MS4 ANNUAL REPORT

For the Period July 1, 2021 to June 30, 2022
NPDES Permit No. PAI-133546

Prepared for:

MAIDENCREEK TOWNSHIP
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Blandon, PA 19510

Prepared by:

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22-0019-0191

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MS4 Annual Report

Stormwater Management Program (SWMP)

MS4 ANNUAL REPORT

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

ANNUAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) STATUS REPORT

FOR THE PERIOD July 1, 2021 TO JUNE 30, 2022

GENERAL INFORMATION			
Permittee Name:	Maidencreek Township	NPDES Permit No.:	PAI133546
Mailing Address:	P.O. Box 319	Effective Date:	04/01/2019
City, State, Zip:	Blandon, PA 19510	Expiration Date:	03/31/2024
MS4 Contact Person:	Hunter L. Ahrens	Renewal Due Date:	10/02/2023
Title:	Township Manager	Municipality:	Maidencreek Township
Phone:	(610) 926-4920	County:	Berks
Email:	hlahrens@maidencreek.net		
Co-Permittees (if applicable):			

Appendix(ces) that permittee is subject to (select all that apply):

☐ Appendix A ☒ Appendix B ☒ Appendix C ☐ Appendix D ☒ Appendix E ☒ Appendix F

WATER QUALITY INFORMATION

Are there any discharges to waters within the Chesapeake Bay Watershed? ☐ Yes ☒ No

Identify all surface waters that receive stormwater discharges from the permittee's MS4 and provide the requested information (see instructions).

Receiving Water Name	Ch. 93 Class.	Impaired?	Cause(s)	TMDL?	WLA?
Lake Ontelaunee	WWF, MF	yes	Nutrients, Suspended solids	yes	TP/TSS
Willow Creek and unnamed tributaries	HQ-CWF/MF	yes	Pathogens, Nutrients	no	no
Maiden Creek	WWF, MF	yes	Pathogens	no	no

GENERAL MINIMUM CONTROL MEASURE (MCM) INFORMATION

Have you completed all MCM activities required by the permit for this reporting period? ☐ Yes ☐ No

List the current entity responsible for implementing each MCM of your SWMP, along with contact name and phone number.

MCM	Entity Responsible	Contact Name	Phone
#1 Public Education and Outreach on Storm Water Impacts	Maidencreek Township	Hunter Ahrens	(610) 926-4920
#2 Public Involvement/Participation	Maidencreek Township	Hunter Ahrens	(610) 926-4920
#3 Illicit Discharge Detection and Elimination (IDD&E)	Maidencreek Township	Keith Shuman	(610) 926-4920
#4 Construction Site Storm Water Runoff Control	Berks County Conservation District	Dean Druckenmiller	(610) 372-4657
#5 Post-Construction Storm Water Management in New Development and Redevelopment	Maidencreek Township	Hunter Ahrens	(610) 926-4920
#6 Pollution Prevention / Good Housekeeping	Maidencreek Township	Keith Shuman	(610) 926-4920

MCM #1 – PUBLIC EDUCATION AND OUTREACH ON STORM WATER IMPACTS

BMP #1: Develop, implement and maintain a written Public Education and Outreach Program.

1. For new permittees only, has the written PEOP been developed and implemented within the first year of permit coverage?

   ☐ Yes ☐ No

2. Date of latest annual review of PEOP: 08/13/2020 Were updates made? ☐ Yes ☒ No

3. What were the plans and goals for public education and outreach for the reporting period?

   Educate residents on reducing stormwater runoff and proper disposal of pet waste, grass clippings, leaves and brush. Provide education to farmers and septic systems owners. Handouts were provided at the Township Building. Stormwater information was handed out with building permits.

4. Did the MS4 achieve its goal(s) for the PEOP during the reporting period? ☒ Yes ☐ No

5. Identify specific plans and goals for public education and outreach for the upcoming year:

   Educate residents on the location of the new yardwaste dropoff site and what is accepted at the site. Continue to provide education on what illicit discharge is and how to report it. Educate the public on the health of our streams and keeping our drinking water supply clean.

BMP #2: Develop and maintain lists of target audience groups present within the areas served by your MS4.

1. For new permittees only, have the target audience lists been developed and implemented within the first year of permit coverage?

   ☐ Yes ☐ No

2. Date of latest annual review of target audience lists: 08/13/2020 Were updates made? ☐ Yes ☒ No

BMP #3: Annually publish at least one educational item on your Stormwater Management Program.

1. For new permittees only, were stormwater educational and informational items produced and published in print and/or on the Internet within the first year of permit coverage?

☐ Yes ☐ No

2. Date of latest annual review of educational materials: 08/13/2020 Were updates made? ☐ Yes ☒ No

3. Do you have a municipal website? ☒ Yes ☐ No (URL: www.maidencreek.net)

If Yes, what MS4-related material does it contain?
The website contains the PEOP and PIPP, the TMDL plan, the PRP and the last annual MS4 report. There are links to educational materials such as Caring for your Streamside Property, When It Rains, It Drains, Swimming Pool Water Discharge Guidelines, and Septic System Care and Maintenance.

4. Describe any other method(s) used during the reporting period to provide information on stormwater to the public:

5. Identify specific plans for the publication of stormwater materials for the upcoming year:
The Township will continue to publish three newsletters, a calendar and a postcard on the new yard waste dropoff site. A special mailing will be made in August to septic system users. New homeowners will receive educational material in their new homeowners packets.

BMP #4: Distribute stormwater educational materials to the target audiences.

Identify the two additional methods of distributing stormwater educational materials during the previous reporting period (e.g., displays, posters, signs, pamphlets, booklets, brochures, radio, local cable TV, newspaper articles, other advertisements, bill stuffers, posters, presentations, conferences, meetings, fact sheets, giveaways, or storm drain stenciling).

The Township will give away stormwater posters at safe Halloween and maintain signs in the township open space. A stromwater bulletin board is maintained in the Township Lobby and a magnet and a card on storm drain stenciling are available in the Township building lobby.

MCM #1 Comments:

MCM #2 – PUBLIC INVOLVEMENT/PARTICIPATION

BMP #1: Develop, implement and maintain a written Public Involvement and Participation Program (PIPP)

1. For new permittees only, was the PIPP developed and implemented within one year of permit coverage?
☐ Yes ☐ No

2. Date of latest annual review of PIPP: 08/13/2020 Were updates made? ☐ Yes ☒ No

BMP #2: Advertise to the public and solicit public input on ordinances, SOPs, Pollutant Reduction Plans (PRPs) (if applicable) and TMDL Plans (if applicable), including modifications thereto, prior to adoption or submission to DEP:

1. Was an MS4-related ordinance, SOP, PRP or TMDL Plan developed during the reporting period? ☐ Yes ☒ No

2. If Yes, describe how you advertised the draft document(s) and how you provided opportunities for public review, input and feedback:

3. If an ordinance, SOP or plan was developed or amended during the reporting period, provide the following information:

Ordinance / SOP / Plan Name	Date of Public Notice	Date of Public Hearing	Date Enacted or Submitted to DEP

BMP #3: Regularly solicit public involvement and participation from the target audience groups using available distribution and outreach methods.

1. At least one public meeting or other MS4 event must be held during the 5-year permit coverage period to solicit participation and feedback from target audience groups. Was this meeting or event held during the reporting period?

   ☐ Yes ☒ No If Yes, Date of Meeting or Event:

2. Report instances of cooperation and participation in MS4 activities; presentations the permittee made to local watershed and conservation organizations; and similar instances of participation or coordination with organizations in the community.

   On July 16, 2020, Maidencreek Township became actively involved in the Berks County Source Water Protection Committee and began attending quarterly meetings. On March 23, 2021, Maidencreek Township participated in the annual Reading Area Water Authority Source Water Protection meeting.

3. Report activities in which members of the public assisted or participated in the meetings and in the implementation of the SWMP, including education activities or efforts such as cleanups, monitoring, storm drain stenciling, or others.

MCM #2 Comments:

MCM #3 – ILLICIT DISCHARGE DETECTION AND ELIMINATION (IDD&E)

BMP #1: Develop and implement a written program for the detection, elimination, and prevention of illicit discharges into the regulated small MS4.

1. For new permittees only, was the written IDD&E program developed within one year of permit coverage?

   ☐ Yes ☐ No

2. Date of latest annual review of IDD&E program: 06/04/2020 Were updates made? ☐ Yes ☒ No

BMP #2: Develop and maintain map(s) that show permittee and urbanized area boundaries, the location of all outfalls and, if applicable, observation points, and the locations and names of all surface waters that receive discharges from those outfalls. Outfalls and observation points shall be numbered on the map(s).

1. Have you completed a map(s) that includes all components of BMP #2? ☒ Yes ☐ No

   If Yes and you are a new permittee and have not submitted the map(s) previously, attach the map(s) to this report.

   If No, date by which permittee expects map(s) to be completed:

2. Date of last update or revision to map(s): 04/01/2019

3. Total No. of Outfalls in MS4: 56 Total No. of Outfalls Mapped: 56

4. Total No. of Observation Points: 7 Total No. of Observation Points Mapped: 7

5. During the reporting period, have you identified any existing outfalls that have not been previously reported to DEP in an NOI, application or annual report, or are any new MS4 outfalls proposed for the next reporting period?

   ☐ Yes ☒ No If Yes, select: ☐ Existing Outfall(s) Identified ☐ New Outfall(s) Proposed

BMP #3: In conjunction with the map(s) created under BMP #2 (either on the same map or on a different map), the permittee shall develop and maintain map(s) that show the entire storm sewer collection system within the permittee's jurisdiction that are owned or operated by the permittee (including roads, inlets, piping, swales, catch basins, channels, and any other components of the storm sewer collection system), including privately-owned components of the collection system where conveyances or BMPs on private property receive stormwater flows from upstream publicly-owned components.

1. Have you completed a map(s) that includes all components of BMP #3? ☒ Yes ☐ No

   If Yes and you are a new permittee and have not submitted the map(s) previously, attach the map(s) to this report.

   If No, date by which permittee expects map(s) to be completed:

2. If Yes to #1, is the map(s) on the same map(s) as for outfalls and receiving waters? ☒ Yes ☐ No

3. Date of last update or revision to map(s): 04/01/2019

BMP #4: Conduct dry weather screenings of MS4 outfalls to evaluate the presence of illicit discharges. If any illicit discharges are present, the permittee shall identify the source(s) and take appropriate actions to remove or correct any illicit discharges. The permittee shall also respond to reports received from the public or other agencies of suspected or confirmed illicit discharges associated with the storm sewer system, as well as take enforcement action as necessary. The permittee shall immediately report to DEP illicit discharges that would endanger users downstream from the discharge, or would otherwise result in pollution or create a danger of pollution or would damage property.

For new permittees, all identified outfalls (and if applicable observation points) must be screened during dry weather at least twice within the 5-year period following permit coverage. For existing permittees, all identified outfalls (and if applicable observation points) must be screen during dry weather at least once within the 5-year period following permit coverage and, for areas where past problems have been reported or known sources of dry weather flows occur on a continual basis, outfalls must be screened annually during each year of permit coverage.

1. How many unique outfalls (and if applicable observation points) were screened during the reporting period? 11

2. Indicate the percentage of all outfalls screened in the past five years. 100%

3. Indicate the percent of outfalls screened during the reporting period that revealed dry weather flows: 0%

4. Did any dry weather flows reveal color, turbidity, sheen, odor, floating or submerged solids? ☐ Yes ☐ No

5. If Yes for #4, attach all sample results to this report with a map identifying the sample location. Explain the corrective action(s) taken in the attachment.

6. Do you use the MS4 Outfall Field Screening Report form (3800-FM-BCW0521) provided in the permit?

   ☒ Yes ☐ No

   If No, attach a copy of your screening report form.

BMP #5: Enact a Stormwater Management Ordinance or SOP to implement and enforce a stormwater management program that includes prohibition of non-stormwater discharges to the regulated small MS4.

1. Do you have an ordinance (municipal) or SOP or other mechanism (non-municipal) that prohibits non-stormwater discharges? ☒ Yes ☐ No

   If Yes, indicate the date of the ordinance or SOP: 06/12/2008

2. If Yes to #1, is the ordinance or SOP consistent with DEP's 2022 Model Stormwater Management Ordinance (3800-PM-BCW0100j) with respect to authorized non-stormwater discharges? ☐ Yes ☒ No (Township is reviewing DEP's 2022 Model Stormwater Management Ordinance for adoption.)

   If Yes to #2 and the ordinance or SOP has not been submitted to DEP previously, attach the ordinance or SOP.

3. Were there any violations of the ordinance or SOP during the reporting period? ☐ Yes ☒ No

If Yes to #3, complete the table below (attach additional sheets as necessary).

Violation Date	Nature of Violation	Responsible Party	Enforcement Taken

4. Did you approve any waiver or variance during the reporting period that allowed an exception to non-stormwater discharge provisions of an ordinance or SOP? ☐ Yes ☒ No

If Yes to #4, identify the entity that received the waiver or variance and the type of non-stormwater discharge approved.

BMP #6: Provide educational outreach to public employees, business owners and employees, property owners, the general public and elected officials (i.e., target audiences) about the program to detect and eliminate illicit discharges.

1. Was IDD&E-related information distributed to public employees, businesses, and the general public during the reporting period? ☐ Yes ☐ No

If Yes, what was distributed?

2. Is there a well-publicized method for employees, businesses and the public to report stormwater pollution incidents?

☒ Yes ☐ No

3. Do you maintain documentation of all responses, action taken, and the time required to take action? ☒ Yes ☐ No

MCM #3 Comments:

MCM #4 – CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

Are you relying on PA's statewide program for stormwater associated with construction activities to satisfy this MCM?

☒ Yes ☐ No

(If Yes, respond to questions for BMP Nos. 1, 2 and 3 only in this section. If No, respond to questions for all BMPs in this section)

BMP #1: The permittee may not issue a building or other permit or final approval to those proposing or conducting earth disturbance activities requiring an NPDES permit unless the party proposing the earth disturbance has valid NPDES Permit coverage (i.e., not expired) under 25 Pa. Code Chapter 102.

During the reporting period, did you comply with 25 Pa. Code § 102.43 (relating to withholding building or other permits or approvals until DEP or a county conservation district (CCD) has approved NPDES permit coverage)?

☒ Yes ☐ No ☐ Not Applicable (no building permit applications received)

BMP #2: A municipality or county which issues building or other permits shall notify DEP or the applicable CCD within 5 days of the receipt of an application for a permit involving an earth disturbance activity consisting of one acre or more, in accordance with 25 Pa. Code § 102.42.

During the reporting period, did you comply with 25 Pa. Code § 102.42 (relating to notifying DEP/CCD within 5 days of receiving an application involving an earth disturbance activity of one acre or more)?

☒ Yes ☐ No ☐ Not Applicable (no building permit applications received)

BMP #3: Enact, implement and enforce an ordinance or SOP to require the implementation and maintenance of E&S control BMPs, including sanctions for non-compliance, as applicable.

1. Do you have an ordinance (municipal) or SOP or other mechanism (non-municipal) that requires implementation and maintenance of E&S control BMPs? ☒ Yes ☐ No

   If Yes, indicate the date of the ordinance or SOP: 06/12/2008

2. If Yes to #1, is the ordinance or SOP consistent with DEP's 2022 Model Stormwater Management Ordinance (3800-PM-BCW0100j)? ☐ Yes ☒ No (Township is reviewing DEP's 2022 Model Stormwater Management Ordinance for adoption.)

3. If Yes to #2 and the ordinance or SOP has not been submitted previously, attach a copy of the ordinance or SOP.

BMP #4: Review Erosion and Sediment (E&S) control plans to ensure that such plans adequately consider water quality impacts and meet regulatory requirements.

Specify the number of E&S Plans you reviewed during the reporting period:

BMP #5: Conduct inspections regarding installation and maintenance of E&S control measures during earth disturbance activities. Maintain records of site inspections, including dates and inspection results, in accordance with the record retention requirements in this permit.

Specify the number of E&S inspections you completed during the reporting period:

BMP #6: Conduct enforcement when installation and maintenance of E&S control measures during earth disturbance activities does not comply with permit and/or regulatory requirements.

Specify the number of enforcement actions you took during the reporting period for improper E&S:

BMP #7: Develop and implement requirements for construction site operators to control waste at construction sites that may cause adverse impacts to water quality. The permittee shall provide education on these requirements to construction site operators.

Specify the method(s) by which you are educating construction site operators on controlling waste at construction sites:

BMP #8: Develop and implement procedures for the receipt and consideration of public inquiries, concerns, and information submitted by the public to the permittee regarding local construction activities.

1. A tracking system has been established for receipt of public inquiries and complaints. ☐ Yes ☐ No

2. Specify the number of inquiries and complaints received during the reporting period:

MCM #4 Comments:

MCM #5 – POST-CONSTRUCTION STORM WATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT

BMP #1: Enact, implement and enforce an ordinance or SOP to require post-construction stormwater management from new development and redevelopment projects, including sanctions for non-compliance.

1. Do you have an ordinance (municipal) or SOP or other mechanism (non-municipal) that requires implementation and maintenance of post-construction stormwater management (PCSM) BMPs? ☒ Yes ☐ No

   If Yes, indicate the date of the ordinance or SOP: 06/12/2008

2. If Yes to #1, is the ordinance or SOP consistent with DEP's 2022 Model Stormwater Management Ordinance (3800-PM-BCW0100j)? ☐ Yes ☒ No (Township is reviewing DEP's 2022 Model Stormwater Management Ordinance for adoption.)

3. If Yes to #2 and the ordinance or SOP has not been submitted previously, attach a copy of the ordinance or SOP.

BMP #2: Develop and implement measures to encourage and expand the use of Low Impact Development (LID) in new development and redevelopment. Measures should also be included to encourage retrofitting LID into existing development. Enact ordinances consistent with LID practices and repeal sections of ordinances that conflict with LID practices.

1. Do you have an ordinance (municipal) or SOP or other mechanism (non-municipal) that encourages and expands the use of LID in new development and redevelopment? ☒ Yes ☐ No

   If Yes, indicate the date of the ordinance or SOP: 06/12/2008

2. If Yes to #1, is the ordinance or SOP consistent with DEP's 2022 Model Stormwater Management Ordinance (3800-PM-BCW0100j)? ☐ Yes ☒ No (Township is reviewing DEP's 2022 Model Stormwater Management Ordinance for adoption.)

3. If Yes to #2 and the ordinance or SOP has not been submitted previously, attach a copy of the ordinance or SOP.

BMP #3: Ensure adequate O&M of all post-construction stormwater management BMPs that have been installed at development or redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale.

1. Do you have an inventory of all PCSM BMPs that were installed to meet requirements in NPDES Permits for Stormwater Discharges Associated with Construction Activities approved since March 10, 2003? ☒ Yes ☐ No

   If Yes to #1, complete Table 1 on the next page.

2. Has proper O&M occurred during the reporting period for all PCSM BMPs? ☐ Yes ☒ No

3. If No to #2, explain what action(s) the permittee has taken or plans to take to ensure proper O&M.

   Inspections were conducted for basins installed before and after March 10, 2003 and letters sent to those property owners who needed to take corrective action.

If you are relying on PA's statewide program for stormwater associated with construction activities, you may skip to MCM #6, otherwise complete all questions for BMPs #4 - #6 in this section.

BMP #4: Require the implementation of a combination of structural and/or non-structural BMPs that are appropriate to the local community, that minimize water quality impacts, and that are designed to maintain pre-development runoff conditions.

1. Specify the number of PCSM Plans reviewed during the reporting period for projects disturbing greater than or equal to one acre (including projects less than one acre that are part of a larger common plan of development or sale):

2. Has a tracking system been established and maintained to record qualifying projects and their associated BMPs?

☐ Yes ☐ No

PCSM BMP INVENTORY

Table 1. To complete the information needed for MCM #5, BMP #3, list all existing structural BMPs that discharge stormwater to the permittee's MS4 that were installed to satisfy PCSM requirements for earth disturbance activities under Chapter 102, and provide the requested information (see instructions).

BMP No.	BMP Name	DA (ac)	Entity Responsible for O&M	Latitude	Longitude	Date Installed	O&M Requirements	NPDES Permit No.
1	Detention Basin - no infiltration because of geology	2.76	Angelo Corrado and Omega builders Lots 1-10 Crossings at Maidencreek	40°26'25"	75°52'15"	October 2010	Inspection by Township	PAG02 0006 15 017
2	Infiltration Basin	1.96	Giorgio Waste Water Treatment	40°26'10"	75°54'18"	2015	Maintenance	PAG02 0006 04 033R(1)
3	Infiltration Basin, amended soils, rain gardens		Stefano Folino - Melrose Place - to be turned over to a homeowner's association	40°26'44"	75°52'11"	2008	Maintenance	
4	Infiltration Basin	0.85	Norm Flamm - Microair Computers	40°26'38"	75°51'53"	2014	Maintenance	
5	Infiltration Basin	2.85	David Small	40°26'38"	75°51'53"	2005	Maintenance	PAG2 0006 05 025
6	Infiltration Basin	8	Adam Wojcicki - Boyer Place	40°27'04"	75°52'25"	June 2007	Operate and Maintain	
7	Infiltration Basin	3.15	Bill Gross - Brandywine Transportation	40°26'02"	75°53'47"	June 2015	Inspect immediately following significant storm water event, remove debris, restore eroded areas	PAG02 0006 15 018
8	Landscape restoration, soil restoration, subsurface infiltration bed	5.5	Tom Psarros - Maidencreek Business Park	40°27'42"	75°53'31"	Summer 2019	Maintenance	PAG2 PAC060121

9	Seepage beds	0.41	Monica Schick - Schick Dental	40°26'40"	75°51'35"	Summer 2020		
10				° ' "	° ' "			
11				° ' "	° ' "			
12				° ' "	° ' "			
13				° ' "	° ' "			
14				° ' "	° ' "			
15				° ' "	° ' "			
16				° ' "	° ' "			

BMP #5: Ensure that controls are installed that shall prevent or minimize water quality impacts. The permittee shall inspect all qualifying development or redevelopment projects during the construction phase to ensure proper installation of the approved structural PCSM BMPs. A tracking system (e.g., database, spreadsheet, or written list) shall be implemented to track the inspections conducted and to track the results of the inspections (e.g., BMPs were, or were not, installed properly).

1. During the reporting period have you inspected all qualifying development and redevelopment projects during the construction phase to ensure proper installation of approved structural BMPs?

   ☐ Yes ☐ No ☐ Not Applicable (no qualifying projects during reporting period)

2. Has a tracking system been established and maintained to record results of inspections?

   ☐ Yes ☐ No

BMP #6: Develop a written procedure that describes how the permittee shall address all required components of this MCM.

Have you developed a written plan that addresses: 1) minimum requirements for use of structural and/or non-structural BMPs in plans for development and redevelopment; 2) criteria for selecting and standards for sizing stormwater BMPs; and 3) implementation of an inspection program to ensure that BMPs are properly installed? ☐ Yes ☐ No

MCM #5 Comments:

MCM #6 – POLLUTION PREVENTION / GOOD HOUSEKEEPING

BMP #1: Identify and document all operations that are owned or operated by the permittee and have the potential for generating pollution in stormwater runoff to the MS4. This includes activities conducted by contractors for the permittee.

