available for public review/comment: June 10, 2017
- End date for receipt of written comments (30 days from the date of public notice): August 10, 2017
- Date PRP comments were accepted at a public meeting: August 8, 2017

Questions received were of a general nature only, and no comments were made that required a response in, or revision to, this document.

Please note that when specific stream segments (along which streambank restoration will occur) are known, the PRP shall be revised to note same and re-advertised for public comment.

B. Map

Attach maps that identify **land uses** and the **storm sewershed boundaries** associated with the MS4 that discharge to impaired surface waters, and calculate the storm sewershed area that is subject to Appendix E of PAG-13. In addition, the proposed location(s) of structural BMP(s) that will be implemented to achieve the required pollutant load reductions must be identified on a map.

The map may be the same as that used to satisfy 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 PRP Planning Area relevant to satisfying the requirements of Appendix E, and to demonstrate that BMPs will be located in appropriate storm sewersheds to meet the requirements.

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.

The map may show areas that are to be "parsed" from the PRP Planning Area. In other words, at the MS4's discretion (subject to DEP rules), certain areas may be shown on the map that are within the Planning Area but are not included in the calculation of land area and existing pollutant loading. Guidance on parsing is outlined below. Note that if parsing is done, BMPs implemented within the parsed area will not count toward achieving pollutant reduction objectives.

Parsing Guidelines for MS4s in Pollutant Reduction Plans

DEP has developed these guidelines to assist owners and operators of MS4s that are required to develop Pollutant Reduction Plans (PRPs) in understanding where it is possible to "parse" land area in the course of developing those plans. For the purpose of this document, parsing is

defined as a process in which land area is removed from a Planning Area in order to calculate the actual or target pollutant loads that are applicable to an MS4.

Parsing is not required by NPDES permits and is therefore optional; however, some MS4 permittees may benefit from parsing. When parsing is done, best management practices (BMPs) implemented within the land area that is parsed may not be considered for meeting pollutant loading reductions.

MS4s must identify the target pollutant loadings (i.e., existing pollutant loading minus loading reduced by existing BMPs). In order to estimate existing pollutant loading, MS4s may parse out appropriate land area.

All parsing must be supported by a map and a determination of the area being parsed and/or appropriate calculations demonstrating how the parsing was done.

Parsing for PRPs

Parsing provides an opportunity for an MS4 permittee to eliminate areas within the storm sewershed that do not drain to the MS4 and areas that are already covered by an NPDES permit (i.e., not a waiver or no exposure certification) for the control of stormwater. For example, the land area of an industrial site that is covered by the PAG-03 General Permit for Stormwater Associated with Industrial Activity that discharges stormwater to the MS4 may be parsed out of the assessment of land area within the storm sewershed that is subject to the calculation of existing pollutant loading. If, however, the industrial land area is removed, BMPs implemented on that land may not be used as credit toward meeting the MS4's pollutant loading reduction requirements. Other examples of land area that may be parsed include:

- The land area associated with non-municipal stormwater NPDES permit coverage that exists within the urbanized area of a municipality (in such cases the entities may submit a combined PRP);
- Land area associated with PennDOT roadways and the Pennsylvania Turnpike (roads and right of ways);

- Lands associated with the production area of a Concentrated Animal Feeding Operation that is covered by an NPDES permit;

- Land areas in which stormwater runoff does not enter the MS4. If an accurate storm sewershed map is developed, these lands may be parsed or excluded as part of that process. Potential examples include homeowner's associations and schools which do not contain municipal roads or other municipal infrastructure.

If parsing is initially done for the PRP but the MS4 permittee decides later that it would be in their best interests to include that land in the PRP, the permittee may submit a modified PRP to DEP, following the public participation requirements of Appendix F of the permit.

The MS4 PRP map(s) shall also show the proposed locations of structural BMPs that will be implemented to achieve the required pollutant load reductions.

The West Chester Borough MS4 PRP Map identifies the PRP 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. The PRP Planning Area in the Brandywine Creek, Blackhorse Run, Plum Run and Taylor Run watersheds was calculated to be 810 acres.

For clarity, land uses within the PRP Planning Area are shown separately on the West Chester Borough MS4 PRP Land Uses (MapShed) Map.

The above referenced Maps are included in Appendix C.

C. Pollutants of Concern

Identify the pollutants of concern for each storm sewershed or the overall PRP 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 for.

For all PRPs, MS4s shall calculate existing loading of the pollutant(s) of concern in lb/year; calculate the minimum reduction in loading in lb/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 Appendix E, 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.

The impaired downstream waters are Brandywine Creek, Blackhorse Run, Plum Run and Taylor Run, which have an impairment of Siltation. Since the impairment is siltation, a minimum 10% reduction is required. This MS4 PRP presents the minimum reduction in loading for siltation as pounds per year (lb/yr).

D. Determine Existing Loading for Pollutants of Concern

Identify the date associated with the existing loading estimate. Calculate the existing loading, in lbs. per year, for the pollutant(s) of concern in the PRP Planning Area.

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 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.

MS4s may claim "credit" for structural BMPs implemented prior to development of the PRP to reduce existing loading estimates. In order to claim credit, identify all such structural BMPs in Section D of the PRP along with the following information:

- A detailed description of the BMP;
- Latitude and longitude coordinates for the 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 reductions 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 and O&M frequencies associated with the BMP.

The MS4 permittee may optionally submit design drawings of the BMP for previously installed or future BMPs with the PRP.

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, and an MS4 may not reduce its obligations for achieving permit term pollutant load reductions through previously installed BMPs. 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.

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.

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 - MapShed, or any other watershed model where channel erosion is explicitly modeled, should be run on a minimum of ~10 mi2 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.

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.

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 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.

NOTE – Use of default effectiveness values (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.

MapShed was utilized to compute the existing sediment loading of the PRP Planning Area, which drains to Brandywine Creek, via the Blackhorse Run, Plum Run and Taylor Run

watersheds. The date the existing loading was calculated / the date of development of this PRP is September 2017, and revised in July 2018.

West Chester Borough has a total existing sediment loading of 609,460 lbs/year to Brandywine Creek, in its Blackhorse Run, Plum Run and Taylor Run storm sewersheds. This is from the total Sediment loads for “00200”, “Area1”, and “Area2” from the Brandywine Creek and the Chester Creek MapShed model runs, included in Appendix E, under “C:MapShed\Runfiles\BrandywineJuly\Output\BrandywineJuly-0_ua.csv”.

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

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.

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.

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.

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, select "Documentation," select "Source Data" and see worksheets named "Land Use Definitions" and "BMP Definitions").

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.

The impairment for West Chester Borough in the Brandywine Creek, via the Blackhorse Run, Plum Run and Taylor Run watersheds is siltation, which requires a minimum 10% reduction. The required reduction is 60,946 lbs/year. The reduction is calculated as follows:

The storm sewershed (the PRP Planning Area) that drains to the municipal separate storm sewer system within the jurisdiction of the MS4 to Brandywine Creek, is via the Blackhorse Run, Plum Run and Taylor Run watersheds, and has been delineated using PAMAP data known as Light Detection and Ranging (LiDAR) contours. For West Chester Borough, the PRP Planning Area consists of three areas, totaling 810 acres. The Brandywine Creek watershed, consisting of the Blackhorse Run, Plum Run and Taylor Run Watersheds consists of 6,882 acres per MapShed.

The first MapShed model run used the PRP Planning Area as an “urban area” to determine the total Brandywine Creek, via the Blackhorse Run, Plum Run and Taylor Run watersheds’ loading as well as the loading exclusively from the MS4 storm sewershed(s) / PRP Planning Area. Note that based on MapShed’s Basin delineations, there are small portions of the PRP Planning Area located in the adjacent watershed (Goose Creek / Chester Creek), as well as a small area located in the Brandywine watershed that drains to Goose Creek. Closer inspection of contours and stormwater collection system indicated that these areas drain to the Brandywine Creek, via

Blackhorse Run, Plum Run and Taylor Run watershed and to the Goose Creek (Chester Creek) watershed. Therefore, the Basin delineation between these watersheds (i.e., Blackhorse / Plum / Taylor and Goose Creek) was revised to match the MS4 storm sewershed(s) / PRP Planning Area(s).

Please note that from the MapShed output ("GWLF-E Average Loads by Source for Watershed 0", included in Appendix E) Taylor Run is "00200", Blackhorse Run is "Area1", and Plum Run is "Area2".

West Chester Borough proposes to install BMP infiltration facilities with a goal of capturing and infiltrating the runoff generated from 1.5" of rainfall. The Borough is considering one (1) project, located at Veterans Park (which is located at the intersections of Brick Alley, Pine Alley and Veit Alley). West Chester Borough proposes to install several small BMP infiltration facilities consisting of rain gardens, vegetated curb extensions, bioswales and infiltration trenches at Veterans Park. This project has been designed by others (see Appendix F), with the drainage area supplied for use in the preparation of this PRP. The drainage area to Veterans Park is 0.55 acre; shape files were loaded into MapShed and the land uses within this drainage area noted, and consist of HD Mixed and HD Residential. The area of 0.55 acre (0.222 hectares), the land use of HD Residential (used to model the total BMP drainage area as the loading rates for HD Residential and HD Mixed are nearly identical), and an infiltration rate of 1.5" (3.81 cm) were utilized in the BMP Editor in MapShed (Urban BMP Editor) and the model run to ascertain the reduction in sediment loading as a result of this BMP. The reduction is 483 lbs. (4,121,075 lbs total load prior to BMPs, and 4,120,592 lbs. total load after BMPs).

The BMP Editor in MapShed for an Infiltration Basin BMP with 1.5" (3.81 cm) Rainfall Captured utilizes an efficiency rate of 0.82 for TSS. Note that per the BMP Effectiveness Values from DEP (3800-PM-BCW0100m 5/2016), Infiltration Practices w/Sand, Veg. has a BMP Efficiency Value of 95%; therefore, the MapShed efficiency rate is acceptable. Note that once the designs have been completed, reductions will be more accurately calculated.

Stream bank restoration and street sweeping are calculated outside of the MapShed program, per the PRP instructions, with streambank restoration as 115 lbs/ft/yr reduction. West Chester

Borough will consider the potential of streambank restoration in the Blackhorse Run, Plum Run and Taylor Run watersheds. If streambank restoration is undertaken, the Borough would propose to install approximately five-hundred (500) feet of streambank restoration. Therefore, the proposed streambank restoration of five hundred (500) feet would result in 57,500 lbs./yr (500 ft * 115 lbs/ft/yr) reduction.