1. Have you identified all facilities and activities owned and operated by the permitee that have the potential to generate stormwater runoff into the MS4? ☒ Yes ☐ No

2. When was the inventory last reviewed? 06/04/2020

3. When was it last updated? 07/26/2019

BMP #2: Develop, implement and maintain a written O&M program for all operations that could contribute to the discharge of pollutants from the MS4, as identified under BMP #1. This program shall address stormwater collection or conveyance systems within the regulated MS4.

1. Have you developed a written O&M program for the operations identified in BMP #1? ☒ Yes ☐ No

2. Date of last review or update to written O&M program: 09/04/2020

BMP #3: Develop and implement an employee training program that addresses appropriate topics to further the goal of preventing or reducing the discharge of pollutants from operations to the regulated small MS4. All relevant employees and contractors shall receive training.

1. Have you developed an employee training program? ☒ Yes ☐ No

2. Date of last review or update to training program: June 2021 Date of latest training: None this reporting period

3. Training topics covered:

   No training during reporting period.

4. Name(s) of training presenter(s):

   No training during reporting period.

5. Names of training attendees:

   No training during reporting period.

MCM #6 Comments:

POLLUTANT CONTROL MEASURES (PCMs)

Indicate the status of implementing PCMs in Appendices A, B and/or C by completing the table below. Skip this section if PCMs are not applicable.

Task	Date Completed	Attached	Anticipated Completion Date
Storm Sewershed Map(s)	04/01/2019	☒	
Source Inventory	03/26/2020	☒	
Investigation of Suspected Sources		☐	06/30/2023
Ordinance/SOP for Controlling Animal Wastes	10/14/1992, 03/17/2017	☒	

PCM Comments:

Pet waste is regulated under Chapter 67 Animals, and Farm Animal waste is regulated in the Township Zoning Ordinance Chapter 220.

POLLUTANT REDUCTION PLANS (PRPs) AND TMDL PLANS

1. Complete this section if the development and submission of a PRP and/or TMDL Plan was required as an attachment to the latest NOI or application or was required by the permit, regardless of whether DEP has approved the plan(s).

Type of Plan	Submission Date	DEP Approval Date	Surface Waters Addressed by Plan
☐ Chesapeake Bay PRP (Appendix D)			Chesapeake Bay
☒ Impaired Waters PRP (Appendix E)	09/2017	04/01/2019	Willow Creek
☒ TMDL Plan (Appendix F)	09/2017	04/01/2019	Lake Ontelaunee
☐ Combined Chesapeake Bay / Impaired Waters PRP			Chesapeake Bay,
☐ Combined PRP / TMDL Plan			

☐ Joint Plan *(if checked, list the name of the MS4 group or names of all entities participating in the joint plan below)*

Joint Plan Participants:

2. Identify the pollutants of concern and pollutant load reduction requirements under the permit (see instructions).

Type of Plan	TSS Load Reduction (lbs/yr)	TP Load Reduction (lbs/yr)	TN Load Reduction (lbs/yr)
☐ Chesapeake Bay PRP (Appendix D)			
☒ Impaired Waters PRP (Appendix E)		82.21 lbs./yr	
☒ TMDL Plan (Appendix F)	26.6 metric ton/yr	13.18 lbs./yr	
☐ Combined Chesapeake Bay / Impaired Waters PRP			
☐ Combined PRP / TMDL Plan			

3. Date Final Report Demonstrating Achievement of Pollutant Load Reductions Due: 09/30/2024

4. Have any modifications to the plan(s) occurred since DEP approval? ☐ Yes ☒ No

   If Yes to #4, was the updated plan(s) submitted to DEP? ☐ Yes ☐ No

   If Yes to #4, did you comply with the public participation requirements of the applicable appendix? ☐ Yes ☐ No

   If Yes to #4, describe the plan modifications.

5. Summary of progress achieved during reporting period.

   PRP - the Well 6 and 7 property on Main Street, Blandon has been kept in meadow grass. No chemicals are used and it is cut twice a year. The well permitting is ongoing with the PA DEP and the engineer is currently designing the well haouse and control building. The 34 acre riparian buffer along the Willow Creek continues to grow. The edges of the 34 acres was mowed three times in the reporting period but 90% of the property remains untouched.

   TMDL - the Berks County MS4 Steering Committee meetings were attended virtually. Education was provided to all property owners inside and outside the MS4 Urbanized Area with septic systems on proper maintenance of their systems. Township has developed and posted on their website a Public Education and Outreach Plan as well as a Public Involvement and Participation Plan in an effort to solicit voluntary cooperation from private landowners.

6. Anticipated activities for next reporting period.

   PRP Plan - Continue to allow meadow and riparian buffer to develop naturally.

   TMDL Plan - During year five the properties that do not wish to implement BMPs voluntarily will be mapped in the Stormshed Areas to Lake Ontelaunee. Resulting "gaps" in the BMP coverage area will be evaluated and alternates will be identified to meet the TMDL reduction requirements.

PRP/TMDL Plan Comments:

NEW BMPs FOR PRP/TMDL PLAN IMPLEMENTATION

Table 2. List all new structural BMPs installed and ongoing non-structural BMPs implemented during the reporting period that are being used toward achieving load reductions in the permittee's PRP and/or TMDL Plan (see instructions).

BMP No.	BMP Name	DA (ac)	% Imp.	BMP Extent	Units	Latitude	Longitude	Date Installed or Implemented	Planning Area?	Ch. 102?	Annual Sediment Load Reduction (lbs/yr)
	No new structural BMPs nor ongoing non-structural BMPs					° ' "	° ' "		☐	☐	
						° ' "	° ' "		☐	☐	
						° ' "	° ' "		☐	☐	
						° ' "	° ' "		☐	☐	
						° ' "	° ' "		☐	☐	

BMP INVENTORY FOR PRP/TMDL PLAN IMPLEMENTATION

Table 3. List all existing structural BMPs that have been installed in prior reporting periods and are eligible to use toward achieving load reductions in the permittee's PRP and/or TMDL Plan (see instructions).

BMP No.	BMP Name	DA (ac)	% Imp.	BMP Extent	Units	Latitude	Longitude	Date Installed	Annual Sediment Load Reduction (lbs/yr)	Date of Latest Inspect -ion	Satis-factory?
FB	Forest Buffer	68	0	34	acres	40°26'55"	75°53'08"	2011	80		☐
CO N	Converted Corpland	63	0	16	acres	40°26'38"	° ' "	2018	10		☐
						° ' "	° ' "				☐
						° ' "	° ' "				☐

CERTIFICATION

For PAG-13 Permittees: I have read the latest PAG-13 General Permit issued by DEP and agree and certify that (1) the permittee continues to be eligible for coverage under the PAG-13 General Permit and (2) the permittee will continue to comply with the conditions of that permit, including any modifications thereto. I understand that if I do not agree to the terms and conditions of the PAG-13 General Permit, I will apply for an individual permit within 90 days of publication of the General Permit. I also acknowledge that any facility construction needed to comply with the General Permit requirements shall be designed, built, operated, and maintained in accordance with operative laws and regulations.

For All Permittees: I certify under penalty of law that this report was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. See 18 Pa. C.S. § 4904 (relating to unsworn falsification).

Hunter L. Ahrens	Hunter L. Ahrens
Name of Responsible Official	Signature
(610) 926-4920	09/29/2022
Telephone No.	Date

STORMWATER MANAGEMENT PROGRAM
(SWMP)

MAIDENCREEK TOWNSHIP
BERKS COUNTY, PA
STORMWATER MANAGEMENT PROGRAM
(SWMP)

Prepared for

MAIDENCREEK TOWNSHIP
PO Box 319
Blandon, PA 19510
NPDES Permit No. PAI-133546

Updated June 2022

SDE SYSTEMS DESIGN ENGINEERING, INC
"A Passion for Engineering Excellence"
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MS4 TMDL Plan

I. INTRODUCTION

A. Discharges of stormwater from regulated small municipal separate storm sewer systems (small MS4s), are required under the federal stormwater regulations and state regulations incorporating those federal requirements by reference to submit an application and obtain a NPDES permit to discharge stormwater into surface waters of the Commonwealth of Pennsylvania.

B. The NPDES permit authorizes discharges from regulated small MS4s to surface waters of the Commonwealth, when such discharges are composed entirely of stormwater. The permittee is required to submit reports to document the implementation of a Stormwater Management Program (SWMP), designed to reduce the discharge of pollutants from the regulated small MS4 to the Maximum Extent Practicable (MEP); and when required, the development of, submission to DEP for approval, and activity to ensure implementation of an MS4 Pollutant Reduction Plan (PRP) and/or Total Maximum Daily Load (TMDL) Plan consistent with the TMDL.

C. Common pollutants found in stormwater runoff include oil and grease from roadways, pesticides from lawns, sediment from construction sites, discarded trash, such as cigarette butts, paper wrappers, and plastic bottles, and sediment from waterway erosion. When these kinds of pollutants are carried by stormwater into regulated small MS4s that discharge into nearby waterways, the waterways can become impaired for uses, such as habitat for fish and other aquatic wildlife, drinking water supplies, and water-contact recreational use.

D. The federal regulations establish six (6) Minimum Control Measures (MCMs) that must be satisfied by the permittee through implementation of a SWMP consisting of Best Management Practices (BMPs) designed to reduce the discharge of pollutants from the regulated small MS4 to the MEP. Rather than numeric "end of pipe" limits, the "narrative" BMPs are designed to reduce the amount of pollutants discharged in stormwater runoff. Permittees meet the regulatory and permit requirements by implementing the BMPs in the permittees' SWMP to the MEP, and demonstrating that such BMPs consistently reduce pollutants in stormwater runoff. The six (6) MCMs are:

- MCM #1 Public education and outreach on storm water impacts
- MCM #2 Public involvement and participation
- MCM #3 Illicit discharge detection and elimination (IDD&E)
- MCM #4 Construction site storm water runoff control
- MCM #5 Post-construction storm water management in new development and redevelopment
- MCM #6 Pollution prevention and good housekeeping for municipal operations

E. This SWMP outlines regulations, policies and procedures for meeting MCMs #1

through #6, for the Township of Maidencreek, Berks County, Pennsylvania.

1.0 MCM #1 – Public Education and Outreach Program (PEOP)

1.1 Description

MCM #1 requires the MS4 municipality to implement the following BMPs:

1.1.1 Develop, implement and maintain a written Public Education and Outreach Program.

1.1.2 Develop and maintain lists of target audience groups that are present within the areas served by the permittee's regulated small MS4.

1.1.3 Annually publish at least one issue of a pamphlet, a flyer, or a website that includes general stormwater educational information, a general description of the permittee's stormwater management plan, and/or information about the permittee's stormwater management activities.

1.1.4 Distribute stormwater educational materials and/or information to the target audiences using two methods annually.

1.2 BMP #1 – Develop, Implement and Maintain the PEOP

Maidencreek Township will update and maintain this PEOP annually at a minimum.

1.3 BMP #2 – Target Audience

Maidencreek Township's target audience includes the following:

- Residents
- Business Owners & Employees
- Municipal Employees
- Developers
- Emergency Services Organizations

Maidencreek Township reaches its target audience via the following:

- Stormwater photographs and information provided via the Township's Facebook page. This page is available to anyone via Facebook: (https://www.facebook.com/pages/category/Community/Maidencreel-Township-379072138773107/)
- Stormwater link on the Township's Website. This page is available to anyone with internet access: (www.maidencreek.net/Stormwater.html)

- Pamphlets are available year-round to the public on the counter at Township Hall; a sample is provided in the Appendix. (https://www.dot.state.pa.us/public/Bureaus/BOMO/raindrainbrochure.pdf)
- Posters are on display in the public area at Borough Hall; samples are provided in Appendix.
- Maidencreek Township is a member of the Berks County MS4 Steering Committee, which provides a clearinghouse of county-wide stormwater information and activities that are available to the public. A summary is included in the Appendix. Relevant information and/or activities will be listed in the MS4 Annual Reports.
- Direct contact with target audience members can be accomplished as deemed necessary via search engine research (e.g., "Google") by the Township Manager.

Maidencreek Township's Manager is responsible for collection, publication and dissemination of stormwater-related materials to the target audiences.

1.4 BMP #3 – Published Materials

1.4.1 Facebook

- The photos section of the Township's Facebook page includes brochures dealing with stormwater pollution and clean water.
- Photos appear on the page timeline as they are posted.
- The page URL is here (screenshots are provided in the Appendix): (https://www.facebook.com/pages/category/Community/Maidencreel-Township-379072138773107/)

1.4.2 Website

- A link to MS4 Stormwater Regulations appears on the Township's home page. This link connects to Berks County's Stormwater Management Program web page, which in turn contains several links to state and federal stormwater resources.
- The page URL is here (screenshots are provided in the Appendix): (www.maidencreek.net)

1.4.3 Pamphlets

- A stormwater pollution pamphlet is available year-round to the public at the counter at Township Building; a sample appears in the Appendix.

1.4.4 Posters

- Posters are on display year-round in the public area at Township Building; samples are provided in the Appendix.

1.4.5 Quarterly Utility Billing Statements

- Utility and trash billing statements include a short reminder on stormwater; e.g., "When it rains it drains."

1.4.6 Berks County MS4 Steering Committee

- The BCMS4SC meets quarterly to discuss stormwater-related regulations, activities and documentation. Maidencreek Township's engineering staff attends these meetings.

1.5 BMP #4 – Additional Educational Materials

- Maidencreek Township reaches its target audience via pamphlets and its website.
- In addition to the BMP #3 outreach requirements, the Township distributes stormwater information via posters, Facebook and billing statements.

APPENDIX A

MCM #1 – PUBLIC EDUCATION AND OUTREACH ON STORM WATER IMPACTS

BMP #1 – PUBLIC EDUCATION AND OUTREACH PLAN (MS4 STEERING COMMITTEE)

Resolution # 14-2017

A RESOLUTION OF THE BOARD OF SUPERVISORS OF THE TOWNSHIP OF MAIDENCREEK, BERKS COUNTY, PENNSYLVANIA ENTERING INTO A MEMORANDUM OF UNDERSTANDING WITH THE BERKS COUNTY CONSERVATION DISTRICT.

WHEREAS, the Berks County Conservation District (BCCD) administers the Erosion and Sediment Control Program for the Pennsylvania Department of Environmental Protection; and

WHEREAS, the Township desires to control accelerated erosion and to prevent sediment pollution to the Waters of the Commonwealth from earth disturbance activities; and

WHEREAS, the Township of Maidencreek (Township) previously had a Memorandum of Understanding with the BCCD dated December 2002, and August 9, 2012; and

WHEREAS, new Federal and State regulations require the revision of the existing Memorandum of Understanding.

NOW, THEREFORE, be it RESOLVED by the Board of Supervisors of the Township of Maidencreek, Berks County, Pennsylvania and it is hereby resolved by the authority of the same to enter into a Memorandum of Understanding with the Berks County Conservation District and adopt the agreement attached as Exhibit A.

All other resolutions or parts of resolutions inconsistent with this Resolution are hereby repealed insofar, but only insofar as the same are inconsistent herewith.

RESOLVED AND ADOPTED by the Board of Supervisors of the Township of Maidencreek, Berks County, Pennsylvania, in lawful session duly assembled this 9th day of February, 2017.

Board of Supervisors
Maidencreek Township
Berks County, Pennsylvania

Joseph E Rudderow III

David Franke

Attest:

Diane Hollenbach

Claude Beaver

EXHIBIT A

MEMORANDUM OF UNDERSTANDING

Between the

BERKS COUNTY CONSERVATION DISTRICT

and

Maidencreek Township

Received
FEB 27 2017
Berks County
Conservation District

This Memorandum has been prepared jointly and agreed upon by each party for the following purposes:

To serve as a joint commitment by the signatory parties to control accelerated erosion and to prevent sediment pollution to the Waters of the Commonwealth which may result from the conduct of earth disturbance activities in Maidencreek Township ("Municipality").

I. In carrying out the intent of this Memorandum, the Berks County Conservation District ("District") shall:

1. Provide the Municipality with District project application packets and promptly notify Municipality of any changes in the plan review fee schedule.

2. Receive and review all Erosion and Sedimentation Control Plans ("E&S Plan" or "Plan") for earth disturbance activities 5,000 square feet or greater, which are required to be written in accordance with Chapter 102.4 of the PA Code.

3. Within ten (10) working days of completion of review, notify the consultant, the applicant, the Municipality, and the municipal engineer of all E&S Plan/NPDES Permit approvals, deficiencies, and all determinations including all project inspection reports and valid complaint inspection reports. Providing this information supports the Municipality with respect to Municipality's MS4 reporting requirements as required to satisfy Minimum Control Measure #4 related to services provided under this Memorandum.

4. Notify the consultant, the applicant, and the Municipality that a Plan submission has been returned based on either the lack of response within the specified time period or the lack of the development of a complete Plan in compliance with PA Department of Environmental Protection (PA DEP) Chapter 102 Erosion and Sediment Control Rules and Regulations.

5. Upon request, provide all applicants with the PA DEP Erosion and Sediment Pollution Control Program Manual and related forms, worksheets, checklists, etc., necessary to successfully prepare a Plan.

6. Upon the filing of a complaint by the Municipality and/or a third party, the following will occur:
a. The District will inspect the complaint within (10) ten calendar days of its receipt.
b. If warranted, the District will provide documentation of the associated findings. The source of the complaint shall remain anonymous in accordance with PA DEP policy.

7. Serve as the repository for all Plans, complaints, Earth Disturbance Inspection Reports, correspondence, etc., within the limitations stated by PA DEP, that involve earth disturbance activities within the said Municipality. All such information, except the complaint forms, shall be contained in a filing system which shall be available for inspection by Municipal officials upon receipt of a formal written request.

8. When requested by the landowner, provide technical assistance in the development of needed Agricultural E&S Plans and Manure Management Plans. 09/7/2016

In carrying out the intent of this Memorandum, the Municipality shall:

1. Retain a sufficient quantity of the District's project application packets and provide such packets to all parties for projects that require a review. The Municipality shall provide instructions to have the Plans (residential, commercial, industrial, timber harvest, agricultural expansion construction, etc.) for earth disturbance activities greater than or equal to 5,000 square feet, which are required to be written in accordance with Chapter 102.4 of the PA Code, submitted to the District for review per Chapter 102 of the PA Code.

2. Notify the District within (5) five days of receipt of an application for a project disturbing greater than or equal to (1) one acre, pursuant to Chapter 102.42.

3. Pursuant to Chapter 102.43, **the Municipality** shall not issue building or other permit or approval to those proposing or conducting earth disturbance activities requiring a PA DEP permit until the PA DEP or District has issued the E&S or individual NPDES Permit or approved coverage under the general NPDES Permit for Stormwater Discharges Associated with Construction Activities under Chapter 102.5.

4. Forward all questions pertaining to the preparation of Plans and applications to the District.

5. Forward all third party complaints about ongoing earth disturbance activities to the District for its inspection.

6. Not issue final close-out, or grant final release of improvement/E&S escrow until the applicant has submitted a Notice of Termination for all NPDES Permitted activates and received Permit termination correspondence from the District.

7. Forward to the District, any third party agricultural complaint relating to: nutrient pollution and sediment pollution.

8. The District highly recommends that the Municipality necessitate the development of written Agricultural E&S Plans, which are required under Chapter 102.4 for agricultural plowing or tilling activities and animal heavy use areas disturbing 5,000 square feet or greater of land, as well as necessitate the development of Manure Management Plans, before building permits for agricultural operations are approved. Manure Management Plans are required under 25 PA. Code Section 91.36 (b) for all farming operations that land apply manure or agricultural process wastewater, whether they generate the manure or import it from another operation. All farming operations that include an Animal Concentration Area (ACA) or pasture must also have a written Manure Management Plan. In addition, the Municipality should not issue a building permit, or other permit or approval, to those proposing to construct a liquid or semi-solid waste storage facility unless they have a design that has been approved and stamped by a professional engineer.

II. This Memorandum of Understanding shall become effective immediately. It shall be reviewed as the need arises by either or both parties, and may be amended by mutual consent of both parties. This Memorandum of Understanding may be terminated at any time, by either party, following a thirty (30) day written notice to the other party.

FOR Maidencreek Township (municipality)

By: [signature] DATE 2-9-17

Piper Zweburn, Chair BCCD

Attest: Diane Dallenbach date

FOR THE BERKS COUNTY CONSERVATION DISTRICT

[signature] 2/9/17

CHAIR DATE

BCCD 3/29/17

BERKS COUNTY
STEERING COMMITTEE

TO: DEP

FROM: Ashley Showers, Berks County MS4 Steering Committee and Cooperative Education Program

RE: Berks County MS4 Steering Committee 2021-2022 Annual Report Information

DATE: September 6, 2022

The Berks County MS4 Steering Committee and Cooperative Education Program was formalized through an Intergovernmental Agreement and Cost Sharing Agreement in 2018. The member municipalities pay annual fees toward education programs provided by the three educational partners. The educational partners are the Berks County Planning Commission, Berks County Conservation District and Berks Nature. (**See member list on Pg. 2)**

The attached excel worksheets depict the numerous educational programs that were held from July 2021 through June 2022 by the educational partners which educate the target audience groups on topics related to stormwater. It should be noted that the timeframe of this annual report was during the Covid-19 pandemic.

Also attached are several presentations that were produced by the educational partners for circulation and use by the member municipalities as well as several outreach materials. Additionally, during this report period the Steering Committee established a YouTube channel to promote the video entries of the annual Student MS4 Video contest as well as training videos prepared by the education partners. You can view the videos here:
https://www.youtube.com/channel/UCeTtxKsyrgWdK5MxSKZ5G-g/featured

If you have any questions regarding these activities, please feel free to contact me at ashowers@countyofberks.com.

The Berks County MS4 Steering Committee is comprised of the following municipalities:

Alsace Township-GP	Mt. Penn Borough-GP
Amity Township-GP	Maidencreek Township-IP
Bechtelsville Borough-IP	Mohnton Borough-IP
Bern Township-GP	Muhlenberg Township-GP
Birdsboro Borough-GP	Ontelaunee Township-IP
Boyertown Borough-GP	
City of Reading-IP	Robeson Township-GP
Colebrookdale Township-GP	Robesonia Borough-GP
Cumru Township-IP	
	Shoemakersville Borough-GP
Exeter Township-GP	Shillington Borough-IP
Fleetwood Borough-GP	Sinking Spring Borough-GP
	South Heidelberg Township-GP
Heidelberg Township-GP	Spring Township-IP
Kenhorst Borough-GP	Tilden Township -GP
Laureldale Borough-GP	Topton Borough-IP
Leesport Borough-GP	Washington Township-IP
	Wernersville Borough-GP
Lower Heidelberg Township-GP	West Reading Borough -IP
	Womelsdorf Borough-IP
	Wyomissing Borough-IP

Berks County Municipal Separate Storm Sewer System Steering Committee
Public Education and Outreach Plan

Background

Portions of municipalities throughout Berks County are located within the United States Bureau of the Census' designated urbanized areas. Therefore, the specific municipality is required to have a Small Municipal Separate Storm Sewer System (MS4) permit as outlined by Pennsylvania Department of Environmental Protection's (PA DEP) National Pollutant Discharge Elimination System (NPDES) Program. The MS4 permit includes the development of a stormwater management program. This program requires that each MS4 permittee develop a Public Education and Outreach Plan (PEOP), which is detailed below and in the attached table entitled *General Public Education and Outreach Program Plan*.