West Chester Borough is proposing to street sweep all streets in the borough more than 25 times annually. Per the BMP Effectiveness Values (5/2016), Street sweeping must be conducted 25 times annually; only count those streets that are swept at least 25 times in a year. The acres associated with all streets that are swept at least 25 times in a year would be eligible for pollutant reductions consistent with the given BMP effectiveness values. From the "Street and Drain Cleaning Expert Panel Report," the standard street cleaning unit is curb miles swept. In general, one impervious acre is equivalent to one curb lane mile swept, assuming they are swept on one-side only (one acre = one curb lane mile rule of thumb). From Table 4, the Average TSS Load is 0.65 tons/ac/yr (1,300 #/ac/yr). From Table 15, using street sweeping frequency of 25 times annually (as a minimum), the sweeping schedule is 1P2W (one pass every 2 weeks). From Table 17, this corresponds to Practice #SCP-3 with a TSS Removal of 11% (see Appendix G). The Borough maintains 33 miles of street; the miles of street within the Brandywine Creek, via the Blackhorse Run, Plum Run and Taylor Run watersheds is approximately 25 miles. Since the Borough sweeps both sides of the streets, the curb lane miles would be 50 miles. Therefore, 0.65 tons/ac/yr * 2000 lbs/ton * 50 curb lane miles * 1 acre/curb lane mile * 11% TSS removal yields 7,150 lbs/yr TSS removal.

West Chester Borough also plants trees every year. The BMP effectiveness values for tree planting are estimated by DEP. DEP estimates that 100 fully mature trees of mixed species (both deciduous and non-deciduous) provide pollutant load reductions for the equivalent of one acre (i.e., one mature tree = 0.01 acre). The BMP effectiveness values given are based on immature trees (seedlings or saplings); the effectiveness values are expected to increase as the trees mature. To determine the amount of pollutant load reduction that can credited for tree planting efforts: 1) multiply the number of trees planted by 0.01; 2) multiply the acreage determined in step 1 by the pollutant loading rate for the land prior to planting the trees (in

lbs/acre/year); and 3) multiply the result of step 2 by the BMP effectiveness values given. The Tree Planting BMP Effectiveness Value is 20% for Sediment.

In the Brandywine Creek, via the Blackhorse Run, Plum Run and Taylor Run watersheds, the Borough intends to plant a minimum of 175 trees annually. The locations of these trees are unknown at this time; however, given the urban nature of the Borough, they estimate that approximately 140 will be street trees. The HD Residential loading rate from MapShed for the Brandywine Creek, Blackhorse Run, Plum Run and Taylor Run watershed will be used to best represent paved streets / sidewalks (i.e., land prior to planting the trees is along streets, i.e., pavement and sidewalks). The sediment HD Residential loading rate from MapShed is 99.8 lb/ac/yr. The reduction is therefore 27.9 lbs/yr. (140 street trees/yr * 0.01 * 99.8 lb/ac/year * 20%).

The final total proposed potential sediment reduction is summarized below in Table E-1. The actual reductions will be refined at the time of design of each BMP.

TABLE E-1: REQUIRED 10% SILTATION REDUCTION

	Brandywine Creek, Blackhorse Run, Plum Run and Taylor Run Storm Sewershed
Existing Load (lb/yr)	609,460
Percent Reduction	10%
Required Reduction (lb/yr)	60,946
Proposed Reduction (lbs./yr)	483 (One BMP) 7,150 (Street Sweeping) 28 (Plant Street Trees) 57,500 (Streambank Restoration) Total Potential Reduction 65,161

West Chester Borough plans to achieve the sediment reduction by designing, constructing, operating and maintaining Best Management Practices (BMPs). West Chester Borough is required to implement this plan over the next five (5) years.

The following table summarizes the sediment load and required and proposed potential reductions for West Chester Borough's Brandywine Creek, via that Blackhorse Run, Plum Run and Taylor Run Storm Sewershed / PRP Planning Area.

TABLE E-2: MS4 PRP STRATEGY SUMMARY

Description	Value	Unit
Brandywine Creek, Blackhorse Run, Plum Run and Taylor Run Storm Sewershed / PRP Planning Area	810	acres
Existing Sediment Load	609,460	lb/year
Required Sediment Pollutant Load Reduction Percentage	10%	lb/year
Minimum Required Pollutant Load Reduction	60,946	lb/year
Proposed BMPs' Sediment Load Reduction	65,161	lb/year

F. Identify Funding Mechanism(s)

Prior to approving coverage DEP will evaluate the feasibility of implementation of an applicant's 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.

West Chester Borough has adopted a Stream Protection Fee, moneys from which will be used to fund BMP projects the Borough will undertake in the next NPDES Permit term.

G. 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 party(ies) 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 G-1 lists the required information.

TABLE G-1 OPERATION AND MAINTENANCE OF BMPs

NAME OF BMP	RESPONSIBLE PARTY	O&M ACTIVITY & FREQUENCY
Street Sweeping	West Chester Borough	Per PA BMP Manual (latest revision) BMP 5.9.1 pg 94-97
Street Tree Planting	West Chester Borough	Per PA BMP Manual (latest revision) BMP 5.6.3 pg 63-67
Streambank Restoration	West Chester Borough	Per PA BMP Manual (latest revision) BMP 6.7.1 pg 191-210
Proposed Infiltration Facilities	West Chester Borough	Per PA BMP Manual (latest revision) BMP 6.4.3/6.4.4 pg 33-47

H. GENERAL 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. 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 NPDES Individual Permit, the permittee must achieve the required pollutant load reductions within 5 years following DEP's approval of coverage under the Individual 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 Individual 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.

West Chester Borough will submit the PRP in accordance with the above requirements.

APPENDIX A

MS4 Name	NPDES ID	Individual Permit Required?	Reason	Impaired Downstream Waters or Applicable TMDL Name	Requirement(s)	Other Cause(s) of Impairment
Chester County						
WEST BRANDYWINE TWP	PAI130544	Yes	TMDL Plan, SP, IP	West Branch Brandywine Creek	Appendix C-PCB (4a), Appendix E-Siltation (4a)	Water/Flow Variability (4c)
				Beaver Creek		Cause Unknown (4a), Other Habitat Alterations, Water/Flow Variability (4c)
				Christina River Basin Nutrients	TMDL Plan-Nutrients, Organic Enrichment/Low D.O. (4a)	
				Culbertson Run	Appendix E-Siltation (4a)	Other Habitat Alterations (4c)
				East Branch Brandywine Creek		Cause Unknown (4a), Other Habitat Alterations, Water/Flow Variability (4c)
				Unnamed Tributaries to West Branch Brandywine Creek		Cause Unknown (4a)
WEST CALN TWP	PAG130145	Yes	TMDL Plan, SP	Christina River Basin Nutrients	TMDL Plan-Nutrients, Organic Enrichment/Low D.O. (4a)	
				Christina River Basin Sediment	TMDL Plan-Siltation, Suspended Solids (4a)	
				Indian Spring Run	Appendix E-Nutrients, Organic Enrichment/Low D.O., Siltation (4a)	
				Pequea Creek	Appendix E-Nutrients, Organic Enrichment/Low D.O., Siltation (4a)	
				West Branch Brandywine Creek	Appendix C-PCB (4a)	Water/Flow Variability (4c)
				Chesapeake Bay Nutrients/Sediment	Appendix D-Nutrients, Siltation (4a)	
WEST CHESTER BORO	PAG130002	Yes	TMDL Plan	Blackhorse Run	Appendix E-Siltation (4a)	Other Habitat Alterations, Water/Flow Variability (4c)
				Brandywine Creek	Appendix E-Siltation (4a)	
				Chester Creek	Appendix B-Pathogens (5), Appendix E-Siltation (5)	Cause Unknown (5), Flow Alterations, Water/Flow Variability (4c)
				Goose Creek TMDL	TMDL Plan-Nutrients (4a)	Cause Unknown (4a)
				Plum Run	Appendix E-Siltation (4a)	Water/Flow Variability (4c)
				Taylor Run	Appendix E-Siltation (4a)	Cause Unknown (4a), Other Habitat Alterations (4c)
WEST GOSHEN TWP	PAI130532	Yes	TMDL Plan, SP, IP	Broad Run		Water/Flow Variability (4c)
				Taylor Run		Cause Unknown (4a), Other Habitat Alterations (4c)
				Plum Run		Water/Flow Variability (4c)
				John Smedley Run		Water/Flow Variability (4c)
				Goose Creek TMDL	TMDL Plan-Nutrients (4a)	Cause Unknown (4a)
				East Branch Chester Creek	Appendix E-Siltation (5)	Cause Unknown (5), Other Habitat Alterations, Water/Flow Variability (4c)
				East Branch Brandywine Creek		Cause Unknown (4a), Water/Flow Variability (4c)
				Chester Creek	Appendix B-Pathogens (5), Appendix E-Siltation (5)	Cause Unknown (5), Flow Alterations, Water/Flow Variability (4c)
				Christina River Basin Sediment	TMDL Plan-Siltation, Suspended Solids (4a)	

APPENDIX B

Public Notice & Proof of Publication

Plan needs to be on July 18 Workses Agenda

Christine McAllister

To: legals@dailylocal.com
Subject: Public Notice Advertisement
Attachments: ADVERTISEMENT-WC (002).DOCX

Importance: High

7/7/17

Maureen – Please advertise the attached Notice on July 10. E-mail me a Proof of Publication and send the invoice to my attention.

Thank you for your help with EVERYTHING!!!!