In accordance with the PA DEP MS4 Permit requirements, the municipalities that comprise the Berks County MS4 Steering Committee are implementing the public education, outreach, and involvement requirements of the Permit through a cooperative effort. (See attached list for municipalities) Each MS4 Permit Holder, who is located within Berks County and has signed an intergovernmental agreement, are participating in the Berks County Cooperative Education Program. The Berks County Planning Commission, Berks County Conservation District and Berks Nature (Formally the Berks Conservancy) (in this document, referred to as the Education Program Partners) implement the Berks County Cooperative Education Program on behalf of and in cooperation with the participating MS4 Permit Holders. The Berks County Cooperative Education Program will implement the various items that are described in this PEOP document. The PEOP was developed by the Berks County MS4 Steering Committee and follows the PA DEP Protocol for the education/outreach portions of the Minimum Control Measures (MCM) #1, #2, #6 specifically, along with certain educational information overlaps for MCM #3, #4, and #5.

Goals and Intended Use of this Plan & Matrix

The goal of the PEOP for the participating municipalities of Berks County MS4 Steering Committee is to ensure that the various target audiences are educated about the impacts of stormwater discharges on water bodies and the steps that the public can take to reduce pollutants in stormwater runoff. The Berks County MS4 Steering Committee followed the public education/outreach format provided by the PA DEP. It included target audiences, actions needed, responsible parties, etc. This narrative and matrix are intended to meet the measurable goals of MCM1, BMPs 1 through 2 (relating to creating and maintaining a Public Education and Outreach Plan and identifying and listing a target audience).

This narrative and matrix PEOP is to be reviewed, amended, and/or adopted by each participating member municipality that is a member of the Berks County MS4 Steering Committee on an annual basis.

The Education Program Partners submit a quarterly update to each participating municipality on the public education and outreach opportunities that the Education Program Partners have offered in the corresponding quarter. The municipalities are to file this information for their records and progress reports, as well as include any other public education efforts in which they participated (for example: municipal community days and/or Earth Day events).

Target Audience

The below list is the PEOP's groups and individuals identified as target audiences for educational efforts. The list below also identifies community stakeholder organizations that focus on particular target audiences, provides public education materials, and educational offerings regards to stormwater in MS4 municipalities.

- *General Public*
  - Schools (Lead: Berks County Planning Commission, all educational partners)
  - Residents/Homeowners (Lead: Berks Nature, all educational partners)
- Agricultural Community (Lead: Berks County Conservation District, all educational partners)
- *Businesses*
- Developers/Engineers (Lead: Berks County Conservation District, all educational partners)
- *Municipal Employees*
  - Public Works (Lead: Berks County Planning Commission, all educational partners)
  - Solicitors (Lead: Berks County Planning Commission, all educational partners)

Approved by the Berks County MS4 Steering Committee, January 15, 2015
Reviewed, updated, and approved by Berks County MS4 Steering Committee, April 28, 2016

Berks County Municipal Separate Storm Sewer System Steering Committee
Public Education and Outreach Plan

The Berks County MS4 Steering Committee has identified that the target audiences primarily interact with the Berks County Planning Commission, the Berks County Conservation District and Berks Nature, however other groups that the target audience may interact with include:

- Residents: Watershed Associations, Trout Unlimited, Land Conservancies
- Business/Developers: Chamber of Commerce, Economic Development Agencies
- Schools: Berks County Intermediate Unit
- Municipal Employees: Berks County Public Works Association, Albright College's Center for Excellence in Local Government, PA State Association of Township Supervisors

Municipalities and Education Program Partners may outreach to target audiences directly (i.e., community event/fair) or they may partner with another group for the education effort (i.e., a presentation at the Berks County Public Works Association meeting).

The enclosed Matrix details specific education and outreach efforts that will be undertaken on a yearly basis, although this Matrix's main purpose is to satisfy MCM #1. The Berks County MS4 Steering Committee believes in a multi-disciplined approach to educating target audiences, thus, various education efforts for other MCMs are included here as well.

Approved by the Berks County MS4 Steering Committee, January 15, 2015
Reviewed, updated, and approved by Berks County MS4 Steering Committee, April 28, 2016

Berks County Municipal Separate Storm Sewer System Steering Committee
Public Education and Outreach Plan

General Public Education and Outreach Program Plan

MCM #1 – Public Education and Outreach on Stormwater Impacts					
	Residents	Businesses	Developers	Schools	Municipal Employees
BMP #1 Develop, implement and maintain a written Public Education and Outreach Program (PEOP)	- Review current education plan - Annually, update education plan using feedback from municipal contacts - Maintain Cooperative Education Plan	- Review current education plan - Annually, update education plan using feedback from local businesses & Chamber of Commerce - Maintain Cooperative Education Plan	- Review current education plan - Annually, update education plan using feedback from local development community - Maintain Cooperative Education Plan	- Review current education plan - Annually, update education plan using feedback from local education facilities - Maintain Cooperative Education Plan	- Review current education plan - Annually, update education plan using feedback from municipal contacts - Maintain Cooperative Education Plan
BMP #2 Develop and maintain lists of target audiences in area	- Review and update target listing annually - Coordinate & maintain listing	- Update target listing annually - Coordinate with municipality and Chamber of Commerce to maintain listing	- Update target listing annually - Coordinate with municipality and Conservation District to maintain listing	- Update target listing annually - Coordinate with municipality, BCIU, and School Districts to maintain listing	- Update target listing annually - Coordinate with municipality and Berks County Public Works Association to maintain listing
BMP #3 Annual Publication – Publish educational and informational items including links to DEP's and EPA's stormwater websites on municipal websites	- Include a link on respective municipal websites to the MS4 Steering Committee's Webpage on the Berks County Planning Commission's Website - Update & assess information annually - Berks County Planning Commission will update website annually	- Include a link on respective municipal websites to the MS4 Steering Committee's Webpage on the Berks County Planning Commission's Website - Update & assess information annually - Berks County Planning Commission will update website annually	- Include a link on respective municipal websites to the MS4 Steering Committee's Webpage on the Berks County Planning Commission's Website - Update & assess information annually - Berks County Planning Commission will update website annually	- Include a link on respective municipal websites to the MS4 Steering Committee's Webpage on the Berks County Planning Commission's Website Update & assess information annually - Berks County Planning Commission will update website annually	- Coordinate with municipal employees regarding all stormwater program information & formats for dissemination of information
BMP #4	- Distribute stormwater	- Distribute stormwater	Distribute Stormwater	- Distribute stormwater	- Coordinate

Approved by the Berks County MS4 Steering Committee, January 15, 2015
Reviewed, updated, and approved by Berks County MS4 Steering Committee, April 28, 2016

Berks County Municipal Separate Storm Sewer System Steering Committee
Public Education and Outreach Plan

Distribute stormwater educational materials to target audiences	education materials: 1. At community events 2. Newsletter article - Review distribution format each year to determine effectiveness	education materials 1. Brochures at Chamber of Commerce 2. Newsletter article - Review distribution format each year and work with business community to determine effectiveness	education materials: 1. Flyer attached to all Erosion & Sediment Control Plans and NPDES Permits 2. Workshop Presentation - Review distribution format each year and work with development entities to determine effectiveness	education materials: 1. In-Class Presentations 2. Intermediate Unit email distributions - Review distribution format each year and work with education community to determine effectiveness	distribution of education materials - Determine additional needs, if any, for distribution
MCM #2 – Public Involvement / Participation** **(**See specific Public Involvement and Participation Plan for Specific Activities/Goals)**					
	Residents	Businesses	Developers	Schools	Municipal Employees
BMP #1 Develop, implement and maintain a written Public Involvement and Participation Program (PIPP)	- Review current PIPP practices - Update practices to expand public involvement where possible	- Review current PIPP practices - Work with business community to encourage input	- Review current PIPP practices - Work with development community to encourage input	- Review current PIPP practices - Work with educational facilities to encourage input	- Review current PIPP practices - Determine effectiveness of practices and re-vise where needed
BMP #2 Prior to any adoption of ordinances with regard to the Permit provide notice & opportunities for review input and feedback	- Encourage public review, input and feedback	- Encourage review, input and feedback	- Encourage review, input and feedback	- Encourage review, input and feedback	- Review advertising requirements with municipalities for ordinance adoption process - Determine if other opportunities exist for encourage involvement
BMP #3 Solicit public involvement and participation from the target	- Conduct one public meeting each year to discuss the	- Conduct one public meeting each year to discuss the Stormwater	- Conduct one public meeting each year to discuss the Stormwater	- Conduct one public meeting each year to discuss the	- Review effectiveness of public meeting to determine content

Approved by the Berks County MS4 Steering Committee, January 15, 2015
Reviewed, updated, and approved by Berks County MS4 Steering Committee, April 28, 2016

audience groups	Stormwater Management Plan - Encourage feedback for future meetings - Document all PIPP activities	Management Plan - Encourage feedback for future meetings - Document all PIPP activities	Management Plan - Encourage feedback for future meetings\ - Document all PIPP activities	Stormwater Management Plan - Conduct education programs regarding water topics at various schools - Encourage feedback for future meetings - Document all PIPP activities	and format for future meetings and activities - Document all PIPP activities
MCM #3 – Illicit Discharge Detection and Elimination (IDD&E)					
	Residents	Businesses	Developers	Schools	Municipal Employees
BMP #6 Provide educational outreach to public employees, business owners and employees, property owners, the general public and elected officials about IDD&E	- Distribute educational materials that explain the IDD&E program - Educate the target audiences regarding what is an illicit discharge - Educate the target audiences regarding recycling programs for common wastes - Work with local organizations to inspect outfalls and storm drain stenciling				
MCM #4 – Construction Site Stormwater Runoff Control					
	Residents	Businesses	Developers	Schools	Municipal Employees
	- Berks County Conservation District will send out construction activities information with NPDES approval notices for those municipalities that have enacted an MOU with the District - Track complaints (response, actions, and results) and provide to municipalities as part of the MOU - Review education programs for developers/designers and revise for future as appropriate based upon feedback from attendees and other stakeholders - Berks County Planning Commission will continue to make comments regarding stormwater management activities and recommendations for managing stormwater through Best Management Practices				- Work with municipalities to determine if there are any issues with existing program - Identify future needs
MCM #5 – Post-Construction Stormwater Management (PCSM) in New and Re-Development Activities					
	Residents	Businesses	Developers	Schools	Municipal Employees
BMP #5 Encourage the use of Low	- Provide comments and information regarding LIDs during review processes				

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Berks County Municipal Separate Storm Sewer System Steering Committee
Public Education and Outreach Plan

Impact Development (LID) in new, re-development and retrofits					
BMP #6 Education regarding maintenance of BMPs	- Provide guidance and education to target audiences regarding maintenance and operation of stormwater BMPs				
MCM #6 – Pollution Prevention/Good Housekeeping for Municipal Operations					
	Residents	Businesses	Developers	Schools	Municipal Employees
BMP #1 Identify and document all facilities and activities that are owned or operated by the permittee and have a pollution potential to stormwater.					- Educate municipal employees on how to maintain and update facilities and activities that have pollution potential through workshops
BMP #2 Develop, implement and maintain a written O & M program for all municipal operations and facilities ID in #1.					- Work with municipalities to maintain and update their O & M program for their operations and activities from BMP #1
- Management practices, policies and procedures					
- Maintenance activities, schedules and inspection procedures					
- Controls for reducing or eliminating discharge of pollutants					
- Proper disposal procedures for wastes removed					

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Berks County Municipal Separate Storm Sewer System Steering Committee
Public Education and Outreach Plan

BMP #3 Develop and Implement Employee Training Program					- Hold annual employee training event to educate municipal employees regarding preventing or reducing the potential for the discharge of pollutants - Training will include other relevant parts - Identify and include other personnel that may have contact with stormwater

Approved by the Berks County MS4 Steering Committee, January 15, 2015
Reviewed, updated, and approved by Berks County MS4 Steering Committee, April 28, 2016

2021 MS4 3rd QUARTER PROGRAMMING Berks County Planning Commission

* funded partially by BCMS4 Education Program ^ Completely funded by other program	Targeted Audience	MCM 1 (Public Education & Outreach)					MCM 2 (Public Involvement & Participation)					MCM 3 (IDD&E)					MCM 4 (Construction Site Stormwater Runoff Control)					MCM 5 (Post Construction Stormwater Mangement)					MCM 6 (Pollution Prevention & Good housekeeping for Municipal Operations)				
Program Name, Date and Description	School District, Municipalities, Countywide	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.

2021 MS4 3rd QUARTER PROGRAMMING Berks County Conservation District

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Program Name, Date and Description	School District, Municipalities, Countywide	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.
2021-2022 School Year - Berks County Trout-In-The-Classroom.	School Districts - Antietam, Brandywine Heights, Conrad Weiser, Daniel Boone, Exeter, Fleetwood, Govenor Mifflin, Kutztown, Muhlenberg, Oley Valley, Reading, Schuylkill Valley, Tulpehocken, Twin Valley, Upper Perkiomen, Wilson, and Wyomissing.				X																										
July 22, 2021 - Spring Township Family Creek Exploration - Provided watershed education to Spring Township Residents.	Spring Township	X																												
July 26, 2021 - Urban Ag Workshop - Opportunity House Community Garden. Provide education on soil health and composting.	City of Reading	X																												

2021 MS4 3rd QUARTER PROGRAMMING Berks Nature

* funded partially by BCMS4 Education Program ^ Completely funded by other program	Targeted Audience	MCM 1 (Public Education & Outreach)					MCM 2 (Public Involvement & Participation)					MCM 3 (IDD&E)					MCM 4 (Construction Site Stormwater Runoff Control)					MCM 5 (Post Construction Stormwater Mangement)					MCM 6 (Pollution Prevention & Good housekeeping for Municipal Operations)				
Program Name, Date and Description	School District, Municipalities, Countywide	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.
^7/6/2022-8/13/2021 Berks Nature summer camp	County Wide 200 kids	X	X	X	X	X	X	X	X	X	X																				
^9/25/2021 Ride for the River	Countywide about 250 people and riders	X	X	X	X	X	X	X	X	X	X																				

2021 MS4 4th QUARTER PROGRAMMING Berks County Planning Commission

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Program Name, Date and Description	School District, Municipalities, Countywide	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.
Municipal Employee Training Series Video #1 YouTube Video - Municipal Operations for MS4 Permittees	Countywide					x					x					x					x					x					x

2021 MS4 4th QUARTER PROGRAMMING Berks County Conservation District

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Program Name, Date and Description	School District, Municipalities, Countywide	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.
November 4, 2021 - How to Get Through Completeness Without Really Trying (2 Sessions)	Berks County		X	X		X												X	X		X		X	X		X		X	X		X
December 21, 2021 - Presentation to Berks Career & Technical Center (High School Students (2 Sessions)	Berks County				X															X					X						

2021 MS4 4th QUARTER PROGRAMMING Berks Nature

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^10/2/2021 Trout Release at the Tully	Advertised County wide done in Tully watershed 35 people	X	X	X	X	X	X	X	X	X	X																				
^ 10/9/2021 Cumru Fall fest tabling	Cumru	X	X	X	X	X	X	X	X	X	X																				
^ 10/14/2021 Watershed Association Mixer at Blue Marsh	Countywide	X	X	X	X	X	X	X	X	X	X																				

2022 MS4 1st QUARTER PROGRAMMING Berks County Planning Commission

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Program Name, Date and Description	School District, Municipalities, Countywide	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.
2022 CELG Municipal Officials Workshop Presentation : MS4 and Your Municipality	Countywide	x				x	x				x	x				x	x				x	x				x	x				x

2022 MS4 1st QUARTER PROGRAMMING Berks County Conservation District

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Program Name, Date and Description	**School District, Municipalities, Countywide**	**Residents**	**Businesses**	**Developers**	**Schools**	**Municipal Empl.**	**Residents**	**Businesses**	**Developers**	**Schools**	**Municipal Empl.**	**Residents**	**Businesses**	**Developers**	**Schools**	**Municipal Empl.**	**Residents**	**Businesses**	**Developers**	**Schools**	**Municipal Empl.**	**Residents**	**Businesses**	**Developers**	**Schools**	**Municipal Empl.**	**Residents**	**Businesses**	**Developers**	**Schools**	**Municipal Empl.**
2021-2022 School Year - Berks County Trout-In-The-Classroom.	School Districts - Antietam, Brandywine Heights, Conrad Weiser, Daniel Boone, Exeter, Fleetwood, Govenor Mifflin, Kutztown, Muhlenberg, Oley Valley, Reading, Schuylkill Valley, Tulpehocken, Twin Valley, Upper Perkiomen, Wilson, and Wyomissing.				X																	X	X	X	X	X	X	X	X	X	X
March 3rd, 2022 - Tulpehocken Creek Watershed Association Presentation - Updated Assoc. on water quality projects.	Tulpehocken Watershed	X																													
March 30, 2022 - Atonement Preschool - Enviroscape Demonstration	Wyomissing Borough/School District				X																										
March 14, 2022 - West Branch Perkiomen Live Stake Planting w/ Perkiomen Valley Trout Unlimited Chapter & Volunteers	Washington Township									X																					
March 26,2022-Barrels and Beer Rainbarrel Workshop	Public	x	x				x	x																							
																									X						

2022 MS4 1st QUARTER PROGRAMMING Berks Nature

* funded partially by BCMS4 Education Program ^ Completely funded by other program	Targeted Audience	# attendees	MCM 1					MCM 2					MCM 3					MCM 4					MCM 5					MCM 6				
Program Name, Date and Description	School District, Municipalities, County wide		R	B	D	S	ME	R	B	D	S	ME	R	B	D	S	ME	R	B	D	S	ME	R	B	D	S	ME	R	B	D	S	ME
*3/12/2022 Well water testing and outreach	County Wide	37	X	X	X	X	X	X	X	X	X	X																			
^ 3/19/2022 Kids drop off program at the Nature Place Enviroscape	County Wide	8	X	X	X	X	X	X	X	X	X	X																			
*3/24/2022 Reiftann School in classs enviroscape.	Exeter SD	300	X	X	X	X	X	X	X	X	X	X																			
* 3/25/2022 Reiftann School in classs enviroscape.	Exeter SD	300	X	X	X	X	X	X	X	X	X	X																			
^ 3/29/2022 Wernersville Library Invasive Vs native	Wernersville (but advertised county wide)	10	X	X	X	X	X	X	X	X	X	X																			
^ 3/30/2022 Tulpehocken SD field Trip (FT)	Tulpehocken SD	15	X	X	X	X	X	X	X	X	X	X																			

2022 MS4 2nd QUARTER PROGRAMMING Berks County Planning Commission

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Program Name, Date and Description	School District, Municipalities, Countywide	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.
Presentation to Municipal Emergency Management Coordinators : MS4, Source Water Protection and Municipal Emergency Management	Countywide	x				x	x				x	x				x	x				x	x				x	x				x

2022 MS4 2nd QUARTER PROGRAMMING Berks County Conservation District

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Program Name, Date and Description	School District, Municipalities, Countywide	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.
April, 2022 Paint the Rain -Rainbarrel contest	Exeter, Tulpehocken, Schuylkill Valley, Kutztown, Govenor Mifflin, Oley, Muhlenberg, Hamburg	x			x		x			x																				
April 4, 2022 Contractor Workshop	Berks County																X	X		X		X	X		X		X	X		X
April 22, 2022 Seedling Sale	Berks County	x	x		x																										
April 23, 2022 Conservation Celebration	Berks County	x	x				x	x																							
May 6, 2022 Schuylkill Valley Trout Release Field Day	Schuylkill Valley				x					x																				
May 10-12, 2022 Wilson Field and Stream Days	Wilson School District				x					x																				
May 13, 2022 Twin Valley French Creek Field Trip re: Enviroscape	Twin Valley				x					x															X					
May 20, 2022 Kutztown Trout Release Field Day	Kutztown School District				x					x																				
May 27, 2022 Upper Perkiomen School District Trout Release re:Rain Gardens	Hereford Elementary				x					x																				
June 3, 2022 Vegetated Swale Video	Berks County	x	x	x	x	x																				X				
June 17, 2022 Library Program re: Macros and Watersheds	Oley Valley Library	x					x																							
June 22, 2022 Don Hartman Conservation Leadership School re: Stream Quality Monitoring Plum Creek	High School Students	x			x		x			x																				
May 11th, 2022 - Municipal Riparian Buffer Maintenaince	Sinking Spring Borough, South Heidelberg Township, Bern Township																													
May 26, 2022 - Reading High School Courtyard Celebration - Table Display	City of Reading				X																									
June 23, 2022 - Spring Township Creek Exploration - Family watershed and water quality education	Spring Township	X																												
June 29, 2022 - County DES - Municipal Emergency Managers Meeting Presentation - MS4, SWP, and PFAS education	Countywide				X																									
an Ag Container Garden Workshop - Soil health workshop	City of Reading	X					X																							