Regards,

Christine

Christine M. McAllister
Administrative Assistant to the Borough Manager
Borough of West Chester
cmcallister@west-chester.com
610-344-3246 (W)
484-456-8281 (Cell)
610-436-0009 (F)

BOROUGH OF WEST CHESTER

MS4 POLLUTANT REDUCTION PLANS AND TMDL PLAN

JUNE 30, 2017

The Borough Council of the Borough of West Chester will accept comments from the public beginning on June 10, 2017 and extending through August 10, 2017 associated with the Borough's two (2) Pollutant Reduction Plans (PRPs) and one (1) Total Maximum Daily Load (TMDL) Plan as required by the Pennsylvania Department of Environmental Protection as a component of the Borough's *National Pollutant Discharge Elimination System (NPDES) Individual Permit to Discharge Stormwater from Small Municipal Separate Storm Sewer Systems* (MS4s). The PRPs outline in general terms the Borough's 5-year plan between 2018 and 2023 to reduce sediment loadings from the MS4 stormwater discharges to Chester Creek/Goose Creek, Brandywine Creek, Blackhorse Run, Plum Run, and Taylor Run. The TMDL Plan outlines in general terms the Borough's 5-year plan between 2018 and 2023 to reduce Total Phosphorus loadings from the MS4 stormwater discharges to Goose Creek. The PRPs and TMDL Plan will be available for public review Monday through Friday between the hours of 8:30 AM to 4:00 PM at the municipal offices of the Borough of West Chester located at 401 E. Gay Street, West Chester, PA 19380. The PRPs and TMDL Plan is also available for public review on the Borough's website at www.west-chester.com. Comments may be provided in writing and delivered in person or via e-mail or regular mail and addressed to Michael A. Cotter, Borough Manager at macotter@west-chester.com. The PRPs and TMDL Plan will be on the agenda for the Borough Council Work Session meeting scheduled for July 18, 2017. Comments received after August 10, 2017 will not be considered by the Borough Council.

Michael A. Cotter
Borough Manager

21ST CENTURY media

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PHILADELPHIA GROUP

AFFIDAVIT OF PUBLICATION

307 Derstine Avenue • Lansdale, PA 19446

WEST CHESTER BOROUGH
401 E GAY STREET
WEST CHESTER, PA 19380
Attention:

STATE OF PENNSYLVANIA,
COUNTY OF MONTGOMERY

The undersigned Kelly Vincent, being duly sworn the he/she is the principal clerk of Daily Local News, Daily Local News Digital, published in the English language for the dissemination of local or transmitted news and intelligence of a general character, which are duly qualified newspapers, and the annexed hereto is a copy of certain order, notice, publication or advertisement of:

WEST CHESTER BOROUGH

Published in the following edition(s):

Daily Local News	07/10/17
Daily Local News Digital	07/10/17

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

Sworn to the subscribed before me this 7/11/2017.

Maureen Schmid

Notary Public, State of Pennsylvania
Acting in County of Montgomery

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Michael A. Cotter
Borough Manager
DL-July 10-1a

Advertisement Information

Client Id: 884439 **Ad Id:** 1379705 **PO:** **Sales Person:** 093304

and 455-14.C to allow a minimum Front Yard Setback of 30.05 feet and minimum Rear Yard Setback of 55.37 feet where the minimum Front and Rear Yard Setbacks are 75 feet; Section 455-132 to allow a pool and associated structures within the minimum Rear Yard Setback where they are not permitted; and from Section 274-19 to allow land disturbance, improvements, and construction activities within the Riparian Buffer where no disturbance is permitted; and any other relief that may be deemed necessary by the Zoning Hearing Board.

2. ZHB 563 – Nguyen/Vu – 1026A Lancaster Avenue, Berwyn. (VB District TPN 55-2L-4) Applicant has changed the property's use from commercial to single-family detached dwelling without Township approval. Applicant seeks a Variance from Section 455-21.(A)(1) to eliminate the need for commercial uses where second floor apartments are only allowed as accessory uses to nonresidential uses on the ground-level floor; a Special Exception in accordance with Section 455-122.B to change a nonconforming use or in the alternative appeal of the Zoning Officer's determination that the Applicant changed the property's use from commercial to single-family detached dwelling which is not a permitted use, and any other relief that may be deemed necessary by the Zoning Hearing Board.

Copies of applications are available for review in the Easttown Township Building weekdays from 8:00 a.m. through 12:00 p.m. and 12:30 p.m. through 4:30 p.m. If any person wishing to attend the hearing has a disability and/or requires an auxiliary aid, service or other accommodation, he or she should contact the Township at 610-687-3000 to discuss how those needs may be accommodated.
dln. 7/10, 17 - 1a.

The Borough Council of the Borough of West Chester will accept comments from the public beginning on June 10, 2017 and extending through August 10, 2017 associated with the Borough's two (2) Pollutant Reduction Plans (PRPs) and one (1) Total Maximum Daily Load (TMDL) Plan as required by the Pennsylvania Department of Environmental Protection as a component of the Borough's National Pollutant Discharge Elimination System (NPDES) Individual Permit to Discharge Stormwater from Small Municipal Separate Storm Sewer Systems (MS4s). The PRPs outline in general terms the Borough's 5-year plan between 2018 and 2023 to reduce sediment loadings from the MS4 stormwater discharges to Chester Creek/Goose Creek, Brandywine Creek, Blackhorse Run, Plum Run, and Taylor Run. The TMDL Plan outlines in general terms the Borough's 5-year plan between 2018 and 2023 to reduce Total Phosphorus loadings from the MS4 stormwater discharges to Goose Creek. The PRPs and TMDL Plan will be available for public review Monday through Friday between the hours of 8:30 AM to 4:00 PM at the municipal offices of the Borough of West Chester located at 401 E. Gay Street, West Chester, PA 19380. The PRPs and TMDL Plan is also available for public review on the Borough's website at www.west-chester.com. Comments may be provided in writing and delivered in person or via e-mail or regular mail and addressed to Michael A. Cotter, Borough Manager at macotter@west-chester.com. The PRPs and TMDL Plan will be on the agenda for the Borough Council Work Session meeting scheduled for July 18, 2017. Comments received after August 10, 2017 will not be considered by the Borough Council.
Michael A. Cotter
Borough Manager
DL-July 10-1a

BIDS & PROPOSALS

ADVERTISEMENT FOR BIDS

Sealed bids for the construction of the **Dogwood / Scott Drive Sewer Extension** will be received by the Caln Township Municipal Authority electronically via **PennBid™** until **10:00 A.M. local time, Tuesday, August 8, 2017** at which time all bids will be opened online.

Construction of the sewer extension will involve the installation of approximately 4,000 linear feet of low pressure sewer lines by open trench and horizontal directional drilling, installation of approximately 400 linear feet of gravity sanitary sewer by open trench, and the completion of all other necessary work to provide public sewer to approximately 55 existing homes located in Caln Township, Chester County Pennsylvania.

All Bid Documents and solicitation details are available at **PennBid™** - www.PennBid.net. Click on the "Solicitations" then "View" tabs. Please note the low bidder is responsible for a fee to **PennBid™**.

Each bid must be accompanied by a bid bond or a certified check in an amount not less than ten percent (10%) of the amount of the bid in the form and subject to the conditions provided in the Instructions to Bidders. No bid may be withdrawn for the

Public Agenda

And

Meeting Minutes

Public Works Committee

July 11, 2017 – 5:35 pm

Committee Members Present:	Don Braceland (Chair) Bernard Flynn (Council Member) Denise Polk
Department Heads Present:	**O'B Laing, Public Works** **Keith Kurowski, Recreation** **Mac Cotter (Borough Manager)**

1. Call to Order – meeting was called to order at 5:35 PM

2. Comments, suggestions, petitions by residents in attendance regarding items not on the agenda:
   a) Keith Kurowski reminded everyone that the 35th Annual Turks Head Music Festival was taking place this Sunday, July 16th at Everhart Park.

3. Discuss the Marshall Square Park sidewalk and fieldstone step reconstruction.
   a) After an extended discussion, this item was tabled for further discussion. It was decided that Jeff Beitel, at his request, would offer reasonable alternative to repair the sidewalk instead of total reconstruction.

4. Discuss substitute material to replace tree well grates throughout the BID.
   a) Alternative material was shown along with photograph of similar product which is currently in place for over eight (8) years. This was well received by Council and members of the public. No decision was made however, Jeff Beitel indicated that as the Chairman of the Shade Tree Commission he had some concerns about the product and would like Council to allow him some time to look at alternative products to which Council complied.

5. Appraise Council of proposed Bid solicitation for 2017 Pavement Markings project.
   a) The Public Works Director gave a brief overview of the Pavement Markings project which included the bid documents to be ready for contract award in August.

6. Appraise Council of proposed Bid solicitation for 2017 Street and Alley Resurfacing/Reconstruction project.
   a) The Public Works Director gave a brief overview of the Street and Alley Resurfacing/Reconstruction project which included the bid documents to be ready for contract award in August.

7. Appraise Council of proposed Bid Solicitation for the Barnard Street Culvert project.
   a) The Public Works Director informed Council that this project is scheduled for bidding as soon as possible. He also noted that this is one of the projects which was long overdue, but would not be possible to expedite had it not been for the newly implemented Stream Protection Fee (SPF) which will cover all cost for the project. Councilman Flynn, however, remarked that he would suggest that the bridge abutment be painted with graffiti resistant paint. No action needed.

8. Consider Planned University Campus Overlay Traffic Planning Proposal
   a) Borough Manager gave a brief overview of this project, highlighting scope of work and also indicated it will be joint effort between WCU, West Goshen Township and The Borough.

9. Consider Proposal for Town Center Closed Loop System Upgrade
   a) Borough Manager gave a synopsis of this project which was subsequently sent through by a vote of 3 – 0.
      - **TO WORK SESSION AGENDA**

10. Consider Stream Protection Program Support Change Order.
    a) Courtney Finneran, Project Manager of CH2, gave a brief overview highlighting the rationale for the change order request. This was followed by a 3 – 0 vote by Council.
       - **TO WORK SESSION AGENDA**

11. Authorization to Advertise the Goose Creek Pollution Reduction Plan
    a) Borough Manager gave a brief overview of this plan which was followed by a 3 – 0 approval by Council.
       - **TO WORK SESSION AGENDA**

12. Discuss Tennis Court maintenance at Hoopes Park 2017
    a) 3 - 0 approval to move ahead with the project
       - **TO WORK SESSION AGENDA**

13. Discuss Kathy McBratnie Park Playground Renovation 2017
    a) Informative only, no action required or taken.

14. Approve June 2017 Public Works Committee minutes

15. Other Business
    a) None

16. Adjourn
    a) Meeting called for adjournment by Don Braceland, all in favor 3 – 0 .

Updated August 8, 2017

AGENDA

Public Works Committee

August 8, 2017 – 5:30 pm

Committee Members: Donald Braceland (Chair)
Denise Polk
Bernard Flynn

Department Heads: O'B Laing, Public Works
Keith Kurowski, Parks & Recreation

Borough Manager: Michael A. Cotter

1. Call to Order

2. Comments, suggestions, petitions by residents in attendance regarding items not on the agenda.

3. Discuss Gilmore PRP/TMDL Plans *(Issue Briefing (see Agenda Bookmark) & Attachment)*

4. Discuss Marshall Square Park proposal for sidewalk and staircase reconstruction *(Issue Briefing (see Agenda Bookmark) & Attachment)*

5. Discuss PennDOT Winter Traffic Services Agreement *(Issue Briefing (see Agenda Bookmark) & Attachment)*

6. Appraise Council of pending Shade Tree Grant application *(Information only)*

7. Review and approval of Bid Award for Barnard Street Culvert project *(Issue Briefing (see Agenda Bookmark) & Attachment)*

8. Review and approval of Paving Project Bid Award *(Issue Briefing (see Agenda Bookmark) & Attachment)*

9. Review and approval of Bid Award for Pavement markings *(Issue Briefing (see Agenda Bookmark) & Attachment)*

10. Discuss request from Councilman Bernie Flynn to remove bench from the North side of Gay Street in the vicinity of Rite Aid Pharmacy *(Information only)*

11. Friends of Marshall Square Park – discuss two granite in-lay park signs *(Issue Briefing (see Agenda Bookmark) & Attachment)*

12. Friends of Marshall Square Park – discuss "No Smoking Inside Gazebo" signs *(Issue Briefing (see Agenda Bookmark))*

13. Approve July's Public Works Committee meeting minutes *(see Agenda Bookmark)*

14. Other Business

15. Adjourn

Attachment Information:

Click here to access the Attachments.

Attachments can also be located at www.west-chester.com in the Document Center's "Agenda Attachments" folder.

****IDENTIFIER KEY = PW****

WEST CHESTER BOROUGH

POLLUTANT REDUCTION PLANS
AND
TOTAL MAXIMUM DAILY LOAD STRATEGY PLAN

EXECUTIVE SUMMARY

- West Chester Borough is currently operating under the PADEP's General (PAG-13) Small Municipal Separate Storm Sewer Systems (MS4) permit. Requirements include the following:

  - Public Education and Outreach
  - Public Participation
  - Illicit Discharge Detection and Elimination
  - Construction Site Runoff Control
  - Post-Construction Runoff Control
  - Pollution Prevention / Good Housekeeping

- The first permit was issued in 2003 with renewals every 5 years. The next permit period extends from 2018 to 2023. The Borough is required to prepare and submit a new permit application by September 16, 2017.

- Past permit requirements were limited to the fulfillment and reporting of the above listed efforts. A key component of this next permit cycle is the submission of a Pollutant Reduction Plan (PRP) and/or a Total Maximum Daily Load (TMDL) Strategy Plan to accomplish a specified percentage reduction in the amount of pollutants contributing to impaired streams. Pollutant reductions must be achieved within the 5-year permit period.

- PADEP has identified the following streams in the Borough as having specific impairments:

Goose Creek:	Nutrients (i.e., Total Phosphorus)*
Chester Creek (Goose Creek):	Siltation (i.e., sediment) and pathogens
Brandywine Creek:	Siltation
Blackhorse Run:	Siltation
Plum Run:	Siltation
Taylor Run:	Siltation

*Per U.S. Environmental Protection Agency, Philadelphia, PA report titled *Nutrient Total Maximum Daily Load in Goose Creek Watershed, Pennsylvania*, dated June 30, 2008.

As a result, the Borough is required to develop one (1) TMDL Strategy Plan to achieve a 53.9% reduction in the Total Phosphorus loading contributing to Goose Creek and two (2) PRPs to demonstrate a 10% reduction in the sediment loading contributing to Chester Creek/Goose Creek and Brandywine Creek/Blackhorse Run/Plum Run/Taylor Run.

- Because the Borough is subject to the Total Phosphorus TMDL Plan reduction requirements, the Borough will no longer be eligible to be covered by the PAG-13 permit, but now will be required to obtain an Individual MS4 Permit from PADEP.

- The existing sediment and Total Phosphorus loadings and reductions have been calculated based on the land uses within the contributing drainage areas to the impaired streams.

- Effective stormwater Best Management Practices (BMPs) are proposed, including the following combinations of various BMPs:

  - Rain gardens
  - Vegetated curb extensions
  - Bioswales
  - Infiltration trenches
  - Brick pavers with underground infiltration
  - Streambank restoration
  - Street sweeping
  - Tree plantings
  - Pretreatment and membrane filtration systems
  - Storm inlet cleaning

- The above listed BMPs are proposed to be installed at the following locations throughout the Borough:

  - John O. Green Memorial Park
  - Fugett Park/Borough Hall
  - Greenview Alley

- Veterans Park/Pine Alley
- Marshall Square Park
- South Brandywine Street
- Storm sewer system outfalls at E. Nields Street west of S. Franklin Street

- The Public Participation component of the TMDL Strategy Plan and PRPs has been satisfied as follows:

  - The public notice regarding the draft TMDL strategy plan and PRPs was advertised on July 10, 2017.
  - The required public meeting (this discussion) was held on August 8, 2017.
  - Public comments were accepted from July 10, 2017 to August 10, 2017.
  - Public comments will be incorporated, documents will be finalized, and the permit application will be submitted by September 16, 2017 to PADEP.

APPENDIX C

WEST GOSHEN TOWNSHIP

EAST BRADFORD TOWNSHIP

WEST GOSHEN TOWNSHIP

WEST GOSHEN TOWNSHIP

Unnamed Trib Taylor Run

Unnamed Trib Taylor Run

Unnamed Trib Taylor Run

Hannum Trib to Taylor Run

Streambank Restoration BMP Area Approximate Limits

Streambank Restoration BMP Area Approximate Limits

Unnamed Trib Blackhorse Creek

BLACKHORSE CREEK

Streambank Restoration BMP Area Approximate Limits

PLUM RUN

GOOSE CREEK

GOOSE CREEK

UNNAMED TRIB TO GOOSE CREEK

GOOSE CREEK

WEST GOSHEN TOWNSHIP

GOSHEN RD

N LOCUST LA

PARKE HOLLOW LA

HOOPES PARK LA

E LOCUST LA

S LOCUST LA

W ASHBRIDGE ST

E ASHBRIDGE ST

CLARKE ST

PENNY LA

CLOVER AL

MARSHALL DR

HILLSIDE DR

WALDEN DR

MAYFIELD AV

N BRANDYWINE ST

W VIRGINIA AV

E VIRGINIA AV

ELBOW LA

ELIZABETH ST

N MARYLAND AV

NORRIS LA

EBBS LA

JEAN AL

N DARLINGTON ST

BOBBITT AL

HEBRIE AL

N WALNUT ST

NEWLIN AL

FORD CI

N FRANKLIN ST

E MARSHALL ST

LINCOLN AV

CONVENT LA

MARIE AV

S MARYLAND AV

W MARSHALL ST

DOWNINGTOWN PK

OAK PL

W STRASBURG RD

STRATHMORE ST

EBBS AL

N WAYNE ST

WEAVER AL

DEWEES AL

N HIGH ST

W LAFAYETTE ST

E LAFAYETTE ST

PARK AL

W BIDDLE ST

E BIDDLE ST

BRICK AL

PINE AL

N NEW ST

SCHOOL AL

PROSPECT AL

HELEN AL

HESTON AL

HALL AL

AV DOROTHY

W WASHINGTON ST

E WASHINGTON ST

E EVANS ST

PEAR AL

N CHURCH ST

PATTON AL

HANNUM AV

EVANS ST

W CHESTNUT ST

E CHESTNUT ST

N MATLACK ST

PATTON AV

GRANITE AL

W PRESCOTT AL

E PRESCOTT AL

LAW AL

W GAY ST

E GAY ST

N EVERHART ST

HARMONY AL

W COURTHOUSE AL

POTTER AL

MIDDLE AL

N FRANKLIN ST

W MARKET ST

E MARKET ST

PEARL AL

CEDAR AL

RAILROAD ST

S BRADFORD AV

S EVERHART ST

S BRANDYWINE ST

WOODBINE AL

WOLLERTON AL

E MINER ST

LOCUST AL

APPLE AL

WHITMORE AL

S MARKET ST

S FRANKLIN ST

S ADAMS ST

S PENN ST

S WORTHINGTON ST

S POPLAR ST

E BARNARD ST

HOOPES AL

HEMLOCK AL

W BARNARD ST

SPRUCE AL

W MINER ST

W UNION ST

E UNION ST

OAK AL

HICKORY AL

S DARLINGTON ST

WOODBINE AL

HOLLY AL

DEAN ST

DEAN CT

S CHURCH ST

CLINTON AL

S HIGH ST

POPLAR AL

MAGNOLIA ST

CHERRY AL

ADELE AL

PRICE ST

BIRCH AL

BEECH AL

HEMLOCK AL

ELM AL

LACEY ST

ROXBOROUGH DR

JUNIPER AL

JOYCE AL

SHARPLESS ST

ASH AL

KEYSTONE AL

MULBERRY AL

MAPLE AL

HOWE ST

RIGG AL

E NIELDS ST

W NIELDS ST

MULBERRY AL

RANGE AL

N CAMPUS DR

RICHARDS AL

WILLOW AL

UNIVERSITY AV

SPRING GROVE LA

S BRANDYWINE ST

COLLEGE AV

LINDEN ST

DULANEY AL

S MATLOCK ST

S ADAMS ST

S PENN ST

JOSEPH AL

S BOUNDARY ST

TACIE LYNN DR

W ROSEDALE AV

E ROSEDALE AV

S BRADFORD AV

Legend

Stormwater Features

- Inlet
- Manhole
- Junction Manhole Box
- Private Inlet
- Stormwater Outfall
- Pipe Discharge
- Stormwater Pipes
- Streams
- Swale

- Municipal Boundary
- BMP
- BLACKHORSE CREEK
- PLUM RUN
- TAYLOR RUN
- Parsed Areas

Parsed areas - Stormwater Outfall is located along / at the creek; any overland flow that flows into a creek and does not enter MS4 collection system.