2022 MS4 2nd QUARTER PROGRAMMING Berks Nature

* funded partially by BCMS4 Education Program ^ Completely funded by other program	Targeted Audience	# attendees	MCM 1					MCM 2					MCM 3					MCM 4					MCM 5					MCM 6				
Program Name, Date and Description	School District, Municipalities, County wide		R	B	D	S	ME	R	B	D	S	ME	R	B	D	S	ME	R	B	D	S	ME	R	B	D	S	ME	R	B	D	S	ME
* 4/1/2022 Gov Mifflin FT	Gov Mifflin SD	85	X	X	X	X	X	X	X	X	X	X																				
* 4/5/2022 Muhlenberg FT	Muhlenburg SD	132	X	X	X	X	X	X	X	X	X	X																				
* 4/6/2022 Muhlenberg FT	Muhlenburg SD	132	X	X	X	X	X	X	X	X	X	X																				
* 4/11/2022 Weiser Field Trip	Weiser SD	100	X	X	X	X	X	X	X	X	X	X																				
^ 4/16/2022Berks Nature Drop off Kids Day	County Wide	10	X	X	X	X	X	X	X	X	X	X																				
* 4/20/2022 Gov Mifflin Trauma Kids	Gov Mifflin SD	7	X	X	X	X	X	X	X	X	X	X																				
* 4/22/2022 Weiser Field Trip	Weiser SD	62	X	X	X	X	X	X	X	X	X	X																				
^ 4/23/2022 Girl Scouts and citizen science water quaility	County Wide	25	X	X	X	X	X	X	X	X	X	X																				
^ 4/25/2022 Alvernia Field Trip Water Quality	Reading (Alvernia Students)	25	X	X	X	X	X	X	X	X	X	X																				
* 4/27/2022 La Salle FT	Reading	20	X	X	X	X	X	X	X	X	X	X																				
* 4/28/2022 Weiser Field Trip	Wesier SD	100	X	X	X	X	X	X	X	X	X	X																				
^ 4/28/2022 Wernersville Library Owl Pellets	Wernersville (but advertised county wide)	8	X	X	X	X	X	X	X	X	X	X																				
^ 4/29/2022 Brandywine Heights FT	Brandywine Heights FT	105	X	X	X	X	X	X	X	X	X	X																				
^ 4/29/2022 Story Hike and Smores	County wide	67	X	X	X	X	X	X	X	X	X	X																				
^ 5/3/2022 Reach Cyber FT	County Wide	30	X	X	X	X	X	X	X	X	X	X																				
^ 5/4/2022 Hereford FT	Upper Perkiomen SD	150	X	X	X	X	X	X	X	X	X	X																				
* 5/5/2022St Ignatius FT	Reading SD	27	X	X	X	X	X	X	X	X	X	X																				
^ 5/6/2022 Penn Bernville FT	Tulpehocken SD	75	X	X	X	X	X	X	X	X	X	X																				
^ 5/7/2022Gov Miffin Regatta	Gov Mifflen SD	100	X	X	X	X	X	X	X	X	X	X																				
^5/10/2022 Robeson Elementary FT	Twin Valley SD	70	X	X	X	X	X	X	X	X	X	X																				
* 5/12/2022 Reading Gifted FT	Reading SD	20	X	X	X	X	X	X	X	X	X	X																				
^ 5/13/2022 Oley Valley Middle School FT	Oley Valley SD	125	X	X	X	X	X	X	X	X	X	X																				
^ 5/13/2022 Girl Scouts and Eco Friend	County Wide	20	X	X	X	X	X	X	X	X	X	X																				
* 5/19/2022Southern Middle School FT	Reading SD	125	X	X	X	X	X	X	X	X	X	X																				
* 5/20/2022Southern Middle School FT	Reading SD	125	X	X	X	X	X	X	X	X	X	X																				
^ 5/21/2022 Berks Drop Off Program	County Wide	10	X	X	X	X	X	X	X	X	X	X																				
* 5/24/2022 Southern Middle School FT	Reading SD	125	X	X	X	X	X	X	X	X	X	X																				
* 5/25/2022 Wyomissing FT	Wyomissing SD	120	X	X	X	X	X	X	X	X	X	X																				
* 5/26/2022 Millmont Eco Fun Day	Reading SD	200	X	X	X	X	X	X	X	X	X	X																				
^ 5/27/2022 Wilson Teachers FT	Wilson SD	20	X	X	X	X	X	X	X	X	X	X																				
* 5/27/2022 Northeast Middle School FT	Reading SD	100	X	X	X	X	X	X	X	X	X	X																				
^ 5/28/2022Girl Scouts Eco Learner	County Wide	25	X	X	X	X	X	X	X	X	X	X																				
^ 5/31/2022 Gov Mifflin Pre K Counts FT	Gov Mifflin SD	40	X	X	X	X	X	X	X	X	X	X																				
^ 6/1/2022 Gov Mifflin Pre K Counts FT	Gov Mifflin SD	40	X	X	X	X	X	X	X	X	X	X																				
* 6/2/2022 Northeast Middle School FT	Reading SD	100	X	X	X	X	X	X	X	X	X	X																				
^ 6/12/2022 Family Fishing at Stonecliffe Park	County Wide	20	X	X	X	X	X	X	X	X	X	X																				
^ 6/21/2022 Olivets Ft	Reading	60	X	X	X	X	X	X	X	X	X	X																				
^ 6/24/2022 Kindercare FT	Reading SD	20	X	X	X	X	X	X	X	X	X	X																				

APPENDIX B

MCM #1 – PUBLIC EDUCATION AND OUTREACH ON STORM WATER IMPACTS

BMP #3 – PUBLISHED EDUCATIONAL ITEMS

Web Cover Page

Not secure | www.maidencreek.net

Not syncing

RESUBMITTED CONDITIONAL USE APPLICATION

These slides include both the first and second plan submissions of the Maidencreek Associates Warehouse Project

Conditional Use Resubmission

These slides include both the first and second plan submissions of the Maidencreek Associates Warehouse Project

UPCOMING MEETINGS

Thursday, September 22, 2022 Parks and Recreation Board Meeting at 7:00pm
Wednesday, October 5, 2022 Regular Planning Commission Meeting at 7:00pm
Thursday, October 13, 2022 Board of Supervisors Meeting at 7:00pm

PAY YOUR WATER AND SEWER BILLS

Under the drop down button entitled "Government" please click the tab entitled "Authority" in order to pay water and sewer bills.

BOARD OF SUPERVISORS

Click to view Board members, staff contact information, minutes and resolutions. Links to the meeting agenda can be found in this section.

MAIDENCREEK TOWNSHIP AUTHORITY

Click to view information about your water and sewer service provider and pay your bill online.

PARK AND RECREATION

Click to view township recreation facilities and rental information.
You can also view Board members, minutes and agendas.

PLANNING COMMISSION

Click to view Board members, minutes and agendas

FINANCE AND BUDGET

Click to view current year budget information, the latest audit of the township's finances and tax collector information.

EMERGENCY SERVICES

Blandon Fire Company

Northern Berks Regional Police Department

Northern Berks Emergency Medical Services

CODE OF ORDINANCES

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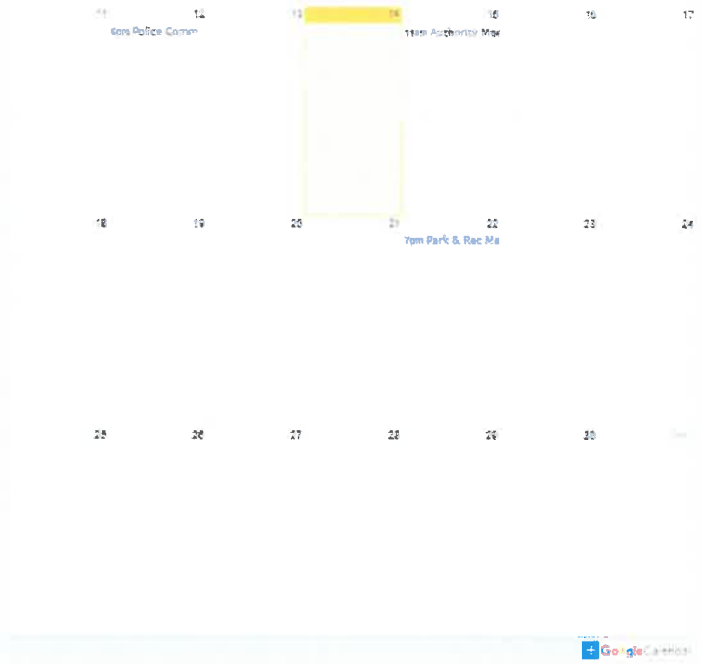

Maidencreek Township

Phone: 610-926-4627

hlahrens@maidencreek.net or clhafer@maidencreek.net

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9/14/

Berks County Stormwater Web Page

About
Berks County Comprehensive Plan
Calendar
GIS/Mapping
Links
Municipal Contact Information
Partnerships
Planning Topics
Transportation/Reading MPO

Berks County's Stormwater Management Program

Under the 1987 Clean Water Act Amendments, the U.S. Environmental Protection Agency developed new stormwater regulations to address storm water that might impact water quality. These new regulations are set up in two Phases depending upon population. Phase I, which is already instituted, affected Allentown and Philadelphia and now U.S. EPA, through the Pennsylvania Department of Environmental Protection (DEP), is enforcing the Phase II portion of the regulation. There are about 1,000 municipalities in Pennsylvania that fall under the Phase II requirements. Those municipalities that are located within an "urbanized area" as defined by the 1990 Census and the 2000 Census were required to apply for a National Pollutant Discharge Elimination System (NPDES) permit to discharge stormwater from their municipal separate storm sewer system (MS4s). Following is a list of municipalities and public entities in Berks County that are affected.

To meet the NPDES permit requirements each municipality submits a permit application to DEP. The permit period runs for five (5) years. The permit application is basically an action plan for the municipality to institute six requirements called minimum control measures (mcm): 1. Public Education 2. Public Participation, 3. Illicit Discharge Detection and Elimination, 4. Construction Site Storm Water Runoff Control, 5. Post-Construction Storm Water Management in New Development and Redevelopment, and 6. Pollution Prevention/Good Housekeeping for Municipal Operations Maintenance. The municipality will have five years to put these protocols into effect, however certain protocols must be completed earlier than others. Many of these six components are directly related to the PA Act 167 Stormwater Management Planning Program.

Pennsylvania Stormwater Management Act (Act 167)

For information on Act 167 Stormwater Management ordinances please contact the municipalitiy in which the watershed you are working in is located as shown in this map. In addition, please contact the Berks County Conservation District at (610) 372-4657 or view their Land Development Information page.

MS4 Educational Materials

DEP's Stormwater Management Program website

List of MS4s within Urbanized Areas in Pennsylvania

If you have any questions or would like further information please feel free to call us at 610-478-6300

COUNTY OF BERKS
PENNSYLVANIA

Berks County MS4 Steering Committee

The Berks County MS4 Steering Committee was formed prior to the end of the previous NPDES permit cycle to address the permit requirements on a regional level. The BC MS4 Steering Committee was developed at the beginning of the Phase II permitting process in 2003. The committee was formalized in 2012 prior to the current permit renewal. The Steering Committee member municipalities, along with the educational partners (Berks County Planning Commission, Berks County Conservation District, Berks Nature) provide the Berks County Cooperative Education Program. This program was developed to meet the education and outreach permit requirements for the NPDES program. The cooperative education program focuses on the portion of the 6 minimum control measures related to education and outreach.

A large portion of the NPDES MS4 permit deals with education, awareness, and involvement in relation to stormwater runoff, municipal stormwater systems, and the prevention of pollution from entering storm drains. The Berks County MS4 Steering Committee created a cooperative cost sharing education program in which the Berks County Planning Commission, the Berks County Conservation District, and the Berks County Conservancy provide and report upon a coordinated education effort on portions of the six minimum control measures. This Cooperative Education Program was formalized via intergovernmental agreement in 2012.

As part of the Cooperative Education Program, various educational materials are linked below. Materials are listed by the Minimum Control Measure that they relate to. Materials that are proprietary to the members of the MS4 Steering Committee can be found at the Berks County Conservation District website. These propriety materials are for the use and distribution of MS4 Steering Committee Members only.

2022 Student Video Contest Rules

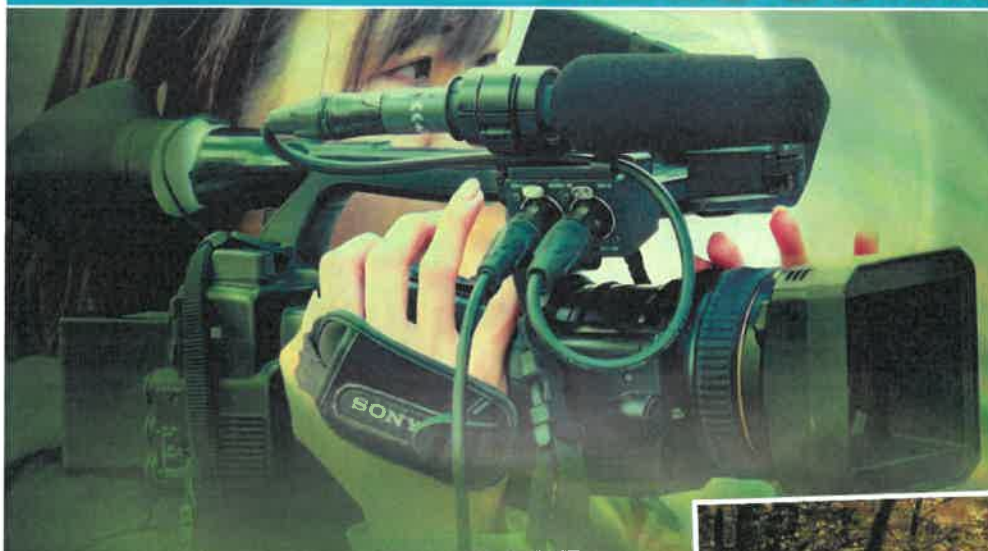
MS4 Resource Links

MS4 Educational Documents

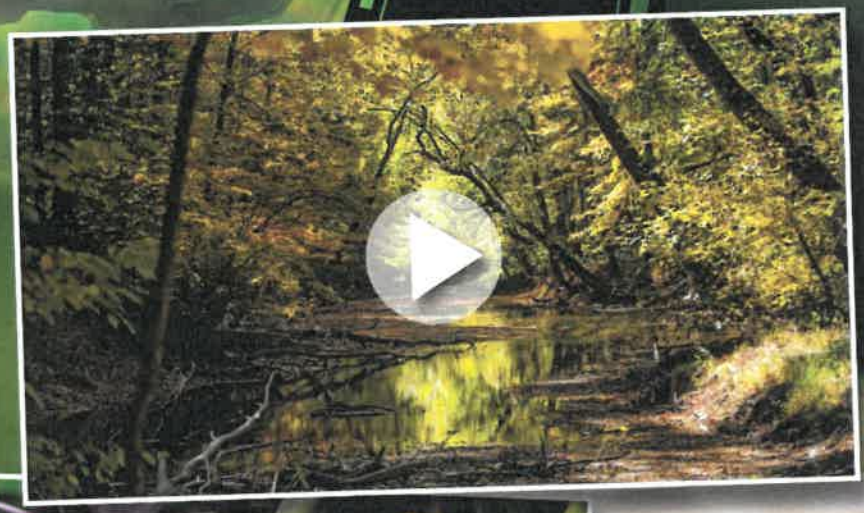
2022 STUDENT STORMWATER VIDEO CONTEST

MS4

BERKS COUNTY
STEERING COMMITTEE



SHOW OFF YOUR VIDEO SKILLS AND CREATIVITY



Create a short clip about your local watershed.

You can:
- Record video
- Take pictures
- Create animation
- Team up with friends
- HAVE FUN!

All videos will be posted to educate the community about watershed topics.

1ST PLACE WINNERS
$500
CASH PRIZE!

OPENS: APRIL 25, 2022
ENDS: JUNE 3, 2022

CONTEST RULES HERE:
www.co.berks.pa.us/Dept/Planning/Pages/MS4%20Cooperative%20Education%20Program.aspx

Pamphlet Available Year-Round on Counter at Township Hall

What is Storm Water?

Storm water is water from precipitation that flows across the ground and pavement when it rains or when snow and ice melt. The water seeps into the ground or drains into what we call storm sewers. These are the drains you see at street corners or at low points on the sides of streets. Collectively, the draining water is called storm water runoff.

Why is Storm Water "Good Rain Gone Wrong?"

Storm water becomes a problem when it picks up debris, chemicals, dirt, and other pollutants as it flows or when it causes flooding and erosion of stream banks. Storm water travels through a system of pipes and roadside ditches that make up storm sewer systems. It eventually flows directly to a lake, river, stream, wetland, or coastal water. All of the pollutants storm water carries along the way empty into our waters, too, because storm water does not get treated!

Pet wastes left on the ground get carried away by storm water, contributing harmful bacteria, parasites and viruses to our water.

Vehicles drip fluids (oil, grease, gasoline, antifreeze, brake fluids, etc.) onto paved areas where storm water runoff carries them through our storm drains and into our water.

Chemicals used to grow and maintain beautiful lawns and gardens, if not used properly, can run off into the storm drains when it rains or when we water our lawns and gardens.

Waste from chemicals and materials used in construction can wash into the storm sewer system when it rains. Soil that erodes from construction sites causes environmental degradation, including harming fish and shellfish populations that are important for recreation and our economy.

Where To Go To Continue the Information Flow

Your community is preventing storm water pollution through a storm water management program. This program addresses storm water pollution from construction, new development, illegal dumping to the storm sewer system, and pollution prevention and good housekeeping practices in municipal operations. It will also continue to educate the community and get everyone involved in making sure the only thing that storm water contributes to our water is ... water! Contact your community's storm water management program coordinator or the Pennsylvania Department of Environmental Protection for more information about storm water management.

Pennsylvania Department of Environmental Protection
www.dep.state.pa.us

Answers to Test Your Storm Sewer System Savvy:

1. Ditch – Part of the storm sewer system. Most people think that the system is just a series of underground pipes; it can also include ditches used to convey storm water from the land to a receiving lake, river, or stream.

2. Fire Hydrant – Not part of the storm sewer system. Water sprayed from fire hydrants is not storm water, but is allowed by law to enter the storm sewer system.

3. Curb with Storm Drain Inlet – Part of the storm sewer system. Many people do not realize that this is an opening leading to the storm sewer system. Anything going into this inlet (e.g., trash, leaves, improperly disposed of hazardous materials) travel directly to a receiving lake, river or stream without being treated first. Many communities stencil storm drains with "Do Not Dump" messages so let people know.

4. Storm Sewer Outfall – Part of the storm sewer system. An outfall is where storm water drains from the storm sewer system into a receiving lake, stream, or river. If there is a flow from an outfall when it isn't raining, there could be a problem with the system or someone has used a storm drain for illegally disposing of materials.

5. Toilet – Not part of the storm sewer system. Wastewater from sinks and toilets in houses and businesses travel through a sewer system constructed to carry sanitary wastes. In some instances, older communities may have a combined sewer system designed to carry both storm water and sanitary waste.

6. Septic System – Not part of the storm sewer system. Homeowners use septic tanks to manage sanitary wastes on-site. Improperly maintained septic systems can leak and contribute pollutants to the storm sewer system, as well as directly to lakes, rivers, and streams.

7. Roads and Other Paved Areas – Not part of the storm sewer system. Roads and other hardened surfaces such as parking lots and sidewalks can accumulate pollutants (e.g., oil, grease, dirt, leaves, trash, pet wastes) that storm water eventually washes into the storm sewer system.

8. Storm Drain Inlet – Part of the storm sewer system. This is another example of what a storm drain may look like. Like the storm drain inlet shown in picture #3, anything that enters this drain will go directly to streams, rivers, and lakes without being treated first. It is important to recognize this as a storm drain to prevent it from being used as a trash can.

When It Rains, It Drains

Understanding Storm Water and How It can Affect Your Money, Safety, Health, and the Environment

What Happens When It Rains?

Rain is an important part of nature's water cycle, but there are times it can do more damage than good. Problems related to storm water runoff can include:

Flooding caused by too much storm water flowing over hardened surfaces such as roads and parking lots, instead of soaking into the ground.

Increases in spending on maintaining storm drains and the storm sewer system that become clogged with excessive amounts of dirt and debris.

Decreases in sportfish populations because storm water carries sediment and pollutants that degrade important fish habitat.

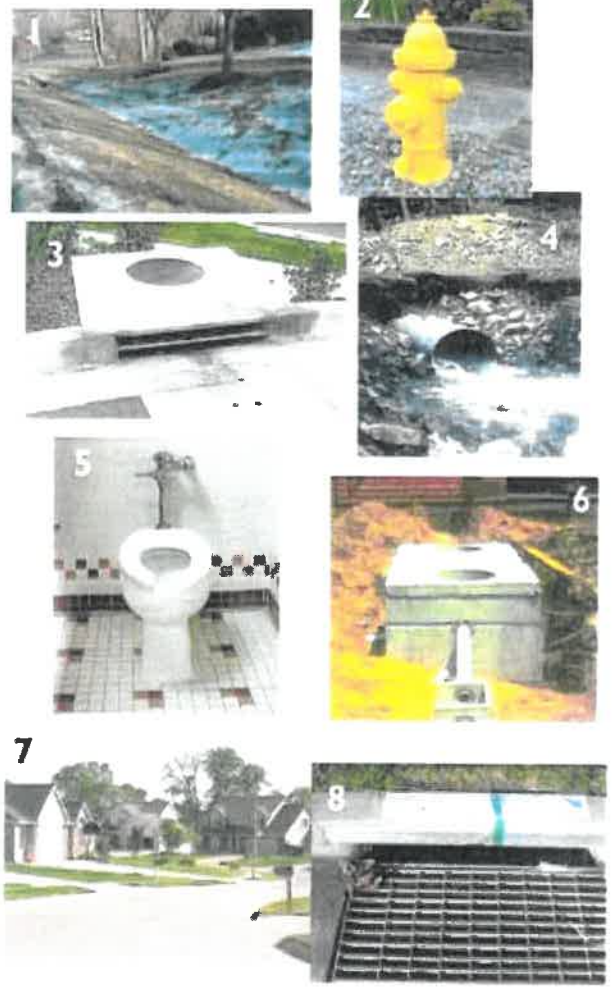
More expensive treatment technologies to remove harmful pollutants carried by storm water into our drinking water supplies.

Closed beaches due to high levels of bacteria carried by storm water that make swimming unsafe.

We can help rain restore its good reputation while protecting our health and environment while saving money for ourselves and our community. Keep reading to find out how...

Test Your Storm Sewer System Savvy!

What does the storm sewer system look like in your community? See if you can identify which pictures are part of the storm sewer system. (Answers are on the back.)



Restoring Rain's Reputation: What Everyone Can Do To Help

Rain by nature is important for replenishing drinking water supplies, recreation, and healthy wildlife habitats. It only becomes a problem when pollutants from our activities like car maintenance, lawn care, and dog walking are left on the ground for rain to wash away. Here are some of the most important ways to prevent storm water pollution:

- Properly dispose of hazardous substances such as used oil, cleaning supplies and paint—never pour them down any part of the storm sewer system and report anyone who does.
- Use pesticides, fertilizers, and herbicides properly and efficiently to prevent excess runoff.
- Look for signs of soil and other pollutants, such as debris and chemicals, leaving construction sites in storm water runoff or tracked into roads by construction vehicles. Report poorly managed construction sites that could impact storm water runoff to your community. (See the back of this brochure for contact information.)
- Install innovative storm water practices on residential property, such as rain barrels or rain gardens, that capture storm water and keep it on site instead of letting it drain away into the storm sewer system.
- Report any discharges from storm water outfalls during times of dry weather—a sign that there could be a problem with the storm sewer system.
- Pick up after pets and dispose of their waste properly. No matter where pets make a mess—in a backyard or at the park—storm water runoff can carry pet waste from the land to the storm sewer system to a stream.
- Store materials that could pollute storm water indoors and use containers for outdoor storage that do not rust or leak to eliminate exposure of materials to storm water.

CLEAN WATER

MS4

BERKS COUNTY
STEERING COMMITTEE

Polluted runoff threatens the health of Berks County water resources. Please do your part at home, work and play to help keep our waterways clear of pollution after rain and snow melt.

SCOOP IT!

Pet waste is gross and can make you sick. Bag and dispose of solid pet waste in trash cans.

CLOSE IT!

Rain water running off of trash cans sends waste into nearby streams. Close your trash can lids, cover dumpsters, and properly dispose of trash to keep pollution locked away.

CATCH IT!

Industries and businesses can keep oil, gas, and grease from washing into streams. Use drip pans to catch fluids. Keep absorbent materials close by to clean up small spills. Fix leaks and clean up spills quickly.

Recently, the Berks County MS4 Steering Committee with assistance from Sign Pros completed the installation of the "Keeping Our Watersheds Clean" sign at the Berks County Electronic Recycling Center in Bern Township. The sign's purpose is to thank users of the facility for correctly disposing their electronic waste and other waste properly which protects our water resources from pollution. The correct disposal of electronic waste prevents contamination of surface water when rainwater dissolves toxic chemicals such as heavy metal compounds of barium, lead, and mercury that rushes down to ponds, rivers, and lakes. Additionally, electronic waste that is disposed of inappropriately produces chemicals once heated which are absorbed into the ground and into groundwater. The Steering Committee invites you to visit the Electronic Recycling center at 1316 Hilltop Rd., in Leesport and view our sign.