WEST CHESTER BOROUGH
MS4 PRP MAP

BRANDYWINE CREEK/ BLACKHORSE RUN/ PLUM RUN/ TAYLOR RUN

WEST CHESTER BOROUGH, CHESTER COUNTY, PA

GILMORE & ASSOCIATES, INC.
ENGINEERING & CONSULTING SERVICES
65 E. BUTLER AVE. SUITE 100, NEW BRITAIN, PA 18901-5106 - (215) 345-4330
www.gilmore-assoc.com

JOB NO: 15-08026T | DATE: JULY 2018 | 0 100 200 400 Feet

WEST GOSHEN TOWNSHIP

EAST BRADFORD TOWNSHIP

WEST GOSHEN TOWNSHIP

WEST GOSHEN TOWNSHIP

Unnamed Trib Taylor Run

Unnamed Trib Blackhorse Creek

Hannum Trib to Taylor Run

BLACKHORSE CREEK

PLUM RUN

GOOSE CREEK

UNNAMED TRIB TO GOOSE CREEK

GOSHEN RD

N LOCUST LA

PARKE HOLLOW LA

HOOPES PARK LA

E LOCUST LA

S LOCUST LA

W ASHBRIDGE ST

E ASHBRIDGE ST

CLARKE ST

PENNY LA

CLOVER AL

MARSHALL DR

HILLSIDE DR

WALDEN DR

MAYFIELD AV

N BRANDYWINE ST

ELIZABETH ST

EL BOW LA

W VIRGINIA AV

E VIRGINIA AV

N MARYLAND AV

S MARYLAND AV

NORRIS LA

EBBS LA

JEAN AL

N DARLINGTON ST

BBBTT AL

WEAVER AL

HIGBEE AL

N WALNUT ST

NEWLIN AL

FORD CI

N FRANKLIN ST

E MARSHALL ST

DOWNINGTOWN PK

W MARSHALL ST

W STRASBURG RD

OAK PL

N EVERHART ST

N WAYNE ST

DEVISES AL

N HIGH ST

W LAFAYETTE ST

E LAFAYETTE ST

CONVENT LA

MARIE AV

LINCOLN AV

PARK AL

W BIDDLE ST

E BIDDLE ST

N BRADFORD AV

HANNUM AV

BIRCH AL

PEAR AL

N CHURCH ST

W WASHINGTON ST

E WASHINGTON ST

PROSPECT ST

HALL AL

E EVANS ST

EVANS ST

PATTON AL

N ADAMS ST

PENN AL

N PENN ST

ST JOHNS AL

W CHESTNUT ST

E CHESTNUT ST

PATTON ST

N MATLACK ST

GRANITE AL

W PRESCOTT AL

PRESCOTT AL

W GAY ST

E GAY ST

HARMONY AL

POTTER AL

W COURTHOUSE AL

MIDDLE AL

N EVERHART ST

N BRANDYWINE ST

W MARKET ST

WOLFERTON AL

HEMLOCK AL

PEARL AL

CEDAR AL

E MARKET ST

E MINER ST

LOCUST AL

APPLE AL

S WARNDT ST

SPRUCE AL

S FRANKLIN ST

S ADAMS ST

S PENN ST

S WORTHINGTON ST

S MATLACK ST

S POPLAR ST

E BARNARD ST

E UNION ST

POPLAR AL

MAGNOLIA ST

BEECH AL

ELM AL

LACEY ST

ASH AL

KEYSTONE AL

MULBERRY AL

RIGG AL

HOWE ST

E NIELDS ST

WILLOW AL

W BARNARD ST

W UNION ST

OAK AL

HICKORY AL

S HIGH ST

ADELE AL

PRICE ST

JUNIPER AL

SHARPLESS ST

DEAN ST

DEAN CT

W NIELDS ST

N CAMPUS DR

UNIVERSITY AV

S BRANDYWINE ST

SPRING GROVE LA

COLLEGE AV

W ROSEDALE AV

S BRADFORD AV

TACIE LYNN DR

DULANEY AL

LINDEN ST

JOSEPH AL

S MATLACK ST

S NEW ST

S WAYNE ST

S EVERHART ST

S BRADFORD AV

HOOPES AL

Legend

Stormwater Features

- Inlet
- Manhole
- Junction Manhole Box
- Private Inlet
- Stormwater Outfall
- Pipe Discharge
- Stormwater Pipes
- Streams
- Swale

Mapshed Landuse Code

- Water
- Low-Density Residential
- Medium-Density Residential
- High-Density Residential
- Low-Density Mixed Urban
- Medium-Density Mixed Urban
- High-Density Mixed Urban
- Hay/Pasture
- Cropland
- Coniferous
- Decidious
- Mixed Woodland
- Woody Wetland
- Emergent Wetland
- Disturbed
- Disturbed
- Turf/Golf

WEST CHESTER BOROUGH
MS4 PRP LAND USE (MAPSHED) MAP

BRANDYWINE CREEK/ BLACKHORSE RUN/ PLUM RUN/ TAYLOR RUN

WEST CHESTER BOROUGH, CHESTER COUNTY, PA

GILMORE & ASSOCIATES, INC.
ENGINEERING & CONSULTING SERVICES
65 E. BUTLER AVE. SUITE 100, NEW BRITAIN, PA 18901-5106 - (215) 345-4330
www.gilmore-assoc.com

JOB NO: 15-08026T | DATE: JULY 2018 | 0 100 200 400 Feet

APPENDIX D

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
STORMWATER DISCHARGES FROM
SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS
BMP EFFECTIVENESS VALUES

This table of BMP effectiveness values (i.e., pollutant removal efficiencies) is intended for use by MS4s that are developing and implementing Pollutant Reduction Plans and TMDL Plans to comply with NPDES permit requirements. The values used in this table generally consider pollutant reductions from both overland flow and reduced downstream erosion, and are based primarily on average values within the Chesapeake Assessment Scenario Tool (CAST) (www.casttool.org). Design considerations, operation and maintenance, and construction sequences should be as outlined in the Pennsylvania Stormwater BMP Manual, Chesapeake Bay Program guidance, or other technical sources. The Department of Environmental Protection (DEP) will update the information contained in this table as new information becomes available. Interested parties may submit information to DEP for consideration in updating this table to DEP's MS4 resource account, RA-EPPAMS4@pa.gov. Where an MS4 proposes a BMP not identified in this document or in Chesapeake Bay Program expert panel reports, other technical resources may be consulted for BMP effectiveness values. Note – TN = Total Nitrogen and TP = Total Phosphorus.

BMP Name	BMP Effectiveness Values			BMP Description
	TN	TP	Sediment	
Wet Ponds and Wetlands	20%	45%	60%	A water impoundment structure that intercepts stormwater runoff then releases it to an open water system at a specified flow rate. These structures retain a permanent pool and usually have retention times sufficient to allow settlement of some portion of the intercepted sediments and attached nutrients/toxics. Until recently, these practices were designed specifically to meet water quantity, not water quality objectives. There is little or no vegetation living within the pooled area nor are outfalls directed through vegetated areas prior to open water release. Nitrogen reduction is minimal.
Dry Detention Basins and Hydrodynamic Structures	5%	10%	10%	Dry Detention Ponds are depressions or basins created by excavation or berm construction that temporarily store runoff and release it slowly via surface flow or groundwater infiltration following storms. Hydrodynamic Structures are devices designed to improve quality of stormwater using features such as swirl concentrators, grit chambers, oil barriers, baffles, micropools, and absorbent pads that are designed to remove sediments, nutrients, metals, organic chemicals, or oil and grease from urban runoff.
Dry Extended Detention Basins	20%	20%	60%	Dry extended detention (ED) basins are depressions created by excavation or berm construction that temporarily store runoff and release it slowly via surface flow or groundwater infiltration following storms. Dry ED basins are designed to dry out between storm events, in contrast with wet ponds, which contain standing water permanently. As such, they are similar in construction and function to dry detention basins, except that the duration of detention of stormwater is designed to be longer, theoretically improving treatment effectiveness.

BMP Name	BMP Effectiveness Values			BMP Description
	TN	TP	Sediment	
Infiltration Practices w/ Sand, Veg.	85%	85%	95%	A depression to form an infiltration basin where sediment is trapped and water infiltrates the soil. No underdrains are associated with infiltration basins and trenches, because by definition these systems provide complete infiltration. Design specifications require infiltration basins and trenches to be built in good soil, they are not constructed on poor soils, such as C and D soil types. Engineers are required to test the soil before approval to build is issued. To receive credit over the longer term, jurisdictions must conduct yearly inspections to determine if the basin or trench is still infiltrating runoff.
Filtering Practices	40%	60%	80%	Practices that capture and temporarily store runoff and pass it through a filter bed of either sand or an organic media. There are various sand filter designs, such as above ground, below ground, perimeter, etc. An organic media filter uses another medium besides sand to enhance pollutant removal for many compounds due to the increased cation exchange capacity achieved by increasing the organic matter. These systems require yearly inspection and maintenance to receive pollutant reduction credit.
Filter Strip Runoff Reduction	20%	54%	56%	Urban filter strips are stable areas with vegetated cover on flat or gently sloping land. Runoff entering the filter strip must be in the form of sheet-flow and must enter at a non-erosive rate for the site-specific soil conditions. A 0.4 design ratio of filter strip length to impervious flow length is recommended for runoff reduction urban filter strips.
Filter Strip Stormwater Treatment	0%	0%	22%	Urban filter strips are stable areas with vegetated cover on flat or gently sloping land. Runoff entering the filter strip must be in the form of sheet-flow and must enter at a non-erosive rate for the site-specific soil conditions. A 0.2 design ratio of filter strip length to impervious flow length is recommended for stormwater treatment urban filter strips.
Bioretention – Raingarden (C/D soils w/ underdrain)	25%	45%	55%	An excavated pit backfilled with engineered media, topsoil, mulch, and vegetation. These are planting areas installed in shallow basins in which the storm water runoff is temporarily ponded and then treated by filtering through the bed components, and through biological and biochemical reactions within the soil matrix and around the root zones of the plants. This BMP has an underdrain and is in C or D soil.
Bioretention / Raingarden (A/B soils w/ underdrain)	70%	75%	80%	An excavated pit backfilled with engineered media, topsoil, mulch, and vegetation. These are planting areas installed in shallow basins in which the storm water runoff is temporarily ponded and then treated by filtering through the bed components, and through biological and biochemical reactions within the soil matrix and around the root zones of the plants. This BMP has an underdrain and is in A or B soil.

BMP Name	BMP Effectiveness Values			BMP Description
	TN	TP	Sediment	
Bioretention / Raingarden (A/B soils w/o underdrain)	80%	85%	90%	An excavated pit backfilled with engineered media, topsoil, mulch, and vegetation. These are planting areas installed in shallow basins in which the storm water runoff is temporarily ponded and then treated by filtering through the bed components, and through biological and biochemical reactions within the soil matrix and around the root zones of the plants. This BMP has no underdrain and is in A or B soil.
Vegetated Open Channels (C/D Soils)	10%	10%	50%	Open channels are practices that convey stormwater runoff and provide treatment as the water is conveyed, includes bioswales. Runoff passes through either vegetation in the channel, subsoil matrix, and/or is infiltrated into the underlying soils. This BMP has no underdrain and is in C or D soil.
Vegetated Open Channels (A/B Soils)	45%	45%	70%	Open channels are practices that convey stormwater runoff and provide treatment as the water is conveyed, includes bioswales. Runoff passes through either vegetation in the channel, subsoil matrix, and/or is infiltrated into the underlying soils. This BMP has no underdrain and is in A or B soil.
Bioswale	70%	75%	80%	With a bioswale, the load is reduced because, unlike other open channel designs, there is now treatment through the soil. A bioswale is designed to function as a bioretention area.
Permeable Pavement w/o Sand or Veg. (C/D Soils w/ underdrain)	10%	20%	55%	Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has an underdrain, no sand or vegetation and is in C or D soil.
Permeable Pavement w/o Sand or Veg. (A/B Soils w/ underdrain)	45%	50%	70%	Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has an underdrain, no sand or vegetation and is in A or B soil.
Permeable Pavement w/o Sand or Veg. (A/B Soils w/o underdrain)	75%	80%	85%	Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has no underdrain, no sand or vegetation and is in A or B soil.
Permeable Pavement w/ Sand or Veg. (A/B Soils w/ underdrain)	50%	50%	70%	Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has an underdrain, has sand and/or vegetation and is in A or B soil.

BMP Name	BMP Effectiveness Values			BMP Description
	TN	TP	Sediment	
Permeable Pavement w/ Sand or Veg. (A/B Soils w/o underdrain)	80%	80%	85%	Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has no underdrain, has sand and/or vegetation and is in A or B soil.
Permeable Pavement w/ Sand or Veg. (C/D Soils w/ underdrain)	20%	20%	55%	Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has an underdrain, has sand and/or vegetation and is in C or D soil.
Stream Restoration	0.075 lbs/ft/yr	0.068 lbs/ft/yr	44.88 lbs/ft/yr	An annual mass nutrient and sediment reduction credit for qualifying stream restoration practices that prevent channel or bank erosion that otherwise would be delivered downstream from an actively enlarging or incising urban stream. Applies to 0 to 3rd order streams that are not tidally influenced. If one of the protocols is cited and pounds are reported, then the mass reduction is received for the protocol.
Forest Buffers	25%	50%	50%	An area of trees at least 35 feet wide on one side of a stream, usually accompanied by trees, shrubs and other vegetation that is adjacent to a body of water. The riparian area is managed to maintain the integrity of stream channels and shorelines, to reduce the impacts of upland sources of pollution by trapping, filtering, and converting sediments, nutrients, and other chemicals. (Note – the values represent pollutant load reductions from stormwater draining through buffers).
Tree Planting	10%	15%	20%	The BMP effectiveness values for tree planting are estimated by DEP. DEP estimates that 100 fully mature trees of mixed species (both deciduous and non-deciduous) provide pollutant load reductions for the equivalent of one acre (i.e., one mature tree = 0.01 acre). The BMP effectiveness values given are based on immature trees (seedlings or saplings); the effectiveness values are expected to increase as the trees mature. To determine the amount of pollutant load reduction that can credited for tree planting efforts: 1) multiply the number of trees planted by 0.01; 2) multiply the acreage determined in step 1 by the pollutant loading rate for the land prior to planting the trees (in lbs/acre/year); and 3) multiply the result of step 2 by the BMP effectiveness values given.
Street Sweeping	3%	3%	9%	Street sweeping must be conducted 25 times annually. Only count those streets that have been swept at least 25 times in a year. The acres associated with all streets that have been swept at least 25 times in a year would be eligible for pollutant reductions consistent with the given BMP effectiveness values.

BMP Name	BMP Effectiveness Values			BMP Description
	TN	TP	Sediment	
Storm Sewer System Solids Removal	0.0027 for sediment, 0.0111 for organic matter	0.0006 for sediment, 0.0012 for organic matter	1 – TN and TP concentrations	This BMP (also referred to as "Storm Drain Cleaning") involves the collection or capture and proper disposal of solid material within the storm system to prevent discharge to surface waters. Examples include catch basins, stormwater inlet filter bags, end of pipe or outlet solids removal systems and related practices. Credit is authorized for this BMP only when proper maintenance practices are observed (i.e., inspection and removal of solids as recommended by the system manufacturer or other available guidelines). The entity using this BMP for pollutant removal credits must demonstrate that they have developed and are implementing a standard operating procedure for tracking the material removed from the sewer system. Locating such BMPs should consider the potential for backups onto roadways or other areas that can produce safety hazards. To determine pollutant reductions for this BMP, these steps must be taken: 1) Measure the weight of solid/organic material collected (lbs). Sum the total weight of material collected for an annual period. Note – do not include refuse, debris and floatables in the determination of total mass collected. 2) Convert the annual wet weight captured into annual dry weight (lbs) by using site-specific measurements (i.e., dry a sample of the wet material to find its weight) or by using default factors of 0.7 (material that is predominantly wet sediment) or 0.2 (material that is predominantly wet organic matter, e.g., leaf litter). 3) Multiply the annual dry weight of material collected by default or site-specific pollutant concentration factors. The default concentrations are shown in the BMP Effectiveness Values columns. Alternatively, the material may be sampled (at least annually) to determine site-specific pollutant concentrations. DEP will allow up to 50% of total pollutant reduction requirements to be met through this BMP. The drainage area treated by this BMP may be no greater than 0.5 acre unless it can be demonstrated that the specific system proposed is capable of treating stormwater from larger drainage areas. For planning purposes, the sediment removal efficiency specified by the manufacturer may be assumed, but no higher than 80%.

APPENDIX E

Select input data file: C:\MapShed\Runfiles\BrandywineJuly\Output\BrandywineJuly-0_ua.csv

Watershed Totals | Municipality Loads | Regulated Loads | Unregulated Loads

GWLF-E Average Loads by Source for Watershed 0

Source	Area (ac)	Sediment Total Load (lb)	Sediment Loading Rate (lb/ac)	Nitrogen Total Load (lb)	Nitrogen Loading Rate (lb/ac)	Phosphorus Total Load (lb)	Phosphorus Loading Rate (lb/ac)
Hay/Pasture	403	81482.85	202.20	261.87	0.65	67.31	0.17
Cropland	124	221630.71	1787.30	734.21	5.92	136.62	1.10
Forest	1169	17659.03	15.10	92.09	0.08	12.43	0.01
Wetland	126	1080.27	8.60	30.23	0.24	2.05	0.02
Disturbed	5	396.83	79.40	0.97	0.19	0.31	0.06
Turfgrass	153	13999.35	91.40	110.52	0.72	13.32	0.09
Open Land	914	222534.61	243.50	1067.19	1.17	131.48	0.14
Bare Rock	0	0.00	0.00	0.00	0.00	0.00	0.00
Sandy Areas	0	0.00	0.00	0.00	0.00	0.00	0.00
Unpaved Roads	0	0.00	0.00	0.00	0.00	0.00	0.00
LD Mixed	49	1212.54	24.70	28.31	0.58	3.09	0.06
MD Mixed	215	21428.93	99.70	458.08	2.13	52.56	0.24
HD Mixed	880	87699.89	99.70	1874.39	2.13	215.08	0.24
LD Residential	222	5467.46	24.60	127.43	0.57	13.85	0.06
MD Residential	2390	238231.52	99.70	5091.42	2.13	584.20	0.24
HD Residential	230	22906.03	99.60	489.67	2.13	56.20	0.24
Water	1.7946637						
Farm Animals				0.0		0.0	
Tile Drainage		0.0		0.0		0.0	
Stream Bank		3185344.6		1591.7		425.5	
Groundwater				13090.3		251.9	
Point Sources				0.0		0.0	
Septic Systems				1563.1		0.0	
Totals	**6882**	**4121075**		**26611**		**1966**	

Print | Export to JPEG | Exit

Select input data file: C:\MapShed\Runfiles\BrandywineJuly\Output\BrandywineJuly-0_ua.csv

Watershed Totals | **Municipality Loads** | Regulated Loads | Unregulated Loads

View loads for municipality: (00200)

Source	Source Area (ac)	Sediment Total Load (lb)	Sediment Loading Rate (lb/ac)	Nitrogen Total Load (lb)	Nitrogen Loading Rate (lb/ac)	Phosphorus Total Load (lb)	Phosphorus Loading Rate (lb/ac)
Hay/Pasture	0	0.00	0.00	0.00	0.00	0.00	0.00
Cropland	0	0.00	0.00	0.00	0.00	0.00	0.00
Forest	7	105.70	15.10	0.60	0.08	0.10	0.01
Wetland	0	0.00	0.00	0.00	0.00	0.00	0.00
Disturbed	0	0.00	0.00	0.00	0.00	0.00	0.00
Turfgrass	27	2467.80	91.40	19.40	0.72	2.40	0.09
Open Land	7	1704.50	243.50	8.20	1.17	1.00	0.14
Bare Rock	0	0.00	0.00	0.00	0.00	0.00	0.00
Sandy Areas	0	0.00	0.00	0.00	0.00	0.00	0.00
Unpaved Roads	0	0.00	0.00	0.00	0.00	0.00	0.00
LD Mixed	0	0.00	0.00	0.00	0.00	0.00	0.00
MD Mixed	10	997.00	99.70	21.30	2.13	2.40	0.24
HD Mixed	205	20438.50	99.70	436.70	2.13	49.20	0.24
LD Residential	2	49.20	24.60	1.10	0.57	0.10	0.06
MD Residential	188	18743.60	99.70	400.40	2.13	45.10	0.24
HD Residential	67	6673.20	99.60	142.70	2.13	16.10	0.24
Water	0						
							Source Weighting
Farm Animals				0.0		0.0	0.000
Tile Drainage		0.00		0.0		0.0	0.000
Stream Bank		326219.28		163.0		43.6	0.144
Groundwater				1374.5		26.4	0.105
Point Sources				0.0		0.0	0.000
Septic Systems				17.2		0.0	0.011
Totals	**513**	**377398.8**		**2585.1**		**186.4**	