To find out what is accepted at the Center please visit

https://bit.ly/CleanWatersheds

0014

APPENDIX C

MCM #1 – PUBLIC EDUCATION AND OUTREACH ON STORM WATER IMPACTS

BMP #4 – ADDITIONAL EDUCATIONAL MATERIALS DISTRIBUTED

Facebook Screenshots:

https://www.facebook.com/Maidencreek-Township-379072138773107

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Email or phone Password Log In Forgot Account?

Maidencreek Township

Community

Learn more

app.my-waste.mobi

Home About Photos Events More

About

See all

1,967 people like this

2,089 people follow this

http://www.maidencreek.net/

(610) 926-4920

maidentwp@aol.com

Community

Photos

See all

Maidencreek Township
November 11, 2021 ·

Topic: Board of Supervisors Meeting
Time: Nov 11, 2021 07:00 PM Eastern Time (US and Canada)

Join Zoom Meeting
https://us02web.zoom.us/j/83032987454... **See more**

See more of Maidencreek Township on Facebook

Log In or Create new account

9:08
9/14/

Posters On Display, Year-Round

The Benefits of a Native Landscape

Native plants and animals sustain the environment on which we ourselves depend. By planting native species in your streamside buffer, you are providing an excellent opportunity for our native birds, insects and other wildlife to thrive in the habitat they need. Seeds from your native species can travel throughout the watershed, promoting a healthier community environment.

Furthermore, native plants are much better adapted to our specific environment — the climate and conditions of this area. Natives are therefore easier to grow and require far less maintenance than their non-native counterparts.

Native plants can provide year-round color and texture in your streamside area or garden. Vibrant flowers in the spring, colorful berries in the summer, deep colors in the fall, and contrasting bark and branch patterns in the winter are just some of the diverse characteristics of the many native plants available.

Use the chart of plants inside as a guide to select ferns, flowers, grasses, shrubs and trees native to Pennsylvania. They are beautiful, easy to maintain, and they attract wildlife. Important local resources for native plants are listed on the back of this brochure.

For more information contact:

Berks County Conservation District
1238 County Welfare Rd.
Suite 200
Leesport, PA 19533
610-372-4657
www.co.berks.pa.us/conservation

Hay Creek Watershed Association
P. O. Box 162
Geigertown, PA 19523
610-404-4292
www.haycreekwatershed.org

Maiden Creek Watershed Association
P. O. Box 68
Kutztown, PA 19530
610-683-3795
www.maidencreekwatershed.org

To purchase native plants in Berks County:

Hawk Mountain Sanctuary
1700 Hawk Mountain Road
Kempton, PA 19529
610-756-6961
www.hawkmountain.org
Plant Sale
3rd Weekend of May

Sugarbush Nursery
4272 Morgantown Road
Mohnton, PA 19540
610-856-0998
www.sugarbushnursery.com

Brochure funded by Reading Area Water Authority (RAWA)

Brochure produced by Lehigh County Conservation District
Customized by Berks County Conservation District

Streamside Buffers

Taking good care of a stream involves taking care of the land around it. A streamside buffer (or riparian buffer) is a planted area along the edge of the stream.

A well-planted streamside buffer:

- **absorbs nutrients and pollutants**
- **stablizes the bank and prevent erosion**
- **reduces floodwater damage**
- **filters out sediment**
- **helps control the temperature of the stream**

Creating a Streamside Buffer

Begin with a "no mow" or "no graze zone" along your stream banks. A buffer of any width is more beneficial than grass. Make yours as wide as possible.

Plant trees and shrubs in your buffer area. They provide many long-lasting benefits and can be quite inexpensive to establish and maintain.

Using shrubs will give your buffer a quick start; many reach full size in just a few years.

Where you do have lawn, set your mower blades at least three inches high. Taller grass slows runoff, resists drought and needs less fertilizer.

Stabilizing Your Streambank

It is best to work with professionals when looking for the causes of and solutions to erosion problems. Where buffers alone aren't enough, there are many new and innovative techniques to help solve the problem. Contact your regional office of the Pennsylvania Department of Environmental Protection (DEP) before making plans to alter a streambank. Permits are likely to be required.

Top Reasons Not to Mow

Promotes bank stability —
Deep rooted native plants hold soil in place and keep banks stable. Turf grass has roots only an inch or two deep - not very effective at preventing erosion!

Flood flow reduction —
Fully grown vegetation slows the velocity of overland flows by providing enough resistance to allow some of the water to infiltrate the soil. This helps to recharge groundwater and reduces flood damage downstream.

Water quality —
Natural vegetation removes pollutants and fine sediment from the waterway, leaving water cleaner and clearer.

Reduction of mosquito habitat —
Turf grass does not absorb water as well as full-height vegetation; consequently, ponding occurs which makes ideal habitat for mosquito breeding. Higher vegetation may absorb more water and decrease the opportunity for mosquitos to breed.

Wildlife habitat —
Stream banks in a natural state provide habitat for a diversity of reptiles, amphibians, birds, and small mammals. Fish and aquatic insects are also protected by the purifying function of a buffer.

Reduce Pollution

Most stream pollution comes from manure, fertilizers, road salts, oil and other chemicals. Called *non-point source pollution*, these come from the entire watershed rather than from any one point. Together, these pollutants add up in the streams and become a big problem. Other accumulated pollution includes trash and yard debris that washes into the streams.

To protect a stream from pollution:

- don't overuse fertilizers - more is not better - and don't use fertilizer near streams.
- limit your overall use of pesticides and herbicides, and use extreme caution when using them near streams.
- compost, don't bag, yard waste. Leave lawn trimmings in place for effective recycling of nutrients.
- don't burn refuse near streambanks.
- don't store or dump manure, garden waste, or grass clippings near streams.
- store firewood, trash, or other materials away from streams.
- never dump trash or chemicals into streams, storm drains or sewers.
- keep farm animals out of and away from the stream. Contact the county conservation office to find out about farm fencing programs.

Prevent Excess Sediment

Every stream carries with it, fine particles of soil. But too much soil can clog the streambed, covering rocks and gravel where fish lay their eggs. Excess sediment can choke out the life of a stream. A major source of silt and sediment is construction or any project that disturbs the soil. Farming activities can also cause soil runoff.

To protect the stream from silt:

- use hay bales or a special silt fence to prevent soil from washing off a work site.
- never store loose piles of soil near a stream
- cover piles of soil with tarps to protect them from rain
- use good farm practices like no-till cropping and planting winter cover crops to conserve soil.
- contact your local county conservation office if you see soil run-off from a construction site.

Ticks are an unpleasant and potentially dangerous reality in this area of Pennsylvania. Deer ticks can carry Lyme disease and are often found in areas of high grass and shrubs. Fear of ticks, however, should not be a reason to mow your streambank to the edge. Some basic precautions will minimize this danger:

- consider mowing a path through the buffer to access the stream without having to walk through high grass.
- learn to recognize deer ticks and check yourself and your pet thoroughly if you have been walking through the woods or fields.

Caring for Streamside Buffers — What to Plant?

Often, when left to grow up on its own, a streamside buffer will contain mostly weeds and other undesireable plants. One way to make sure this doesn't happen is to plant native plants. The plants below represent just a limited selection of Pennsylvania's native species appropriate for planting throughout the state along streams and in adjacent floodplains and wetlands. Choose plants adapted for your soil conditions, and your garden will thrive with less watering and without the need for chemical fertilizers or pesticides. There are many resources to help homeowners with native plantings. For some help, contact one of the organizations on the back of this brochure, or visit one of the following websites: PA Department of Conservation and Natural Resources - www.dcnr.state.pa.us or PA Native Plant Society - www.pawildflower.org

Illustrations by Erin Frederick, Lehigh County Conservation District

Ferns

Cinnamon Fern
Osumnda cinnamomea
Full sun to shade
Wet to moist soils
Cinnamon-colored fertile fronds; moist acidic soils
Photo: Robert Mohlenbrock, USDA

Royal Fern
Osmunda regalis
Part shade
Consistently wet or saturated soils
Unique form and texture
Photo: Robert Mohlenbrock, USDA

Sensitive Fern
Onoclea sensibilis
Full sun to shade
Wet to moist soils
Sunny or shaded swamps, marshes, moist meadows
Forms colonizing masses

Flowering Perennials

Wild Bergamot
Monarda fistulosa
Blooms May to September
Full sun to light shade
Moist to dry soils
Dry open woods, wet meadows, ditches, edge of woods and marshes

Black-eyed Susan
Rudbeckia hirta
Blooms May to June
Moist to dry soils
Full sun to light shade
Attracts birds and butterflies

Blue Lobelia
Lobelia siphilitica
Blooms from July to October
Light shade
Wet to moist soils
Attracts hummingbirds

Blue Vervain
Verbena hastata
Blooms June to September
Full sun to light shade
Dry soils
Bright flowers; herbal uses; streambanks and moist meadows

Boneset
Eupatorium perfoliatum
Blooms July to August
Light shade to full shade
Wet to moist soils
Wet meadow species

Wild Geranium
Geranium maculatum L.
Blooms Spring and early Summer
Common in woods and meadows
Photo: Jennifer Anderson @ USDA-NRCS PLANTS Database

Purple Coneflower
Echinacea purpurea
Blooms April to September
Full sun to light shade
Moist soils
Herbal uses

Ironweed
Vernonia noveboracensis
Blooms August to September
Full sun
Wet to moist soils
Tall plant with brilliant late summer flowers

Joe-Pye Weed
Eupatorium fistulosum
Blooms August to September
Light shade
Wet to moist soils
Attracts beneficial insects; herbal uses

Blue Mist Flower
Conoclinium coelestinum
Blooms July to November
Full sun to light shade
Moist soils
Good border plant or colonizing ground cover; attracts butterflies

New England Aster
Aster novae-angliae
Blooms August to October
Full sun to light shade
Wet to moist soils
Showy and frequently cultivated; dry to moist meadows

Common Sneezeweed
Helenium autumnale
Blooms July to September
Full sun Consistently wet to moist soils
Moist open areas along streams & ponds; wet meadows

Grasses

Sedge
Carex vulpinoidea
Blooms Summer
Full sun
Consistently wet or saturated soils
Swampy areas

Switch Grass
Panicum virgatum
Blooms August to September
Moist soils
Clump grass; can help to control erosion
Sandy and river soils
Photo: Bonnie Harper, Lady Bird Johnson Wildflower Center

Virginia Wild Rye
Elymus virginicus
Blooms June to September
Full sun to light shade
Wet to moist soils
Moist woods, meadows, stream banks
Photo: EPA

Shrubs

Arrowwood
Viburnum dentatum
Blooms May
Full sun to full shade Moist soils
Dark blue fruits in fall; high wildlife value; streambanks, pastures
Photo: Campbell and Lynn Loughmiller, Lady Bird Johnson Wildflower Center

Buttonbush
Cephalanthus occidentalis
Blooms June to September
Full sun Consistently wet or saturated soils
Multi-stemmed; tolerates inundation
Photo: Norman Flagg, Lady Bird Johnson Wildflower Center

Highbush Blueberry
Vaccinium corymbosum
Blooms May to June
Light shade
Wet to moist soils
Multi-stemmed; edible berries; fall color; very high wildlife value

Nine Bark
Physocarpus opulifolius
Blooms May to July
Full sun to part shade
Wet to moist soils
Wet woods, sandy or rocky stream banks
Photo: Stefan Bloodworth, Lady Bird Johnson Wildflower Center

Red Chokeberry
Aronia arbutifolia
Blooms May
Part shade
Wet to moist soils
Red berries; high value for wildlife
Photo: Robert Mohlenbrock, USDA

Serviceberry
Amelanchier arborea
Blooms March to April
Part shade Moist soil
Small tree with early spring flowers; delicious edible berries in summer
Photo: Stefan Bloodworth, Lady Bird Johnson Wildflower Center

Silky Dogwood
Cornus amomum
Blooms May to July
Full sun Wet to moist soils
Flowers in summer; blue berries; multi-stemmed; very high wildlife value
Photo: Sally & Andy Wasowski, Lady Bird Johnson Wildflower Center

Spice Bush
Lindera benzoin
Blooms March to May
Light shade to shade
Wet to moist soils
Bright red berries in fall; herbal uses; wildlife value

Winterberry Holly
Ilex verticillata
Blooms May to June
Part shade Wet to moist soils
Showy berries in winter; high wildlife value; good colonizing shrubs for stream banks
Photo: George Bruso, Lady Bird Johnson Wildflower Center

Trees

American Beech
Fagus grandifolia
Blooms April to May
Full sun to full shade
Moist, but well-drained soils
Large tree with handsome gray bark; high wildlife value
Foliage photo: Bill Cook, Michigan State University

American Sycamore
Platanus occidentalis
Blooms April
Full sun
Wet to moist soils
Large tree with showy mottled bark; riverbanks, floodplains and alluvial soils

Black Gum
Nyssa sylvatica
Blooms April to May
Full sun to part shade
Moist soils
Tall tree with outstanding fall color; high wildlife value
Photo: Keith Kanoti, Maine Forest Service

Green Ash
Fraxinus pennsylvanica
Blooms April to May
Part shade
Wet to moist soils
Fast growth; good fall color.
Photo: Robert Mohlenbrock, USDA

Pagoda Dogwood
Cornus alternifolia
Blooms May to June
Part shade
Moist soils
Small tree for moist woods and shaded ravines; dark blue fruit

Red Maple
Acer rubrum
Blooms March to April
Full sun to full shade
Moist soils
Adapts to a range of moisture conditions; good fall color
Photo: Bill Cook, Michigan State University

River Birch
Betula Nigra
Blooms May
Full sun to part shade
Wet to moist soils
Notable for its peeling bark; floodplains, streambanks, wet woods, swamps
Photo: Steven Katovich, USDA Forest Svc

Shagbark Hickory
Carya ovata
Blooms in May
Full sun to part shade
Moist soils
Shaggy gray exfoliating bark; very high wildlife value
Photo: Keith Kanoti, Maine Forest Service

Swamp White Oak
Quercus bicolor
Blooms in May
Part shade
Wet to moist soils
Large tree with very high wildlife value; good wetland oak
Photo: Mark Brand, Univ. of CT

Only Rain in the Drain

Stormwater protection starts with YOU!

Remove fluids from incoming vehicles

Drain fluids from incoming vehicles to reduce the possibility of spills when parts are removed later, and time and cost to your business from cleaning up leaks and spills.
Drain vehicle fluids before dismantling fluid-containing parts, placing vehicles in the yard for long-term storage, or crushing.

Handle drained fluids properly

Store fluids properly to reduce the amount of contaminants that end up in stormwater. Confine fluid storage to designated areas that are covered and have adequate secondary containment.
Keep all storage containers away from storm drains, and don't leave open drain pans around the shop.

Drain, cover and contain all oily parts

Store engines, transmissions, and other oily parts to avoid exposure to rain or snowfall. Store these parts indoors or under a roof on an impervious surface, if you store oily parts outside, use weather- and leak-proof covered containers, or place them in vehicle bodies.

Routine housekeeping is important

Clean up spills promptly and thoroughly. Use shop rags and oil dry to clean up smaller spills, and keep spill kits available in the areas where you conduct dismantling, fluid removal, and fluid storage. Sweep paved surfaces and clean absorbent material daily to reduce sediment and contaminant buildup.

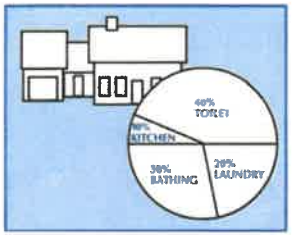
Train all relevant employees in your BMPs

Employee training is critical!
Train employees on stormwater management procedures, especially during the wet season and before it rains or snows.
All employees must be trained upon their initial hire and at least once per year thereafter.

Caring for Your System

Remember that the Homeowner is responsible for the care and maintenance of the septic system! Here are some ideas to keep your system in top shape:

- Inspect the entire system every 1 to 3 years to ensure good working order.
- Pump the solids from the tank every three (3) years to avoid overfilling and failing tanks.
- Keep service and pumping records handy.
- Repair the system as soon as trouble signs appear, such as sluggish toilets, sewer odors, spongy ground around septic tank, or raw sewage backups.
- Conserve water and follow directions to prevent malfunctions.
- Visit the PA Department of Environmental Protection website for more information at http://www.portal.state.pa.us/portal/server.pt?open=514&objID=554156&mode=2



Septic System Maintenance Record

Date	Company	Service	Comments

Do's and Don'ts

DO dispose of motor oil at a garage that will recycle it. Never pour oil down the sink or in a storm drain or sewer on the street.

DO limit the use of household chemicals. These substances can reduce the necessary bacteria that breaks down the waste solids. Resulting sludge can clog the drainfield.

DON'T dispose of non-degradable solids in the system. Examples include tissues, sanitary supplies, cigarette butts, and paper towels. A buildup will clog the inlet and effluent pipes.

DO regularly check faucets and toilets for leaks. This extra drainage can overload your system.

DO substitute less toxic substances like baking soda or borax for household hazardous wastes like ammonia and other cleaners. Use a phosphate-free laundry detergent.

DON'T clean paint brushes or dispose of paint into the septic system. Both latex-based and oil-based paint can clog the system and create problems.

For more information

Pennsylvania DEP Factsheet
http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-77465/3800-FS-DEP1414.pdf

On-lot System Operation and Maintenance
http://www.portal.state.pa.us/portal/server.pt?open=514&objID=554156&mode=2

HOMEOWNER GUIDE

Septic Systems Care and Maintenance

Reading Area Water Authority
Source Water Protection Program

For more information
Reading Area Water Authority
1801 Kutztown Road
Reading, PA 19604
(610) 406-6300

RAWA

What is a Septic System?

Households that are not on a public sewer system use an on-lot septic system to dispose of their wastewater. Household wastewater contains all the wastes from our homes, including toilet use, bathroom and kitchen use, laundry, and other activities. It contains human waste, detergents, chemicals, grease, oils, and many other substances. If not treated properly, these substances can travel through soil and potentially contaminate local waterways.

Most systems have three components:

- **Septic Tank** – Tanks can be constructed from plastic, fiberglass, or concrete. Tank size and specifications are determined by state regulation, and systems are permitted and approved by local agencies.

- **Drainfield** – a drainfield is constructed from a series of perforated pipes buried in gravel-filled trenches in the soil. When wastewater enters the septic tank, an equal amount (known as *effluent)* is forced into the drainfield for treatment.

- **Soil** – the soil encompassing the trenches treats the wastewater by allowing infiltration of the liquids to neutralize most of the pollutants. The effluent eventually is incorporated into groundwater.

RAWA
READING AREA WATER AUTHORITY

SSM
SSM GROUP, INC.
Engineering and Environmental Services
ssmgroup.com

Example of Typical Septic System

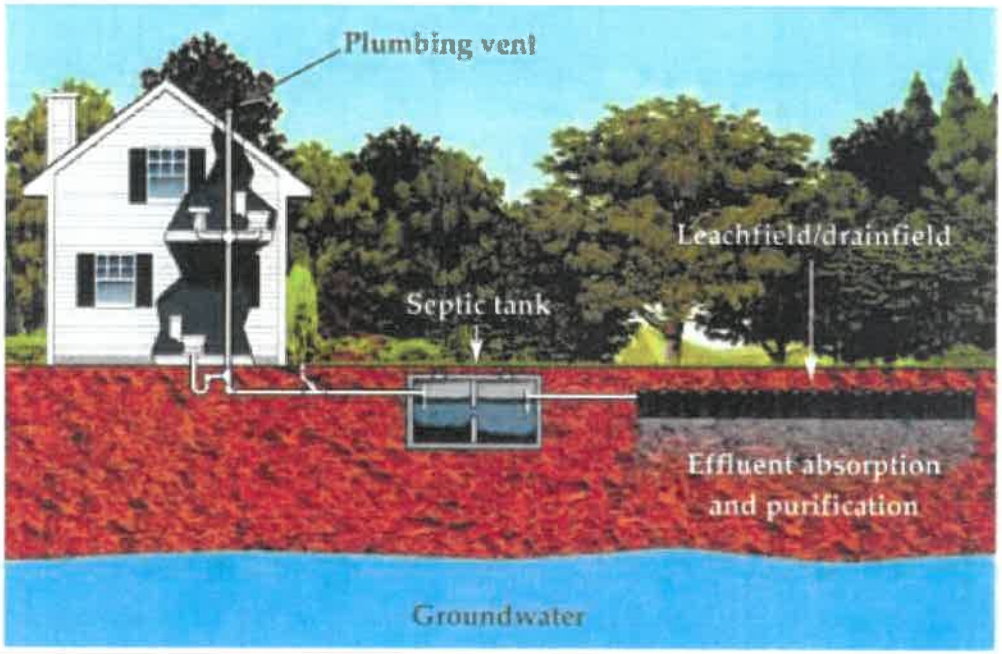


Photo courtesy of Infiltrator Systems, Inc.

Why Should I Maintain My Septic System?

- ***Saves Money!*** Repairing or replacing a septic system can be very expensive. Inspecting and pumping the system every 3 years helps keep the components working correctly.

- ***Protects Your Health!*** Bacteria and viruses are found in the wastewater, and a functional septic system removes most of the organisms during treatment.

- ***Protects the Environment!*** What goes into your septic system may end up in your drinking water source. Refrain from using cleaners and other chemicals that may eventually be discharged from your system and soak into the ground.

Maidencreek Newsletter

None this reporting period

2.0 MCM #2 – Public Involvement / Participation Program

2.1 Description

MCM #2 requires the MS4 municipality to implement the following BMPs:

2.1.1 Develop, implement and maintain a written Public Involvement and Participation Program (PIPP).

2.1.2 Provide adequate public notice and opportunities for public review, input, and feedback prior to adoption of any ordinance, SOP or plan required by the General Permit.

2.1.3 Regularly solicit public involvement and participation from the target audience groups using available distribution and outreach methods.

2.2 BMP #1 – Develop, Implement and Maintain the PIPP

Maidencreek Township will update and maintain this PIPP annually at a minimum.

2.3 BMP #2 – Meetings, Public Notice and Advertisement

Maidencreek Township will utilize both the local newspaper (Reading Eagle) and social media (Facebook) to advertise public meetings that concern stormwater. The regular July meeting of the Township Supervisors will be established beginning in 2022 as the meeting for stormwater related issues to be discussed.

Council meets the second Thursday of each month at 7:00 p.m., in the Township Building at 1 Quarry Road.

Meeting minutes are kept and will document stormwater-related topics and discussions. Township Council discusses stormwater catch basin cleaning at every meeting.

Any special meetings of Township Council to discuss stormwater will be advertised via Facebook.

Maidencreek Township adopted its Stormwater Management Ordinance, Ordinance Number 214, on June 12, 2008. Any updates will be properly advertised.

2.4 BMP #3 - Public Involvement and Participation

Maidencreek Township has stormwater-related flyers and related information available on display. Attendees are made aware of the Township's Facebook page and website.

Additional public involvement and solicitations for participation will be made during the August "stormwater meeting" of Township Supervisors.

APPENDIX D

MCM #2 – PUBLIC INVOLVEMENT/PARTICIPATION

BMP #3 – PUBLIC INVOLVEMENT/PARTICIPATION PLAN (MS4 STEERING COMMITTEE)

Berks County Municipal Separate Storm Sewer System Steering Committee
Public Involvement and Participation Program

Background

Portions of municipalities throughout Berks County are located within the United States Bureau of the Census' designated urbanized areas. Therefore, the specific municipality is required to have a Small Municipal Separate Storm Sewer System (MS4) permit as outlined by Pennsylvania Department of Environmental Protection's (PA DEP) National Pollutant Discharge Elimination System (NPDES) Program. The MS4 permit includes the development of a stormwater management program. This program requires that each MS4 permittee develop a Public Involvement and Participation Program (PIPP), which is detailed below and in the attached table entitled *General Public Involvement and Participation Program Plan*.

In accordance with the PA DEP MS4 Permit requirements, the municipalities that comprise the Berks County MS4 Steering Committee are implementing the public education, outreach, and involvement requirements of the Permit through a cooperative effort. (See attached list for municipalities) Each MS4 Permit Holder, who is located within Berks County and has signed an intergovernmental agreement, are participating in the Berks County Cooperative Education Program. The Berks County Planning Commission, Berks County Conservation District and Berks Nature (formally the Berks Conservancy) (in this document, referred to as the Education Program Partners) implement the Berks County Cooperative Education Program on behalf of and in cooperation with the participating MS4 Permit Holders. The Berks County Cooperative Education Program will implement the various items that are described in this PIPP document. The PIPP was developed by the Berks County MS4 Steering Committee and follows the PA DEP Protocol for the education/outreach portions of the Minimum Control Measures (MCM) #2.

Goals and Intended Use of this Plan & Matrix

By the implementation of this PIPP, the Berks County MS4 Steering Committee will provide the opportunity for the target groups/individuals, which were identified in the Public Education and Outreach Document to have an active involvement with MS4 operations, ordinances, and help prevent and/or reduce the discharge of pollutants contained in the stormwater runoff. The Goal of this PIPP document is intended to meet the measurable goals of MCM2, BMP 1. This narrative and matrix PIPP is to be reviewed, amended, and adopted by each participating member municipality that is a member of the Berks County MS4 Steering Committee on an annual basis. **Any review, amendments, and/or changes to the narrative and/or matrix should be done so at a public meeting to allow for appropriate public comment.**

Strategies to Achieve Measurable Goals

The PIPP program for Berks County MS4 Steering Committee Members initially followed the worksheets provided by PA DEP. As in the Public Education and Outreach Plan, there were sections to identify the target audiences (residents, schools, businesses, developers, municipal employees), identifications of local organizations that the target audiences interact with, and strategies/opportunities to partner with those organizations on public involvement. Developing the initial program consisted of filling in the work sheet, determining the audiences, and brainstorming which community groups would be most interested in joint efforts. The below list and the included matrix details the plan and actions that the Berks County MS4 Committee will take to fulfill MCM #2

- Public Participation in the Decision-Making Processes
  - When decisions are needed at a local municipal level in regards the development, implementation, and update of programs and activities related to the municipal MS4 Permit, then the public will be given the opportunity to participate at various public meetings. The public will be notified of these public meetings by means of traditional notice in the newspaper and on the municipality's website.
  - This PIPP will be publicly reviewed annually in order to keep it up to date and effective. The PIPP will be posted on the Berks County MS4 Steering Committee Webpage. Each participating municipality in the MS4 Steering Committee will have a link to this PIPP on their respective websites.
- Methods of Routine Communication with Target Audiences
  - The Berks County MS4 Steering Committee has identified that the target audiences primarily interact with the Berks County Planning Commission, the Berks County Conservation District and Berks Nature. Other groups that target audiences interact with include:
    - Residents: Watershed Associations, Trout Unlimited, Land Conservancies

  - Business/Developers: Chamber of Commerce, Economic Development Agencies
  - Schools: Berks County Intermediate Unit
  - Municipal Employees: Berks County Public Works Association, Albright College's Center for Excellence in Local Government, PA State Association of Township Supervisors
- As with the Public Education and Outreach Plan, the Education Program Partners submit a quarterly update to each participating municipality on the public involvement opportunities that the Education Program Partners have offered in the corresponding quarter. The municipalities are to file this information for their records and progress reports, as well as include any other public involvement efforts in which they participated.
- The Berks County MS4 Steering Committee Education Program Partners responsibilities are outlined below in regards to Routine Communication. Municipalities and Education Program Partners will communicate with target audiences directly (i.e., a stream clean up) or they may partner with another group for the public involvement effort (i.e., a presentation at the Berks County Public Works Association meeting)
  - *General Public*
    - Schools (All educational partners)
    - Residents/Homeowners (Lead: Berks Nature, all educational partners)
    - Agricultural Community (Lead: Berks County Conservation District, all educational partners)
  - *Businesses*
    - Developers/Engineers (Lead: Berks County Conservation District, all educational partners)
  - *Municipal Employees*
    - Public Works(Lead: Berks County Planning Commission, all educational partners)
    - Solicitors (Lead: Berks County Planning Commission, all educational partners)

The enclosed Matrix details specific activities that will be accomplished on a yearly basis to satisfy MCM #2 BMPs #1-3. This matrix as well as the above narrative are to be updated yearly.

Berks County Municipal Separate Storm Sewer System Steering Committee
Public Involvement and Participation Program

General Public Involvement and Participation Program

MCM #2 – Public Involvement / Participation					
	Residents	Businesses	Developers	Schools	Municipal Employees
BMP #1 Develop, implement and maintain a written Public Involvement and Participation Program (PIPP)	- Annually review current PIPP practices - Update practices to expand public involvement where possible	- Annually, review current PIPP practices - Work with business community to encourage input	- Annually review current PIPP practices - Work with development community to encourage input	- Annually review current PIPP practices - Work with educational facilities to encourage input	- Annually review current PIPP practices - Determine effectiveness of practices and re-vise where needed
BMP #2 Prior to any adoption of ordinances with regard to the Permit provide notice & opportunities for review input and feedback	- Advertise any proposed MS4 Stormwater Management Ordinance in local newspaper and document comments and response. - Encourage public review, input and feedback	- Advertise any proposed MS4 Stormwater Management Ordinance in local newspaper and document comments and response. - Encourage review, input and feedback	- Advertise any proposed MS4 Stormwater Management Ordinance in local newspaper and document comments and response. - Encourage review, input and feedback	- Advertise any proposed MS4 Stormwater Management Ordinance in local newspaper and document comments and response. - Encourage review, input and feedback	- Review advertising requirements with municipalities for ordinance adoption process - Determine if other opportunities exist for encourage involvement
BMP #3 Solicit public involvement and participation from the target audience groups	- Conduct one public meeting each year to discuss the Stormwater Management Plan and to solicit public reporting of suspected illicit discharges - Encourage feedback for future meetings - Document all PIPP activities.	- Conduct one public meeting each year to discuss the Stormwater Management Plan and to solicit public reporting of suspected illicit discharges - Conduct one public meeting each year to discuss the Stormwater Management Plan - Encourage feedback for future meetings - Document all PIPP activities. -	- Conduct one public meeting each year to discuss the Stormwater Management Plan and to solicit public reporting of suspected illicit discharges - Conduct one public meeting each year to discuss the Stormwater Management Plan - Encourage feedback for future meetings - Document all PIPP activities.	- Conduct one public meeting each year to discuss the Stormwater Management Plan and to solicit public reporting of suspected illicit discharges - Conduct education programs regarding water topics at various schools - Encourage feedback for future meetings - Document all PIPP activities.	- Review effectiveness of public meeting to determine content and format for future meetings and activities - Document all PIPP activities

Approved by the Berks County MS4 Steering Committee January 15, 2015
Reviewed, updated, and approved by Berks County MS4 Steering Committee, April 28, 2016

2021 MS4 3rd QUARTER PROGRAMMING Berks County Planning Commission

* funded partially by BCMS4 Education Program ^ Completely funded by other program	Targeted Audience	MCM 1 (Public Education & Outreach)					MCM 2 (Public Involvement & Participation)					MCM 3 (IDD&E)					MCM 4 (Construction Site Stormwater Runoff Control)					MCM 5 (Post Construction Stormwater Mangement)					MCM 6 (Pollution Prevention & Good housekeeping for Municipal Operations)				
Program Name, Date and Description	School District, Municipalities, Countywide	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.

2021 MS4 3rd QUARTER PROGRAMMING Berks County Conservation District

* funded partially by BCMS4 Education Program ^ Completely funded by other program	Targeted Audience	MCM 1 (Public Education & Outreach)					MCM 2 (Public Involvement & Participation)					MCM 3 (IDD&E)					MCM 4 (Construction Site Stormwater Runoff Control)					MCM 5 (Post Construction Stormwater Mangement)					MCM 6 (Pollution Prevention & Good housekeeping for Municipal Operations)				
Program Name, Date and Description	School District, Municipalities, Countywide	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.
2021-2022 School Year - Berks County Trout-In-The-Classroom.	School Districts - Antietam, Brandywine Heights, Conrad Weiser, Daniel Boone, Exeter, Fleetwood, Govenor Mifflin, Kutztown, Muhlenberg, Oley Valley, Reading, Schuylkill Valley, Tulpehocken, Twin Valley, Upper Perkiomen, Wilson, and Wyomissing.				X																										
July 22, 2021 - Spring Township Family Creek Exploration - Provided watershed education to Spring Township Residents.	Spring Township	X																												
July 26, 2021 - Urban Ag Workshop - Opportunity House Community Garden. Provide education on soil health and composting.	City of Reading	X																												

2021 MS4 3rd QUARTER PROGRAMMING Berks Nature

* funded partially by BCMS4 Education Program ^ Completely funded by other program	Targeted Audience	MCM 1 (Public Education & Outreach)					MCM 2 (Public Involvement & Participation)					MCM 3 (IDD&E)					MCM 4 (Construction Site Stormwater Runoff Control)					MCM 5 (Post Construction Stormwater Mangement)					MCM 6 (Pollution Prevention & Good housekeeping for Municipal Operations)				
Program Name, Date and Description	School District, Municipalities, Countywide	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.
^7/6/2022-8/13/2021 Berks Nature summer camp	County Wide 200 kids	X	X	X	X	X	X	X	X	X	X																				
^9/25/2021 Ride for the River	Countywide about 250 people and riders	X	X	X	X	X	X	X	X	X	X																				

2021 MS4 4th QUARTER PROGRAMMING Berks County Planning Commission

* funded partially by BCMS4 Education Program ^ Completely funded by other program	Targeted Audience	MCM 1 (Public Education & Outreach)					MCM 2 (Public Involvement & Participation)					MCM 3 (IDD&E)					MCM 4 (Construction Site Stormwater Runoff Control)					MCM 5 (Post Construction Stormwater Mangement)					MCM 6 (Pollution Prevention & Good housekeeping for Municipal Operations)				
Program Name, Date and Description	School District, Municipalities, Countywide	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.
Municipal Employee Training Series Video #1 YouTube Video - Municipal Operations for MS4 Permittees	Countywide					x					x					x					x					x					x

2021 MS4 4th QUARTER PROGRAMMING Berks County Conservation District

* funded partially by BCMS4 Education Program ^ Completely funded by other program	Targeted Audience	MCM 1 (Public Education & Outreach)					MCM 2 (Public Involvement & Participation)					MCM 3 (IDD&E)					MCM 4 (Construction Site Stormwater Runoff Control)					MCM 5 (Post Construction Stormwater Mangement)					MCM 6 (Pollution Prevention & Good housekeeping for Municipal Operations)				
Program Name, Date and Description	School District, Municipalities, Countywide	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.
November 4, 2021 - How to Get Through Completeness Without Really Trying (2 Sessions)	Berks County		X	X		X												X	X		X		X	X		X		X			X
December 21, 2021 - Presentation to Berks Career & Technical Center (High School Students (2 Sessions)	Berks County				X															X					X						

2021 MS4 4th QUARTER PROGRAMMING Berks Nature

* funded partially by BCMS4 Education Program ^ Completely funded by other program	Targeted Audience	MCM 1 (Public Education & Outreach)					MCM 2 (Public Involvement & Participation)					MCM 3 (IDD&E)					MCM 4 (Construction Site Stormwater Runoff Control)					MCM 5 (Post Construction Stormwater Mangement)					MCM 6 (Pollution Prevention & Good housekeeping for Municipal Operations)				
Program Name, Date and Description	School District, Municipalities, Countywide	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.
^10/2/2021 Trout Release at the Tully	Advertised County wide done in Tully watershed 35 people	X	X	X	X	X	X	X	X	X	X																				
^ 10/9/2021 Cumru Fall fest tabling	Cumru	X	X	X	X	X	X	X	X	X	X																				
^ 10/14/2021 Watershed Association Mixer at Blue Marsh	Countywide	X	X	X	X	X	X	X	X	X	X																				

2022 MS4 1st QUARTER PROGRAMMING Berks County Planning Commission

* funded partially by BCMS4 Education Program ^ Completely funded by other program	Targeted Audience	MCM 1 (Public Education & Outreach)					MCM 2 (Public Involvement & Participation)					MCM 3 (IDD&E)					MCM 4 (Construction Site Stormwater Runoff Control)					MCM 5 (Post Construction Stormwater Mangement)					MCM 6 (Pollution Prevention & Good housekeeping for Municipal Operations)				
Program Name, Date and Description	School District, Municipalities, Countywide	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.
2022 CELG Municipal Officials Workshop Presentation : MS4 and Your Municipality	Countywide	x				x	x				x	x				x	x				x	x				x	x				x

2022 MS4 1st QUARTER PROGRAMMING Berks County Conservation District

* funded partially by BCMS4 Education Program
^ Completely funded by other program

Program Name, Date and Description	Targeted Audience	MCM 1 (Public Education & Outreach)					MCM 2 (Public Involvement & Participation)					MCM 3 (IDD&E)					MCM 4 (Construction Site Stormwater Runoff Control)					MCM 5 (Post Construction Stormwater Mangement)					MCM 6 (Pollution Prevention & Good housekeeping for Municipal Operations)				
		Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.
2021-2022 School Year - Berks County Trout-In-The-Classroom.	School Districts - Antietam, Brandywine Heights, Conrad Weiser, Daniel Boone, Exeter, Fleetwood, Govenor Mifflin, Kutztown, Muhlenberg, Oley Valley, Reading, Schuylkill Valley, Tulpehocken, Twin Valley, Upper Perkiomen, Wilson, and Wyomissing.				X																	X	X	X	X	X	X	X	X	X	X
March 3rd, 2022 - Tulpehocken Creek Watershed Association Presentation - Updated Assoc. on water quality projects.	Tulpehocken Watershed	X																													
March 30, 2022 - Atonement Preschool - Enviroscape Demonstration	Wyomissing Borough/School District				X																										
March 14, 2022 - West Branch Perkiomen Live Stake Planting w/ Perkiomen Valley Trout Unlimited Chapter & Volunteers	Washington Township									X																					
March 26,2022-Barrels and Beer Rainbarrel Workshop	Public	x	x				x	x																							
																									X						

2022 MS4 1st QUARTER PROGRAMMING Berks Nature

* funded partially by BCMS4 Education Program ^ Completely funded by other program	Targeted Audience	# attendees	MCM 1					MCM 2					MCM 3					MCM 4					MCM 5					MCM 6				
Program Name, Date and Description	School District, Municipalities, County wide		R	B	D	S	ME	R	B	D	S	ME	R	B	D	S	ME	R	B	D	S	ME	R	B	D	S	ME	R	B	D	S	ME
*3/12/2022 Well water testing and outreach	County Wide	37	X	X	X	X	X	X	X	X	X	X																				
^ 3/19/2022 Kids drop off program at the Nature Place Enviroscape	County Wide	8	X	X	X	X	X	X	X	X	X	X																				
*3/24/2022 Reiftann School in classs enviroscape.	Exeter SD	300	X	X	X	X	X	X	X	X	X	X																				
* 3/25/2022 Reiftann School in classs enviroscape.	Exeter SD	300	X	X	X	X	X	X	X	X	X	X																				
^ 3/29/2022 Wernersville Library Invasive Vs native	Wernersville (but advertised county wide)	10	X	X	X	X	X	X	X	X	X	X																				
^ 3/30/2022 Tulpehocken SD field Trip (FT)	Tulpehocken SD	15	X	X	X	X	X	X	X	X	X	X																				

2022 MS4 2nd QUARTER PROGRAMMING Berks County Planning Commission

* funded partially by BCMS4 Education Program ^ Completely funded by other program	Targeted Audience	MCM 1 (Public Education & Outreach)					MCM 2 (Public Involvement & Participation)					MCM 3 (IDD&E)					MCM 4 (Construction Site Stormwater Runoff Control)					MCM 5 (Post Construction Stormwater Mangement)					MCM 6 (Pollution Prevention & Good housekeeping for Municipal Operations)				
Program Name, Date and Description	School District, Municipalities, Countywide	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.
Presentation to Municipal Emergency Management Coordinators : MS4, Source Water Protection and Municipal Emergency Management	Countywide	x				x	x				x	x				x	x				x	x				x	x				x

2022 MS4 2nd QUARTER PROGRAMMING Berks County Conservation District

^ funded partially by BCMS4 Education Program
Completely funded by other program

Program Name, Date and Description	Targeted Audience	MCM 1 (Public Education & Outreach)					MCM 2 (Public Involvement & Participation)					MCM 3 (IDD&E)					MCM 4 (Construction Site Stormwater Runoff Control)					MCM 5 (Post Construction Stormwater Mangement)					MCM 6 (Pollution Prevention & Good housekeeping for Municipal Operations)				
		Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.	Residents	Businesses	Developers	Schools	Municipal Empl.
April, 2022 Paint the Rain -Rainbarrel contest	Exeter, Tulpehocken, Schuylkill Valley, Kutztown, Govenor Mifflin, Oley, Muhlenberg, Hamburg	x			x		x			x																				
April 4, 2022 Contractor Workshop	Berks County																X	X			X		X	X		X			X		X
April 22, 2022 Seedling Sale	Berks County	x	x		x																										
April 23, 2022 Conservation Celebration	Berks County	x	x				x	x																							
May 6, 2022 Schuylkill Valley Trout Release Field Day	Schuylkill Valley				x					x																					
May 10-12, 2022 Wilson Field and Stream Days	Wilson School District				x					x																					
May 13, 2022 Twin Valley French Creek Field Trip re: Enviroscape	Twin Valley				x					x															X						
May 20, 2022 Kutztown Trout Release Field Day	Kutztown School District				x					x																					
May 27, 2022 Upper Perkiomen School District Trout Release re:Rain Gardens	Hereford Elementary				x					x																					
June 3, 2022 Vegetated Swale Video	Berks County	x	x	x	x	x																				X					
June 17, 2022 Library Program re: Macros and Watersheds	Oley Valley Library	x					x																								
June 22, 2022 Don Hartman Conservation Leadership School re: Stream Quality Monitoring Plum Creek	High School Students	x			x		x			x																					
May 11th, 2022 - Municipal Riparian Buffer Maintenaince	Sinking Spring Borough, South Heidelberg Township, Bern Township																														
May 26, 2022 - Reading High School Courtyard Celebration - Table Display	City of Reading				X																										
June 23, 2022 - Spring Township Creek Exploration - Family watershed and water quality education	Spring Township	X																													
June 29, 2022 - County DES - Municipal Emergency Managers Meeting Presentation - MS4, SWP, and PFAS education	Countywide				X																										
an Ag Container Garden Workshop - Soil health workshop f	City of Reading	X					X																								

2022 MS4 2nd QUARTER PROGRAMMING Berks Nature

* funded partially by BCMS4 Education Program
^ Completely funded by other program

Program Name, Date and Description	Targeted Audience School District, Municipalities, County wide	# attendees	MCM 1					MCM 2					MCM 3					MCM 4					MCM 5					MCM 6				
			R	B	D	S	ME	R	B	D	S	ME	R	B	D	S	ME	R	B	D	S	ME	R	B	D	S	ME	R	B	D	S	ME
* 4/1/2022 Gov Mifflin FT	Gov Mifflin SD	85	X	X	X	X	X	X	X	X	X	X																			
* 4/5/2022 Muhlenberg FT	Muhlenburg SD	132	X	X	X	X	X	X	X	X	X	X																			
* 4/6/2022 Muhlenberg FT	Muhlenburg SD	132	X	X	X	X	X	X	X	X	X	X																			
* 4/11/2022 Weiser Field Trip	Weiser SD	100	X	X	X	X	X	X	X	X	X	X																			
^ 4/16/2022Berks Nature Drop off Kids Day	County Wide	10	X	X	X	X	X	X	X	X	X	X																			
* 4/20/2022 Gov Mifflin Trauma Kids	Gov Mifflin SD	7	X	X	X	X	X	X	X	X	X	X																			
* 4/22/2022 Weiser Field Trip	Weiser SD	62	X	X	X	X	X	X	X	X	X	X																			
^ 4/23/2022 Girl Scouts and citizen science water quaility	County Wide	25	X	X	X	X	X	X	X	X	X	X																			
^ 4/25/2022 Alvernia Field Trip Water Quality	Reading (Alvernia Students)	25	X	X	X	X	X	X	X	X	X	X																			
* 4/27/2022 La Salle FT	Reading	20	X	X	X	X	X	X	X	X	X	X																			
* 4/28/2022 Weiser Field Trip	Weiser SD	100	X	X	X	X	X	X	X	X	X	X																			
^ 4/28/2022 Wernersville Library Owl Pellets	Wernersville (but advertised county wide)	8	X	X	X	X	X	X	X	X	X	X																			
^ 4/29/2022 Brandywine Heights FT	Brandywine Heights FT	105	X	X	X	X	X	X	X	X	X	X																			
^ 4/29/2022 Story Hike and Smores	County wide	67	X	X	X	X	X	X	X	X	X	X																			
^ 5/3/2022 Reach Cyber FT	County Wide	30	X	X	X	X	X	X	X	X	X	X																			
^ 5/4/2022 Hereford FT	Upper Perkiomen SD	150	X	X	X	X	X	X	X	X	X	X																			
* 5/5/2022St Ignatius FT	Reading SD	27	X	X	X	X	X	X	X	X	X	X																			
^ 5/6/2022 Penn Bernville FT	Tulpehocken SD	75	X	X	X	X	X	X	X	X	X	X																			
^ 5/7/2022Gov Miffin Regatta	Gov Mifflen SD	100	X	X	X	X	X	X	X	X	X	X																			
^5/10/2022 Robeson Elementary FT	Twin Valley SD	70	X	X	X	X	X	X	X	X	X	X																			
* 5/12/2022 Reading Gifted FT	Reading SD	20	X	X	X	X	X	X	X	X	X	X																			
^ 5/13/2022 Oley Valley Middle School FT	Oley Valley SD	125	X	X	X	X	X	X	X	X	X	X																			
^ 5/13/2022 Girl Scouts and Eco Friend	County Wide	20	X	X	X	X	X	X	X	X	X	X																			
* 5/19/2022Southern Middle School FT	Reading SD	125	X	X	X	X	X	X	X	X	X	X																			
* 5/20/2022Southern Middle School FT	Reading SD	125	X	X	X	X	X	X	X	X	X	X																			
^ 5/21/2022 Berks Drop Off Program	County Wide	10	X	X	X	X	X	X	X	X	X	X																			
* 5/24/2022 Southern Middle School FT	Reading SD	125	X	X	X	X	X	X	X	X	X	X																			
* 5/25/2022 Wyomissing FT	Wyomissing SD	120	X	X	X	X	X	X	X	X	X	X																			
* 5/26/2022 Millmont Eco Fun Day	Reading SD	200	X	X	X	X	X	X	X	X	X	X																			
^ 5/27/2022 Wilson Teachers FT	Wilson SD	20	X	X	X	X	X	X	X	X	X	X																			
* 5/27/2022 Northeast Middle School FT	Reading SD	100	X	X	X	X	X	X	X	X	X	X																			
^ 5/28/2022Girl Scouts Eco Learner	County Wide	25	X	X	X	X	X	X	X	X	X	X																			
^ 5/31/2022 Gov Mifflin Pre K Counts FT	Gov Mifflin SD	40	X	X	X	X	X	X	X	X	X	X																			
^ 6/1/2022 Gov Mifflin Pre K Counts FT	Gov Mifflin SD	40	X	X	X	X	X	X	X	X	X	X																			
* 6/2/2022 Northeast Middle School FT	Reading SD	100	X	X	X	X	X	X	X	X	X	X																			
^ 6/12/2022 Family Fishing at Stonecliffe Park	County Wide	20	X	X	X	X	X	X	X	X	X	X																			
^ 6/21/2022 Olivets Ft	Reading	60	X	X	X	X	X	X	X	X	X	X																			
^ 6/24/2022 Kindercare FT	Reading SD	20	X	X	X	X	X	X	X	X	X	X																			

APPENDIX E

MCM #2 – PUBLIC INVOLVEMENT/PARTICIPATION

BMP #3 – PUBLIC MEETING NOTICES AND MINUTES

PHONE: 610-926-4920
FAX: 610-926-6314

MAIDENCREEK TOWNSHIP
BOARD OF SUPERVISORS

1 QUARRY ROAD * P.O. BOX 319 * BLANDON, PA 19510
www.maidencreek.net

2021 Annual MS4 Storm Water Presentation July 8, 2021

Purpose of this meeting is to provide an opportunity for public comment on the Township's MS4 Program.