Print | Export to JPEG | Exit

Select input data file: C:\MapShed\Runfiles\BrandywineJuly\Output\BrandywineJuly-0_ua.csv

Watershed Totals | **Municipality Loads** | Regulated Loads | Unregulated Loads

View loads for municipality: Area1 (00001)

Source	Source Area (ac)	Sediment Total Load (lb)	Sediment Loading Rate (lb/ac)	Nitrogen Total Load (lb)	Nitrogen Loading Rate (lb/ac)	Phosphorus Total Load (lb)	Phosphorus Loading Rate (lb/ac)
Hay/Pasture	0	0.00	0.00	0.00	0.00	0.00	0.00
Cropland	0	0.00	0.00	0.00	0.00	0.00	0.00
Forest	10	151.00	15.10	0.80	0.08	0.10	0.01
Wetland	0	0.00	0.00	0.00	0.00	0.00	0.00
Disturbed	0	0.00	0.00	0.00	0.00	0.00	0.00
Turfgrass	0	0.00	0.00	0.00	0.00	0.00	0.00
Open Land	10	2435.00	243.50	11.70	1.17	1.40	0.14
Bare Rock	0	0.00	0.00	0.00	0.00	0.00	0.00
Sandy Areas	0	0.00	0.00	0.00	0.00	0.00	0.00
Unpaved Roads	0	0.00	0.00	0.00	0.00	0.00	0.00
LD Mixed	2	49.40	24.70	1.20	0.58	0.10	0.06
MD Mixed	0	0.00	0.00	0.00	0.00	0.00	0.00
HD Mixed	30	2991.00	99.70	63.90	2.13	7.20	0.24
LD Residential	20	492.00	24.60	11.40	0.57	1.20	0.06
MD Residential	0	0.00	0.00	0.00	0.00	0.00	0.00
HD Residential	59	5876.40	99.60	125.70	2.13	14.20	0.24
Water	0						Source Weighting
Farm Animals				0.0		0.0	0.000
Tile Drainage		0.00		0.0		0.0	0.000
Stream Bank		79700.82		39.8		10.6	0.034
Groundwater				327.3		6.3	0.025
Point Sources				0.0		0.0	0.000
Septic Systems				139.1		0.0	0.089
Totals	**131**	**91695.6**		**720.9**		**41.1**	

Print | Export to JPEG | Exit

Select input data file: C:\MapShed\Runfiles\BrandywineJuly\Output\BrandywineJuly-0_ua.csv

Watershed Totals | **Municipality Loads** | Regulated Loads | Unregulated Loads

View loads for municipality: Area2 (00002)

Source	Source Area (ac)	Sediment Total Load (lb)	Sediment Loading Rate (lb/ac)	Nitrogen Total Load (lb)	Nitrogen Loading Rate (lb/ac)	Phosphorus Total Load (lb)	Phosphorus Loading Rate (lb/ac)
Hay/Pasture	0	0.00	0.00	0.00	0.00	0.00	0.00
Cropland	0	0.00	0.00	0.00	0.00	0.00	0.00
Forest	0	0.00	0.00	0.00	0.00	0.00	0.00
Wetland	0	0.00	0.00	0.00	0.00	0.00	0.00
Disturbed	0	0.00	0.00	0.00	0.00	0.00	0.00
Turfgrass	0	0.00	0.00	0.00	0.00	0.00	0.00
Open Land	0	0.00	0.00	0.00	0.00	0.00	0.00
Bare Rock	0	0.00	0.00	0.00	0.00	0.00	0.00
Sandy Areas	0	0.00	0.00	0.00	0.00	0.00	0.00
Unpaved Roads	0	0.00	0.00	0.00	0.00	0.00	0.00
LD Mixed	0	0.00	0.00	0.00	0.00	0.00	0.00
MD Mixed	0	0.00	0.00	0.00	0.00	0.00	0.00
HD Mixed	94	9371.80	99.70	200.20	2.13	22.60	0.24
LD Residential	0	0.00	0.00	0.00	0.00	0.00	0.00
MD Residential	0	0.00	0.00	0.00	0.00	0.00	0.00
HD Residential	72	7171.20	99.60	153.40	2.13	17.30	0.24
Water	0						
							Source Weighting
Farm Animals				0.0		0.0	0.000
Tile Drainage		0.00		0.0		0.0	0.000
Stream Bank		123822.43		61.9		16.5	0.061
Groundwater				484.3		9.3	0.037
Point Sources				0.0		0.0	0.000
Septic Systems				0.0		0.0	0.000
Totals	166	140365.4		899.8		65.7	

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Urban Scenario BMP Editor

Performance Standard Calculations

Retrofits

BMP Type: Infiltration Basin

Area Treated (ha)		Existing Area (ha)	
LD Residential	0	LD Residential	90
MD Residential	0	MD Residential	967
HD Residential	0.222	HD Residential	93
LD Mixed	0	LD Mixed	20
MD Mixed	0	MD Mixed	87
HD Mixed	0	HD Mixed	356
Total	0	**Total**	1613

Rainfall Captured (2.54 cm = 1 in)

Depth (cm): 3.81

Volume (m3): 74

Run

Calculated Reduction Efficiency

TN 0.65 TP 0.76 TSS 0.82

New Development

BMP Type: Select BMP Type

Area Developed (ha)		Area Replaced (ha)		Existing Area (ha)	
LD Residential	0	Hay/Pasture	0	Hay/Pasture	163
MD Residential	0	Cropland	0	Cropland	50
HD Residential	0	Forest	0	Forest	473
LD Mixed	0	Disturbed	0	Disturbed	2
MD Mixed	0	Turfgrass	0	Turfgrass	62
HD Mixed	0	Open Land	0	Open Land	370
Total	0	**Total**	0	**Total**	1120

Rainfall Captured (2.54 cm = 1 in)

Depth (cm): 7.10

Volume (m3): 0

Run

Calculated Reduction Efficiency

TN 0.00 TP 0.00 TSS 0.00

Stream Protection

Vegetative buffer strip width (m)	0
Fraction of streams treated (0-1)	0.000
Total streams in non-ag areas (km)	29.8
Streams w/bank stabilization (km)	0.0

Street Sweeping

Fraction of area treated (0-1): 1.000

Sweep Type: (•) Mechanical ( ) Vacuum

Times/month

Jan	0	Apr	0	Jul	0	Oct	0
Feb	0	May	0	Aug	0	Nov	0
Mar	0	Jun	0	Sep	0	Dec	0

Rural BMP Editor

BMP Efficiency Editor

Export to JPEG

Save File

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Select input data file: C:\MapShed\Runfiles\BrandywineJuly\Output\BrandywineBMPJuly-0_ua.csv

Watershed Totals | Municipality Loads | Regulated Loads | Unregulated Loads

GWLF-E Average Loads by Source for Watershed 0

Source	Area (ac)	Sediment Total Load (lb)	Sediment Loading Rate (lb/ac)	Nitrogen Total Load (lb)	Nitrogen Loading Rate (lb/ac)	Phosphorus Total Load (lb)	Phosphorus Loading Rate (lb/ac)
Hay/Pasture	403	81482.85	202.20	261.87	0.65	67.31	0.17
Cropland	124	221630.71	1787.30	734.21	5.92	136.62	1.10
Forest	1169	17659.03	15.10	92.09	0.08	12.43	0.01
Wetland	126	1080.27	8.60	30.23	0.24	2.05	0.02
Disturbed	5	396.83	79.40	0.97	0.19	0.31	0.06
Turfgrass	153	13999.35	91.40	110.52	0.72	13.32	0.09
Open Land	914	222534.61	243.50	1067.19	1.17	131.48	0.14
Bare Rock	0	0.00	0.00	0.00	0.00	0.00	0.00
Sandy Areas	0	0.00	0.00	0.00	0.00	0.00	0.00
Unpaved Roads	0	0.00	0.00	0.00	0.00	0.00	0.00
LD Mixed	49	1212.54	24.70	28.31	0.58	3.09	0.06
MD Mixed	215	21428.93	99.70	458.01	2.13	52.56	0.24
HD Mixed	880	87677.84	99.60	1874.15	2.13	215.04	0.24
LD Residential	222	5467.46	24.60	127.41	0.57	13.85	0.06
MD Residential	2390	238187.43	99.70	5090.74	2.13	584.11	0.24
HD Residential	230	22906.03	99.60	489.60	2.13	56.17	0.24
Water	1.7946637						
Farm Animals				0.0		0.0	
Tile Drainage		0.0		0.0		0.0	
Stream Bank		3184927.9		1591.7		425.5	
Groundwater				13090.2		251.9	
Point Sources				0.0		0.0	
Septic Systems				1563.1		0.0	
Totals	**6882**	**4120592**		**26610**		**1966**	

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APPENDIX F

VETERANS PARK/PINE ALLEY: PROPOSED GREEN INFRASTRUCTURE CONCEPTS

Veterans Park is a 0.49 acre park tucked behind residential homes in northwest West Chester. Park visitors can enter the park by car or foot via Brick Alley, Pine Alley, Veit Alley, and by foot at the entrance on W Washington Street.

Proposed green infrastructure (GI) concepts for the park include a vegetated infiltration trench along Pine Alley to capture alley, roadway, and roof runoff, rain gardens (one in the park and two smaller versions near the park entrance on Washington St), planters, and tree plantings throughout to enhance gaps in existing tree canopy. General park enhancement recommendations include improving signage and wayfinding at the park entrances and improving lighting around the park and connecting alleys. There are significant erosion issues along the paved alleys due to vehicular traffic and solutions include introducing vegetated barriers (i.e. dense low-growing shrubs), curbing, bollards, and/or other deterrents. Finally, the amount of impervious paving around the pavilion is excessive and can be slightly reduced and replaced with plantings as shown.