The Townships NPDES Permit was issued on April 1, 2019 and expires March 31, 2024.

The annual cost of the permit is $500 and is due to the PA DEP by April 1st.

A report is due annually on September 30th.

There are 6 minimum control measures that must be met annually:

MCM 1 Public Education and Outreach

- Written plan listing the target audience.
- Newsletter articles 3 times a year.
- Information on the website.
- Signs in the Willow Creek Open Space.

MCM 2 Public Involvement & Participation Plan

- Written plan.
- Annual meeting to discuss public education.
- Ask for the public's help reporting illicit discharge.

MCM 3 Illicit Discharge Detection & Elimination

- Written program
- Screen outfalls over the course of 5 years (9 in 2021)
- Map the storm water shed and storm sewer system
- Enact the DEP's 2022 Model Storm Water Ordinance
- Provide education to employees, public and elected officials.

MCM 4 Construction Site Storm Water Runoff

- The Berks County Conservation District does the heavy lifting on this.

MCM 5 Post Construction Storm Water Management

- Inventory of BMPs
- Storm water basin inspections (9 inspections and letters by SDE)

MCM 6 Pollution Prevention/Good Housekeeping

- Written policies on municipal operations in order to reduce the discharge of pollutants to waterways
- Employee training.

MediaNews Group

PENNSYLVANIA GROUP

Date of proof: **06/29/21**

Account:	1335499
Name:	
Company:	MAIDENCREEK TWP SUPERVISORS
Address:	TOWNSHIP SECRETARY PO BOX 319 BLANDON, PA 19510
Telephone:	(610) 926-4920
Ad ID:	2191781
Description:	MAIDENCREEK TOWNSHIP MEETING NOTICE
Class:	1201
Orig User:	CRPKERR
Words:	90
Lines:	26
Agate Lines:	26
Column width:	1
Depth:	2.889
Blind Box:	
Total:	$79.02

Run Dates: 07/01/21
07/01/21

Publication
Reading Eagle, Reading Eagle Digital

Ad sample

MAIDENCREEK TOWNSHIP MEETING NOTICE

MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4 PROGRAM)

Maidencreek Township will hold a public meeting to discuss their Municipal Separate Storm Sewer System (MS4) program on Thursday, July 8, 2021 in the Maidencreek Township Municipal Building located at 1 Quarry Road, Blandon. The regular business meeting of the Township will begin at 7 p.m. and the public is welcome to attend. CDC guidelines in effect at the date and time of the meeting for Covid-19 will be followed.

Diane Hollenbach, manager
Maidencreek Township
RE July 1 A-1

We Appreciate Your Business!
Thank You !

3.0 Illicit Discharge Detection and Elimination Program

3.1 Description

MCM #3 requires the MS4 municipality to:

3.1.1 Develop and implement a written program for the detection, elimination, and prevention of illicit discharges into the regulated MS4.

3.1.2 Develop and maintain a map of the regulated small MS4's outfalls and surface waters.

3.1.3 In conjunction with the map(s) created above (either on the same map or on a different map), permittees shall show and update the entire storm sewer collection system, including roads, inlets, piping, swales, catch basins, channels, basins, and any other features of the permittee's storm sewer system including municipal boundaries and/or watershed boundaries.

3.1.4 The permittee shall conduct outfall field screenings, identify the source of any illicit discharges, and remove or correct any illicit discharges.

3.1.5 Enact a Stormwater Management Ordinance to implement and enforce a stormwater management program that includes prohibition of non-stormwater discharges to the regulated small MS4.

3.1.6 Provide educational outreach to public employees, business owners and employees, property owners, the general public and elected officials (i.e., target audiences) about the program to detect and eliminate illicit discharges.

3.2 Illicit Discharges

3.2.1 EPA defines "illicit discharge" as "any discharge to a municipal separate storm sewer that is not composed entirely of storm water, except discharges pursuant to a NPDES permit and discharges resulting from firefighting activities".

3.2.2 The municipal Act 167 and/or MS4 ordinance contains a list of authorized discharges, and provides penalties for violators.

3.2.3 Illicit discharges are critical because they make their way to waterways untreated. Discharges such as paint or oil dumped into storm drains, septic effluent, car wash wastewater and illegally connected wastewater piping can cause serious pollution issues. Pollutants include heavy metals, bacteria, viruses, nutrients, oil and grease, solvents and toxins.

3.3 IDD&E Program

There are six (6) Best Management Practices (BMPs) required under MCM #3. BMP #1 is a written program for the detection, elimination, and prevention of illicit discharges into the regulated MS4. The following items comprise the written program for the municipality.

3.3.1 MS4 System Map – The map is included in Appendix F, and depicts the following:

- The extents of the regulated MS4 within the municipality
- The locations of all outfalls, numbered
- Streams, named and unnamed
- Other surface waters
- Catch basins, swales and channels that receive stormwater discharges
- Roads, municipal boundaries and watershed boundaries

This map has been supplied to municipal employees and the local fire and EMS responders.

3.3.2 Identify Priority Areas for Outfall Screenings – Priority areas consist of so-called "hot spots", which are areas having the potential to generate pollutants.

Any outfalls near construction sites or logged resident complaints will be added to the priority list.

3.3.3 Procedures for Screening Outfalls – All outfalls will be screened at least once during each five-year permit cycle, by Township staff. Outfall screenings are generally conducted in February or March each year, when there has been no measurable precipitation within the 72 hours prior to the screening. Efforts are also made to avoid screenings during periods of snowmelt. Screenings are recorded on field sheets, a sample of which is included in Appendix G.

Any outfall that is discovered to have continuous dry weather flow or a history of problems must be screened annually.

3.3.4 Outfall Accessibility – To date, there have been no issues with inaccessibility of outfalls due to private property restrictions. If access to an outfall or a suspected illicit discharge source, is denied by a private property owner, the following course of action will be followed:

- Outfall inspector to contact the Township Street Supervisor and try to gain voluntary access.

- Street Supervisor to contact police if access remains prohibited.
- A search warrant shall be obtained if needed to complete the investigation into the discharge. District magistrate to be contacted.
- DEP is to be contacted at 866-825-0208 if illicit discharges constitute an immediate threat to the population, as well as 9-1-1, regardless of whether access is denied.

3.3.5 Procedures for Identifying an Illicit Discharge – Historically, the outfalls in Maidencreek Township's MS4 have been dry during screenings, or carry a perennial stream and intermittent underground spring flow. Therefore, to date, no illicit discharges have been identified.

If a questionable discharge is encountered, either during routine screenings or in response to a complaint or investigation, the following procedure shall be followed:

3.3.5.1 Visual or odor characteristics shall be recorded. Observations shall be made, either in the field or via the system map of possible sources of the discharge, based on its characteristics (for example, milky discharge downstream of a dairy).

Laboratory sampling is required when odor or appearance indicate that the outfall is polluted.

3.3.5.2 When laboratory testing is necessary, the Township engineering staff will consult with Township staff as to what parameters to test for. Common sampling parameters include pH (where extreme values can indicate commercial or industrial sources), conductivity (dissolved salts and inorganics like alkalis, chlorides and sulfides), optical brighteners (which can identify presence of detergents) and bacteria (which can indicate presence of sanitary wastewater).

3.3.6 Procedures for Identifying the Source of an Illicit Discharge – Once the type of pollutant(s) in the discharge has been identified, its source may be clearly evident, or an in-depth investigation may be necessary. Using the above example, a milky discharge downstream of a dairy may indicate the source without further investigation. However, many times, illicit discharges result from unseen pipe interconnections, sporadic illegal dumping, or other clandestine activities.

Following is a partial list of investigative tools; which or how many to use will be determined on a case-by-case basis:

- Map or historical document review by Township staff or engineering consultant
- Pipe video using in-house equipment by Township staff
- Smoke or dye tests ("Mr. Rehab" or similar service)
- Public interviews/word of mouth; interview nearby residents, by Township staff.
- Surveillance by Township staff, police and/or engineering staff.

3.3.7 Procedures for Eliminating an Illicit Discharge – Once the source of the illicit discharge is identified, measures must be taken to stop the source. Through this IDD&E Plan, the municipality will respond to the discovery of an illegal connection in a graduated manner. Often, home or business owners are not aware of the existence of illegal connections between their buildings and the storm sewer system. The initial step will involve providing the responsible party with information about the connection, its environmental consequences, the applicable regulations, and how the problem may be corrected in an effort to secure voluntary compliance. In the event that voluntary compliance cannot be secured, the municipality will move to enforcement provisions as outlined within the Act 167/MS4 Ordinance.

When the source of the illicit discharge is due to illegal dumping, elimination of the source becomes more difficult. It is often difficult to identify and locate the individuals responsible for illegal dumping. In these cases, the procedure to eliminate the discharge focuses on prevention, supported by enforcement to the extent possible.

Prevention can often be accomplished through education. Implementation of MCMs #1 and #2 via their respective programs is intended to educate the public on the consequences of illegal dumping. The ordinance developed as part of MCM #3 provides the legal basis for penalties, should they become necessary.

3.3.8 Complaints – The Township has in place a system for logging complaints. Any stormwater-related complaints are referred to the Township's engineering staff for response and may be in conjunction with the Streets Supervisor. Complaints must be made in-person at Township Building. Records of all complaints are maintained at Township Building; any stormwater-related complaints are made part of this SWMP.

3.3.9 Records Retention – All MS4 records are retained by the Maidencreek Township Manager at Township Building, with duplicates stored in the Township Engineer's office. Record retention and disposal is subject to Pennsylvania's Municipal Records Act, and rules promulgated thereunder.

3.4 Ordinance Adoption

Maidencreek Township adopted its Stormwater Management Ordinance, which includes documentation on illicit discharges and penalties, as Ordinance Number 214, on June 12, 2008. Any updates will be properly advertised.

3.5 Reaching Target Audiences about IDD&E

The Township will primarily use Facebook to disseminate information about IDD&E, including what illicit discharges are, how to report them, and how to file complaints.

3.6 Evaluation of the IDD&E Program

The IDD&E plan will be evaluated annually throughout the permit term. New outfalls will be mapped as discovered, and will be screened with the others during the routine inspection period. The map will be updated as changes occur. Investigations, enforcement and other actions will be documented and reported.

COMPLAINT FORM

Brief Description of Problem:-

_____

_____

_____

_____

_____

_____

_____

Complainant's Name: _____

Address: _____

Phone Number: _____

FOR OFFICE USE ONLY:

Date Received: _____ Time: _____

Complaint Received By: _____

Complaint Referred To:

- Street Department
- Zoning Department
- Police Department
- Water/Sewer Authority
- Board of Supervisors
- Other

Action Taken:

_____

_____

_____

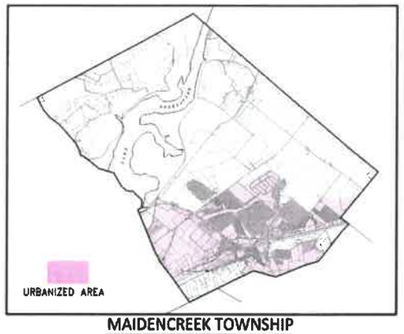
_____

Contact Made By: _____

APPENDIX F

MCM #3 – ILLICIT DISCHARGE DETECTION AND ELIMINATION (IDD&E)

BMP #2 & #3 – MS4 & OUTFALL MAP

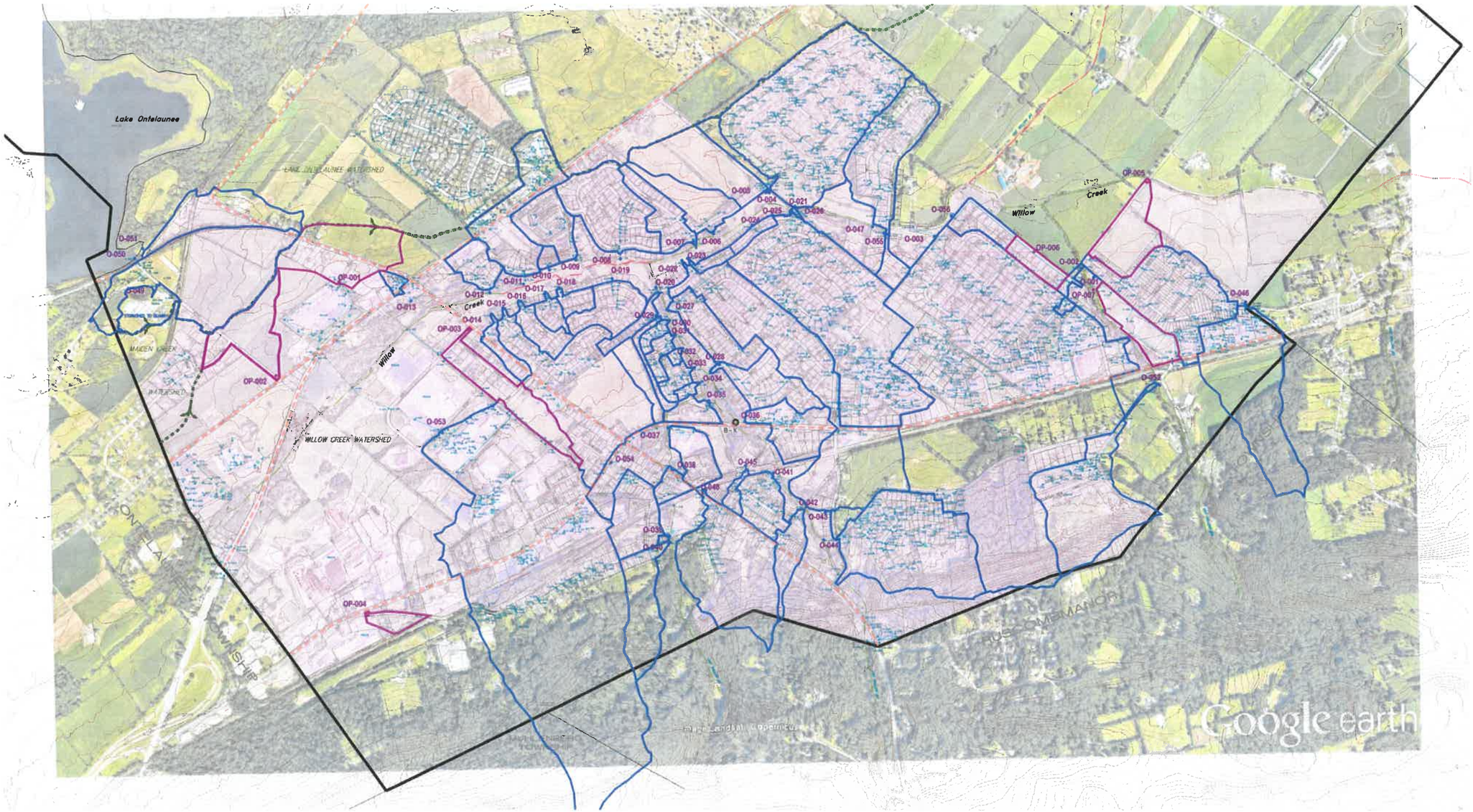


MAIDENCREEK TOWNSHIP

MS4 REQUIREMENTS TABLE		
IMPAIRED DOWNSTREAM WATERS OR APPLICABLE TMDL NAME	REQUIREMENTS	OTHER CAUSE(S) OF IMPAIRMENT
UNNAMED TRIBUTARIES TO WILLOW CREEK	APPENDIX B-PATHOGENS (5)	NONE LISTED
SCHUYLKILL RIVER	APPENDIX C-PCB (6a)	NONE LISTED
MAIDEN CREEK	APPENDIX B-PATHOGENS (8)	OTHER HABITAT ALTERATIONS (4c)
LAKE ONTELAUNEE TMDL	TMDL PLAN-NUTRIENTS, SUSPENDED SOLIDS (4a)	OTHER HABITAT ALTERATIONS (4c)
WILLOW CREEK	APPENDIX B-PATHOGENS(B), APPENDIX E-NUTRIENTS (5)	FLOW ALTERATIONS (4c)

LEGEND

- O-001 MS4 OUTFALL & ID #
- OP-001 MS4 OBSERVATION POINT & ID #
- C-1 EXISTING STORMWATER COLLECTION SYSTEM
- EXISTING STORM PIPE AND FLOW DIRECTION
- EXISTING CHANNEL
- EXISTING STREAM (IMPAIRED-NUTRIENTS)
- EXISTING STREAM (IMPAIRED-PATHOGENS)
- TOWNSHIP ROAD
- STATE ROAD
- ACT 167 WATERSHED BOUNDARY
- STORM SEWERSHED (OUTFALL)
- STORM SEWERSHED (OBSERVATION POINT)
- MUNICIPAL BOUNDARY
- "READING" URBANIZED AREA



SYSTEMS DESIGN ENGINEERING, INC

SDE Project No.: 17-0019-0191

MS4 MAP

MAIDENCREEK TOWNSHIP

BERKS CO., PA.

UPDATED: 04/01/19
05/25/2017

APPENDIX G

MCM #3 – ILLICIT DISCHARGE DETECTION AND ELIMINATION (IDD&E)

BMP #4 – OUTFALL FIELD SCREENING

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Willow Creek		Outfall ID: 0-008	
Today's date: 8/22/2022		Time (Military): 0630	
Investigators: Brian Wise		Form completed by: Brian Wise	
Temperature (°F): 71	Rainfall (in.): Last 24 hours: 0.51 Last 48 hours: trace		
Latitutde: 40.44864N	Longitude: 075.89213W	GPS Unit: Magellan	GPS LMK #: 220/224 Faith Drive
Camera: Brian Wise Cellular Device		Photo #s: #1 & #2	

Land Use in Drainage Area (Check all that apply):

☐ Industrial	☒ Open Space
☐ Ultra-Urban Residential	☐ Institutional
☐ Suburban Residential	Other: _____
☐ Commercial	Known Industries: _____

Notes (e.g.., origin of outfall, if known): 2 out of 3 pipes drain from Faith Drive inlet
Shed on top of pipe

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☒ **Closed Pipe**	☐ RCP ☐ CMP ☐ PVC ☒ HDPE ☐ Steel ☐ Other: _____	☒ Circular ☐ Eliptical ☐ Box ☐ Other: _____	☐ Single ☐ Double ☒ Triple ☐ Other: _____	Diameter/Dimensions: (2) 22" (1) 24"	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☒ **Open drainage**	☐ Concrete ☒ Earthen ☐ rip-rap ☐ Other:	☐ Trapezoid ☒ Parabolic ☐ Other: _____		Depth: 6' Top Width: 9' Bottom Width: 3'	
☐ **In-Stream**	**(applicable when collecting samples)**				
Flow Present?	☐ Yes ☒ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		**RESULT**	**UNIT**	**EQUIPMENT**
☐Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☐ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 -- Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☒ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☒ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?
Triple pipe outflow. Sediment built up that center & right pipe need to flow to the left for water to run away - 2017

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Willow Creek		Outfall ID: 0-009	
Today's date: 8/22/2022		Time (Military): 0645	
Investigators: Brian Wise		Form completed by: Brian Wise	
Temperature (°F): 70	Rainfall (in.): Last 24 hours: 0.51 Last 48 hours: trace		
Latitutde: 40.44911N	Longitude: 075.88934W	GPS Unit: Magellan	GPS LMK #: Leaning Pine
Camera: Brian Wise Cellular Device		Photo #s: #3	

Land Use in Drainage Area (Check all that apply):

☐ Industrial	☒ Open Space
☐ Ultra-Urban Residential	☐ Institutional
☐ Suburban Residential	Other: _____
☐ Commercial	Known Industries: _____

Notes (e.g.., origin of outfall, if known): Across from 100 Colonial Court

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☒ **Closed Pipe**	☒ RCP ☐ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☒ Circular ☐ Eliptical ☐ Box ☐ Other: ____	☒ Single ☐ Double ☐ Triple ☐ Other: ____	Diameter/Dimensions: 20"	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☒ **Open drainage**	☒ Concrete ☐ Earthen ☒ rip-rap ☐ Other:	☐ Trapezoid ☒ Parabolic ☐ Other: ____		Depth: 2' Top Width: 1' 4" Bottom Width: 4' 4"	
☐ **In-Stream**	**(applicable when collecting samples)**				
Flow Present?	☐ Yes ☒ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		**RESULT**	**UNIT**	**EQUIPMENT**
☐Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☐ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☒ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?
Good shape – 2017; Good shape - 2022

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Willow Creek		Outfall ID: 0-010	
Today's date: 8/22/2022		Time (Military): 0700	
Investigators: Brian Wise		Form completed by: Brian Wise	
Temperature (°F): 70	Rainfall (in.): Last 24 hours: 0.51	Last 48 hours: trace	
Latitutde: 40.44882N	Longitude: 075.89081W	GPS Unit: Magellan	GPS LMK #: 310 Colonial Court
Camera: Brian Wise Cellular Device		Photo #s: 4	

Land Use in Drainage Area (Check all that apply):

☐ Industrial	☒ Open Space
☐ Ultra-Urban Residential	☐ Institutional
☐ Suburban Residential	Other: _____
☐ Commercial	Known Industries: _____

Notes (e.g.., origin of outfall, if known): From open grate across entire road

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☒ **Closed Pipe**	☒ RCP ☐ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☐ Circular ☐ Eliptical ☒ Box ☐ Other: ____	☒ Single ☐ Double ☐ Triple ☐ Other: ____	Diameter/Dimensions: 24" x 10"	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☒ **Open drainage**	☐ Concrete ☐ Earthen ☒ rip-rap ☐ Other:	☒ Trapezoid ☐ Parabolic ☐ Other: ____		Depth: 9' Top Width: 3' Bottom Width: 10'	
☐ **In-Stream**	**(applicable when collecting samples)**				
Flow Present?	☐ Yes ☒ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		**RESULT**	**UNIT**	**EQUIPMENT**
☐Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☒ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☒ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?
Remove debris from out flow – 2017
Good 2022