Collectively, these GI features would capture and treat runoff from the park property and several adjacent streets as shown on the concept plan. During larger storm events, overflow structures would allow excess runoff to flow into existing storm sewers. In addition to reducing and treating stormwater runoff, these GI features have the potential to add aesthetic value to the park and work in harmony with the existing active and passive recreational uses on the site. The proposed features along Pine Alley would be closely coordinated with the planned reconstruction of the 36-inch brick storm sewer the runs beneath the alley.

- Inlet
- Stormwater MH
- Existing Stormwater Pipes
- 2 ft Contours
- Surface Flow
- Parcels
- Drainage Area

Proposed GI Features

- Bioswale/Plantings
- Infiltration Trench
- Rain Garden

NORTH

0 20 40 Feet

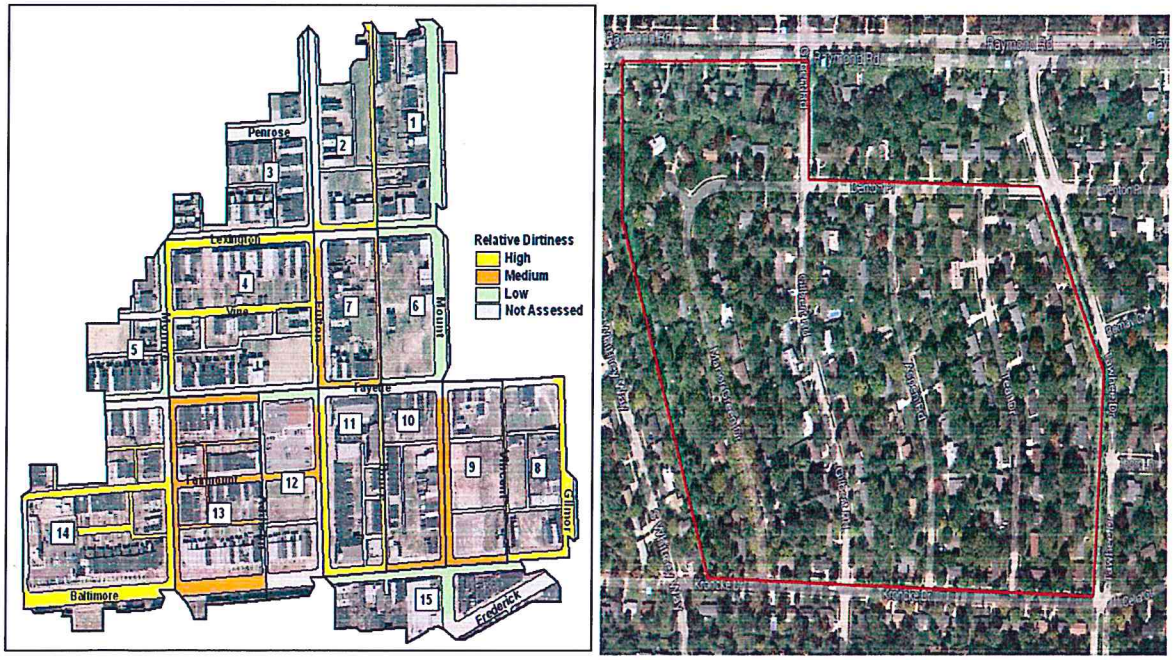
APPENDIX G

Recommendations of the Expert Panel to Define Removal Rates for Street and Storm Drain Cleaning Practices

Sebastian Donner, Bill Frost, Norm Goulet, Marty Hurd, Neely Law, Thomas Maguire, Bill Selbig, Justin Shafer, Steve Stewart and Jenny Tribo

FINAL REPORT

Approved by CBP Management Board



May 19, 2016

Prepared by:

Tom Schueler, Chesapeake Stormwater Network

Table 3. Summary of Street Cleaning Implementation, 2009-2013, as reported and credited in annual progress runs (acres and lbs)

YEAR	DC	DE	PA	WV	VA
2009	1 ac			218,000 lbs	632 ac
2010	1,631 ac			227,000 lbs	
2011	1,540 ac		619 ac		75,385,792 lbs
2012	1,539 ac		413 ac		
2013	1,526 ac	79,541 lbs	3,240,489 lbs	190,000 lbs	218,677 lbs
2014	1,531 ac	413,367 lbs	3,367,040 lbs	700,000 lbs	426,671 lbs

3.4 How the CBWM Simulates Loads From Streets

The Phase 5.3.2 Chesapeake Bay Watershed Model simulates two types of urban land: pervious and impervious cover. These two cover types are used to simulate the full range of urban land use categories (industrial, commercial, residential, institutional and transport). This means that different street types (e.g., highways, arterials, residential streets) are lumped in with other impervious surfaces (e.g., driveways, sidewalks, rooftops, parking lots), and are currently represented as a single impervious layer. As a result, streets and roads do not load differently and are not counted separately in the current version of the CBWM. Table 4 portrays the average annual nutrient and sediment loadings associated with urban impervious cover in the current model.

Table 4. Loading Rates Associated with Urban Impervious Cover in the Chesapeake Bay Watershed Model, Version 5.3.2.

Acres in Watershed [1]	1,269,030
Average TN Load [2]	15.5 lbs/ac/yr
Average TP Load [2]	1.93 lbs/ac/yr
Average TSS Load [2]	0.65 t/ac/yr
Key Inputs	Air Deposition, Build-up/Wash-off, No Groundwater Interaction, No Direct Interaction with Pervious Cover

[1] Acres, as reported in most recent CBWM version 5.3.2
[2] Average values, as reported in Tetra Tech (2014), although actual values are regionally variable across the watershed.

It should be noted that not all of the sediment load generated from urban impervious cover actually reaches the Chesapeake Bay. The sediment loads at the edge of pavement are adjusted downward by a sediment delivery factor in the current version of the CBWM. For a more thorough discussion of the sediment delivery factor, please consult the discussion in SR EP (2014).

The Panel elected to not to use WINSLAMM to explicitly simulate nutrients, and instead estimated them based on empirical nutrient enrichment ratios for street solids (see Section 4.4).

Table 15. Adapting the WINSLAMM Model for the Chesapeake Bay Watershed

Bay rainfall data. The model used the calibration period from 1995 through 2005 using Washington National Airport Station event-based rainfall data. The rainfall data was processed assuming the minimum number of hours between events is 6 hours and the minimum rainfall event depth is 0.01 inch.

East Coast input data files were prepared to represent street conditions across the Chesapeake Bay watershed. The particle size distribution and peak-to-average flow ratio files were set to the program default average pavement and flow ratio files

Four different street types were simulated to represent in different land uses that had curb and gutter drainage systems:

Single-family residential: Approximately 0.25-acre lots, with cul-de-sacs connecting to two-lane residential feeder roads with parallel parking on one side; light traffic; and 25 mile-per-hour (mph) speed limit. Approximately 33 houses in a 10-acre area. The driveways are simulated as draining onto the roads.

Commercial (80 percent impervious): Big box stores and parking lots. Feeder roads (two travel lanes and center turn lane) with no on-street parking, 35 mph speed limit, and heavy traffic.

Ultra-urban downtown (95 percent impervious): Multistory buildings. Two-lane urban roads with parallel parking on both sides of the street, sidewalks, and 25 mph speed limit.

Arterial highway: A four-lane divided road with median with barrier; high-speed traffic with turn lanes; and no on-street parking. Assumed to be commercial land use

Three different sweeping start/stop dates to reflect regional differences in climate across the watershed:

- Sweeping occurs over the entire year
- Sweeping suspended December 1, restarts March 15
- Sweeping suspended December 15, restarts February 15

Six different fixed sweeping schedules

2PW = 2 passes per week	1P4W = 1 pass every 4 weeks
1PW = 1 pass every week	1P8W = 1 pass every 8 weeks
1P2W = 1 pass every 2 weeks	1P12W = 1 pass every 12 weeks

Four seasonal sweeping schedules (more intensive in Spring or Fall)

- S1: Spring – One pass every week from March to April. Monthly otherwise
- S2: Spring – One pass every other week from March to April. Monthly otherwise
- S3: Spring and fall – One pass every week (March to April, October to November). Monthly otherwise
- S4: Spring and fall – One pass every other week during the season. Monthly otherwise

Two Levels of Sweeper Technology

MBC = Mechanical broom cleaning	VAC = Vacuum assisted cleaning

Four Options for Street Parking Density and No Parking Enforcement

For more details, consult the technical memo (Tetra Tech, Inc., 2015)

each street cleaning scenario, and subtracting the resulting nutrient load from the unit area nutrient load for impervious cover calculated by the watershed model.

The standard street cleaning unit are curb miles swept. In general, one impervious acre is equivalent to one curb-lane mile swept, assuming they are swept on one-side only. Credit is also provided for cleaning municipal and commercial parking lots (in this case, the acres of parking lot swept are reported, and converted to lane miles using the one acre = one curb lane mile rule of thumb.

The panel elected to consolidate the model results to show specific removal rates for eleven different street cleaning practices, primarily involving the use of advanced street cleaning technology at different frequencies (Table 17).

Table 17. Pollutant Reductions Associated with Different Street Cleaning Practices

Practice #	Description [1]	Approx Passes/Yr [2]	TSS Removal (%)	TN Removal (%)	TP Removal (%)
SCP-1	AST- 2 PW	~100	21	4	10
SCP-2	AST- 1 PW	~50	16	3	8
SCP-3	AST- 1 P2W	~25	11	2	5
SCP-4	AST- 1 P4W	~10	6	1	3
SCP-5	AST- 1 P8W	~6	4	0.7	2
SCP-6	AST- 1 P12W	~4	2	0	1
SCP-7	AST- S1 or S2	~15	7	1	4
SCP-8	AST- S3 or S4	~20	10	2	5
SCP-9	MBT- 2PW	~100	1.0	0	0
SCP-10	MBT- 1 PW	~50	0.5	0	0
SCP-11	MBT- 1 P4W	~10	0.1	0	0

AST: Advanced Sweeping Technology MBT: Mechanical Broom Technology
[1] See Table 15 for the codes used to define street cleaning frequency
[2] Depending on the length of the winter shutdown, the number of passes/yr may be lower than shown