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Willow Creek		Outfall ID: 0-011	
Today's date: 8/22/2022		Time (Military): 0705	
Investigators: Brian Wise		Form completed by: Brian Wise	
Temperature (°F): 70	Rainfall (in.): Last 24 hours: 0.51 Last 48 hours: trace		
Latitutde: 40.44806N	Longitude: 075.89212W	GPS Unit: Magellan	GPS LMK #: 401 Colonial Court
Camera: Brian Wise Cellular Device		Photo #s: 5	40yds off rd, by 2 sycamore trees, 10' out of creek

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☐ Suburban Residential
- ☐ Commercial
- ☒ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g.., origin of outfall, if known): Drains from Colonial Court

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☒ **Closed Pipe**	☐ RCP ☐ CMP ☐ PVC ☒ HDPE ☐ Steel ☐ Other: _____	☒ Circular ☐ Eliptical ☐ Box ☐ Other: ____	☒ Single ☐ Double ☐ Triple ☐ Other: ____	Diameter/Dimensions: 16"	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☒ **Open drainage**	☐ Concrete ☐ Earthen ☒ rip-rap ☐ Other:	☐ Trapezoid ☒ Parabolic ☐ Other: ____		Depth: 8' Top Width: 2' 2" Bottom Width: 3' 8"	
☐ **In-Stream**	**(applicable when collecting samples)**				
Flow Present?	☐ Yes ☒ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		**RESULT**	**UNIT**	**EQUIPMENT**
☐Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☒ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☒ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

Good shape, need to clean growing brush to locate - 2017

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Willow Creek		Outfall ID: 0-012	
Today's date: 8/22/2022		Time (Military): 0731	
Investigators: Brian Wise		Form completed by: Brian Wise	
Temperature (°F): 70	Rainfall (in.): Last 24 hours: 0.51 Last 48 hours: trace		
Latitutde: 40.44786N	Longitude: 075.89394W	GPS Unit: Magellan	GPS LMK #:across from 419 Col. Ct
Camera: Brian Wise Cellular Device		Photo #s: #6	from grate 15yds to right at patch of 3 big trees,

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☐ Suburban Residential
- ☐ Commercial
- ☒ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g.., origin of outfall, if known): Drains from drain at 419 Col. Ct. both sides of road

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☒ **Closed Pipe**	☐ RCP ☐ CMP ☐ PVC ☒ HDPE ☐ Steel ☐ Other: _____	☒ Circular ☐ Eliptical ☐ Box ☐ Other: _____	☒ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: 24"	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☒ **Open drainage**	☐ Concrete ☐ Earthen ☒ rip-rap ☐ Other:	☐ Trapezoid ☒ Parabolic ☐ Other: _____		Depth: 4' Top Width: 2' 10" Bottom Width: 5'	
☐ **In-Stream**	**(applicable when collecting samples)**				
Flow Present?	☐ Yes ☒ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		**RESULT**	**UNIT**	**EQUIPMENT**
☐Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☒ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☒ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?
O.F. is in good shape, brush need to be cleared for better access – 2017
Brush needs to be cleared for better access - 2022

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Willow Creek		Outfall ID: 0-014	
Today's date: 8/22/2022		Time (Military): 0750	
Investigators: Brian Wise		Form completed by: Brian Wise	
Temperature (°F): 70	Rainfall (in.): Last 24 hours: 0.51 Last 48 hours: trace		
Latitutde: 40.44694N	Longitude: 075.89341W	GPS Unit: Magellan	GPS LMK #: 33-37 Spirit Court
Camera: Brian Wise Cellular Device		Photo #s: #7	

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☒ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g.., origin of outfall, if known): Drains from Spirit Court

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☒ **Closed Pipe**	☒ RCP ☐ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☒ Circular ☐ Eliptical ☐ Box ☐ Other: _____	☒ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: 18"	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☒ **Open drainage**	☐ Concrete ☒ Earthen ☐ rip-rap ☐ Other:	☐ Trapezoid ☒ Parabolic ☐ Other: _____		Depth: 9' Top Width: 4' Bottom Width: 5'	
☐ **In-Stream**	**(applicable when collecting samples)**				
Flow Present?	☐ Yes ☒ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		**RESULT**	**UNIT**	**EQUIPMENT**
☐Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☒ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☒ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

Good shape – 2017; Good Shape - 2022

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Willow Creek		Outfall ID: 0-015	
Today's date: 8/22/2022		Time (Military): 0755	
Investigators: Brian Wise		Form completed by: Brian Wise	
Temperature (°F): 70	Rainfall (in.): Last 24 hours: 0.51 Last 48 hours: trace		
Latitutde: 40.444731N	Longitude: 075.89240W	GPS Unit: Magellan	GPS LMK #: 41-45 Spirit Court
Camera: Brian Wise Cellular Device		Photo #s: #8	

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☒ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g.., origin of outfall, if known): Drains on Cornerstone & Spirit Intersection

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☒ **Closed Pipe**	☒ RCP ☐ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☒ Circular ☐ Eliptical ☐ Box ☐ Other: _____	☒ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: 36"	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☒ **Open drainage**	☐ Concrete ☐ Earthen ☒ rip-rap ☐ Other:	☐ Trapezoid ☒ Parabolic ☐ Other: _____		Depth: 18' Top Width: 3' Bottom Width: 5'	
☐ **In-Stream**	**(applicable when collecting samples)**				
Flow Present?	☐ Yes ☒ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		**RESULT**	**UNIT**	**EQUIPMENT**
☐Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☒ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☒ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?
Re-shaped for MTA 5/17, good Shape – 2017; Good Shape - 2022

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Willow Creek		Outfall ID: 0-016	
Today's date: 8/22/2022		Time (Military): 0800	
Investigators: Brian Wise		Form completed by: Brian Wise	
Temperature (°F): 70	Rainfall (in.): Last 24 hours: 0.51 Last 48 hours: trace		
Latitutde: 40.44728N	Longitude: 075.89234W	GPS Unit: Magellan	GPS LMK #: 57-61 Spirit Court
Camera: Brian Wise Cellular Device		Photo #s: #9	

Land Use in Drainage Area (Check all that apply):

- ☐ Industrial
- ☐ Ultra-Urban Residential
- ☒ Suburban Residential
- ☐ Commercial
- ☐ Open Space
- ☐ Institutional
- Other: _____
- Known Industries: _____

Notes (e.g.., origin of outfall, if known): Street drains on Spirit Court

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☒ **Closed Pipe**	☐ RCP ☒ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☒ Circular ☐ Eliptical ☐ Box ☐ Other: _____	☒ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: 16"	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☒ **Open drainage**	☐ Concrete ☒ Earthen ☐ rip-rap ☐ Other:	☐ Trapezoid ☒ Parabolic ☐ Other: _____		Depth: 4' Top Width: 2' Bottom Width: 3'	
☐ **In-Stream**	**(applicable when collecting samples)**				
Flow Present?	☐ Yes ☒ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		**RESULT**	**UNIT**	**EQUIPMENT**
☐Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☒ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☒ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

18" pipe opens to a 16" x 22" elliptical end cap, sediment is about ¾ up the height of the pipe which restricts flow – 2017, Good condition - 2022

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Willow Creek		Outfall ID: 0-017	
Today's date: 8/22/2022		Time (Military): 0805	
Investigators: Brian Wise		Form completed by: Brian Wise	
Temperature (°F): 70	Rainfall (in.): Last 24 hours: 0.51	Last 48 hours: trace	
Latitutde: 40.44772N	Longitude: 075.89016W	GPS Unit: Magellan	GPS LMK #: 81-85 Spirit Court
Camera:		Photo #s: #10	

Land Use in Drainage Area (Check all that apply):

☐ Industrial	☐ Open Space
☐ Ultra-Urban Residential	☐ Institutional
☒ Suburban Residential	Other: _____
☐ Commercial	Known Industries: _____

Notes (e.g.., origin of outfall, if known): Street drains on Spirit Court

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☒ **Closed Pipe**	☐ RCP ☒ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☒ Circular ☐ Eliptical ☐ Box ☐ Other: _____	☒ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: 18"	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☒ **Open drainage**	☐ Concrete ☒ Earthen ☐ rip-rap ☐ Other:	☐ Trapezoid ☒ Parabolic ☐ Other: _____		Depth: 11' Top Width: 1' 6" Bottom Width: 3'	
☐ **In-Stream**	**(applicable when collecting samples)**				
Flow Present?	☐ Yes ☒ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		**RESULT**	**UNIT**	**EQUIPMENT**
☐Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☒ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☒ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

Good shape! Just re-did swale last summer, 2016 – 2017, Good shape - 2022

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Willow Creek		Outfall ID: 0-018	
Today's date: 8/22/2022		Time (Military): 0810	
Investigators: Brian Wise		Form completed by: Brian Wise	
Temperature (°F): 70	Rainfall (in.): Last 24 hours: 0.51	Last 48 hours: trace	
Latitutde: 40.44821N	Longitude: 075.88733W	GPS Unit: Magellan	GPS LMK #: 93 Spirit Court
Camera: Brian Wise Cellular Device		Photo #s: #11	

Land Use in Drainage Area (Check all that apply):

☐ Industrial	☐ Open Space
☐ Ultra-Urban Residential	☐ Institutional
☒ Suburban Residential	Other: _____
☐ Commercial	Known Industries: _____

Notes (e.g.., origin of outfall, if known): Drain from Spirit Court

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☒ **Closed Pipe**	☐ RCP ☒ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☐ Circular ☒ Eliptical ☐ Box ☐ Other: _____	☒ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: 12" x 24"	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☒ **Open drainage**	☐ Concrete ☒ Earthen ☐ rip-rap ☐ Other:	☒ Trapezoid ☐ Parabolic ☐ Other: _____		Depth: 4' Top Width: 2' 8" Bottom Width: 3' 6"	
☐ **In-Stream**	**(applicable when collecting samples)**				
Flow Present?	☐ Yes ☒ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		**RESULT**	**UNIT**	**EQUIPMENT**
☐Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☒ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☒ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No		
2. If yes, collected from:	☐ Flow	☐ Pool		
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM	☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

Outfall covered by metal grate fastened to wing walls, sediment is up about ½ the pipe – 2017, Clear 2022

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed: Willow Creek		Outfall ID: 0-019	
Today's date: 8/22/2022		Time (Military): 0815	
Investigators: Brian Wise		Form completed by: Brian Wise	
Temperature (°F): 71	Rainfall (in.): Last 24 hours: 0.51 Last 48 hours: trace		
Latitutde: 40.44806N	Longitude: 075.00746W	GPS Unit: Magellan	GPS LMK #: 133-137 Spirit Court
Camera: Brian Wise Cellular Device		Photo #s: #12 & 13	

Land Use in Drainage Area (Check all that apply):

☐ Industrial	☐ Open Space
☐ Ultra-Urban Residential	☐ Institutional
☒ Suburban Residential	Other: _____
☐ Commercial	Known Industries: _____

Notes (e.g.., origin of outfall, if known): Street drains on Spirit Court

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☒ **Closed Pipe**	☐ RCP ☒ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☐ Circular ☒ Eliptical ☐ Box ☐ Other: _____	☒ Single ☐ Double ☐ Triple ☐ Other: _____	Diameter/Dimensions: 18" x 30"	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☒ **Open drainage**	☐ Concrete ☒ Earthen ☐ rip-rap ☐ Other:	☒ Trapezoid ☐ Parabolic ☐ Other: _____		Depth: 7' Top Width: 3' 6" Bottom Width: 7' 6"	
☐ **In-Stream**	**(applicable when collecting samples)**				
Flow Present?	☐ Yes ☒ No *If No, Skip to Section 5*				
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		**RESULT**	**UNIT**	**EQUIPMENT**
☐Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☒ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☒ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

Outfall area is about 10" higher than invert elevation, about 35' below O.F. is hole from water flow in channel – 2017 & 2022

SAMPLE OUTFALL SCREENING FORM

OUTFALL RECONNAISSANCE INVENTORY/ SAMPLE COLLECTION FIELD SHEET

Section 1: Background Data

Subwatershed:		Outfall ID:	
Today's date:		Time (Military):	
Investigators:		Form completed by:	
Temperature (°F):	Rainfall (in.): Last 24 hours: Last 48 hours:		
Latitutde:	Longitude:	GPS Unit:	GPS LMK #:
Camera:		Photo #s:	

Land Use in Drainage Area (Check all that apply):

☐ Industrial ☐ Open Space

☐ Ultra-Urban Residential ☐ Institutional

☐ Suburban Residential Other: _____

☐ Commercial Known Industries: _____

Notes (e.g.., origin of outfall, if known):

Section 2: Outfall Description

LOCATION	MATERIAL	SHAPE		DIMENSIONS (IN.)	SUBMERGED
☐ **Closed Pipe**	☐ RCP ☐ CMP ☐ PVC ☐ HDPE ☐ Steel ☐ Other: _____	☐ Circular ☐ Eliptical ☐ Box ☐ Other: ____	☐ Single ☐ Double ☐ Triple ☐ Other: ____	Diameter/Dimensions: _____	In Water: ☐ No ☐ Partially ☐ Fully With Sediment: ☐ No ☐ Partially ☐ Fully
☐ **Open drainage**	☐ Concrete ☐ Earthen ☐ rip-rap ☐ Other: ____	☐ Trapezoid ☐ Parabolic ☐ Other: ____		Depth: ____ Top Width: ____ Bottom Width: ____	
☐ **In-Stream**	**(applicable when collecting samples)**				
Flow Present?	☐ Yes ☐ No	***If No, Skip to Section 5***			
Flow Description (If present)	☐ Trickle ☐ Moderate ☐ Substantial				

Section 3: Quantitative Characterization

FIELD DATA FOR FLOWING OUTFALLS				
PARAMETER		**RESULT**	**UNIT**	**EQUIPMENT**
☐Flow #1	Volume		Liter	Bottle
	Time to fill		Sec	
☐Flow #2	Flow depth		In	Tape measure
	Flow width	____' ____"	Ft, In	Tape measure
	Measured length	____' ____"	Ft, In	Tape measure
	Time of travel		S	Stop watch
Temperature			°F	Thermometer
pH			pH Units	Test strip/Probe
Ammonia			mg/L	Test strip

Outfall Reconnaissance Inventory Field Sheet

Section 4: Physical Indicators for Flowing Outfalls Only

Are Any Physical Indicators Present in the flow? ☐ Yes ☐ No *(If No, Skip to Section 5)*

INDICATOR	CHECK if Present	DESCRIPTION	RELATIVE SEVERITY INDEX (1-3)		
Odor	☐	☐ Sewage ☐ Rancid/sour ☐ Petroleum/gas ☐ Sulfide ☐ Other:	☐ 1 – Faint	☐ 2 – Easily detected	☐ 3 – Noticeable from a distance
Color	☐	☐ Clear ☐ Brown ☐ Gray ☐ Yellow ☐ Green ☐ Orange ☐ Red ☐ Other:	☐ 1 – Faint colors in sample bottle	☐ 2 – Clearly visible in sample bottle	☐ 3 – Clearly visible in outfall flow
Turbidity	☐	See severity	☐ 1 – Slight cloudiness	☐ 2 – Cloudy	☐ 3 – Opaque
Floatables -Does Not Include Trash!!	☐	☐ Sewage (Toilet Paper, etc.) ☐ Suds ☐ Petroleum (oil sheen) ☐ Other:	☐ 1 – Few/slight; origin not obvious	☐ 2 – Some; indications of origin (e.g., possible suds or oil sheen)	☐ 3 - Some; origin clear (e.g., obvious oil sheen, suds, or floating sanitary materials)

Section 5: Physical Indicators for Both Flowing and Non-Flowing Outfalls

Are physical indicators that are not related to flow present? ☐ Yes ☐ No *(If No, Skip to Section 6)*

INDICATOR	CHECK if Present	DESCRIPTION	COMMENTS
Outfall Damage	☐	☐ Spalling, Cracking or Chipping ☐ Peeling Paint ☐ Corrosion	
Deposits/Stains	☐	☐ Oily ☐ Flow Line ☐ Paint ☐ Other:	
Abnormal Vegetation	☐	☐ Excessive ☐ Inhibited	
Poor pool quality	☐	☐ Odors ☐ Colors ☐ Floatables ☐ Oil Sheen ☐ Suds ☐ Excessive Algae ☐ Other:	
Pipe benthic growth	☐	☐ Brown ☐ Orange ☐ Green ☐ Other:	

Section 6: Overall Outfall Characterization

☐ Unlikely ☐ Potential (presence of two or more indicators) ☐ Suspect (one or more indicators with a severity of 3) ☐ Obvious

Section 7: Data Collection

1. Sample for the lab?	☐ Yes	☐ No	
2. If yes, collected from:	☐ Flow	☐ Pool	
3. Intermittent flow trap set?	☐ Yes	☐ No	If Yes, type: ☐ OBM ☐ Caulk dam

Section 8: Any Non-Illicit Discharge Concerns (e.g., trash or needed infrastructure repairs)?

APPENDIX H

MCM #3 – ILLICIT DISCHARGE DETECTION AND ELIMINATION (IDD&E)

BMP #5 – ACT 167 AND MS4 ORDINANCE #214

MAIDEN CREEK WATERSHED

STORMWATER MANAGEMENT

ORDINANCE

ORDINANCE NO. 214

MAIDENCREEK TOWNSHIP, BERKS COUNTY,

PENNSYLVANIA

Adopted at a Public Meeting Held on

June 12, 2008

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ARTICLE I-GENERAL PROVISIONS

Section 101. Short Title

This Ordinance shall be known and may be cited as the "Maiden Creek Watershed Stormwater Management Ordinance").

Section 102. Statement of Findings

The governing body of the Township of Maidencreek finds that:

A. Inadequate management of accelerated stormwater runoff resulting from development throughout a watershed increases flood flows and velocities, contributes to erosion and sedimentation, overtaxes the carrying capacity of existing streams and storm sewers, greatly increases the cost of public facilities to convey and manage stormwater, undermines floodplain management and flood reduction efforts in upstream and downstream communities, reduces groundwater recharge, and threatens public health and safety.

B. Inadequate planning and management of stormwater runoff resulting from land development and redevelopment throughout a watershed can also harm surface water resources by changing the natural hydrologic patterns, accelerating stream flows (which increase scour and erosion of stream-beds and stream-banks thereby elevating sedimentation), destroying aquatic habitat and elevating aquatic pollutant concentrations and loadings such as sediments, nutrients, heavy metals and pathogens. Groundwater resources are also impacted through loss of recharge.

C. A comprehensive program of stormwater management (SWM), including minimization of impacts of development, redevelopment and activities causing accelerated erosion, is fundamental to the public health, safety, welfare, and the protection of the people of the Municipality and all the people of the Commonwealth, their resources, and the environment.

D. Inadequate management of accelerated stormwater runoff resulting from development throughout a watershed poses a threat to surface and groundwater quality.

E. Stormwater can be an important water resource by providing groundwater recharge for water supplies and base flow of streams, which also protects and maintains surface water quality.

F. Through project design, impacts from stormwater runoff can be minimized to maintain the natural hydrologic regime, and sustain high water quality, groundwater recharge, stream baseflow and aquatic ecosystems. The most cost effective and environmentally advantageous way to manage storm water runoff is through nonstructural project design, minimizing impervious surfaces and sprawl, avoiding sensitive areas (i.e. stream buffers, floodplains, steep slopes), and designing to topography and soils to maintain the natural hydrologic regime.

G. Public education on the control of pollution from stormwater is an essential component in successfully addressing stormwater.

H. Federal and state regulations require certain municipalities to implement a program of stormwater controls. These municipalities are required to obtain a permit for stormwater

discharges from their separate storm sewer systems under the National Pollutant Discharge Elimination System (NPDES).

I. Non-stormwater discharges to municipal separate storm sewer systems can contribute to pollution of waters of the Commonwealth by the Municipality.

Section 103. Purpose

The purpose of this Ordinance is to promote the public health, safety, and welfare within the Maiden Creek Watershed by maintaining the natural hydrologic regime by minimizing the impacts described in **Section 102** of this Ordinance through provisions designed to:

A. Promote alternative project designs and layout that minimizes impacts to surface and ground water.

B. Promote nonstructural BMPs.

C. Minimize increases in stormwater volume.

D. Minimize impervious surfaces.

E. Manage accelerated runoff and erosion and sedimentation problems at their source by regulating activities that cause these problems.

F. Utilize and preserve the existing natural drainage systems.

G. Manage stormwater impacts close to the runoff source, which requires a minimum of structures and relies on natural processes.

H. Focus on infiltration of stormwater, to maintain groundwater recharge, to prevent degradation of surface and groundwater quality and to otherwise protect water resources.

I. Strive to maintain existing base flows and quality of streams and watercourses.

J. Meet legal water quality requirements under state law, including regulations at 25 Pa. Code Chapter 93.4a to protect and maintain "existing uses" and maintain the level of water quality to support those uses in all streams, and to protect and maintain water quality in "special protection" streams.

K. Address the quality and quantity of stormwater discharges from the development site.

L. Provide a mechanism to identify controls necessary to meet the NPDES permit requirements.

M. Implement an illegal discharge detection and elimination program to address non-stormwater discharges into the Township of Maidencreek's separate storm sewer system.

N. Preserve and restore the flood-carrying capacity of streams.

O. Prevent scour and erosion of streambanks and streambeds.

P. Provide proper maintenance of all permanent stormwater management facilities and BMPs that are implemented in the Township of Maidencreek.

Q. Provide performance standards and design criteria for watershed-wide stormwater management and planning.

R. NPDES Requirements

Federal regulations approved October 1999 require operators of small municipal separate storm sewer systems (MS4s) to obtain NPDES Phase II permits from DEP by March 2003. (NPDES II is an acronym for the National Pollutant Discharge Elimination System Phase II Stormwater Permitting Regulations.) This program affects all municipalities in "urbanized areas" of the state. This definition applies to all Maiden Creek watershed municipalities identified in Table III-1 of the Maiden Creek Stormwater Management Plan Volume II as NPDES Phase II municipalities. Therefore, these identified municipalities will be subject to the NPDES Phase II requirements mandated by the Federal Clean Water Act as administered by DEP. For more information on NPDES II requirements, contact the DEP Regional Office.

Section 104. Statutory Authority

Primary Authority:

The Township of Maidencreek is empowered to regulate these activities by the authority of the Act of October 4, 1978, P.L. 864 (Act 167), 32 P.S. Section 680.1, et seq., as amended, the "Storm Water Management Act" and the (appropriate municipal code).

Secondary Authority

The Township of Maidencreek also is empowered to regulate land use activities that affect runoff by the authority of the Act of July 31, 1968, P.L. 805, No. 247, The Pennsylvania Municipalities Planning Code, as amended.

Section 105. Applicability/Regulated Activities

A. All Regulated Activities and all activities that may affect stormwater runoff, including Land Development and Earth Disturbance Activity, are subject to regulation by this Ordinance.

Section 106. Repealer

Any ordinance or ordinance provision of the Township of Maidencreek inconsistent with any of the provisions of this Ordinance is hereby repealed to the extent of the inconsistency only.

Section 107. Severability

Should any section or provision of this Ordinance be declared invalid by a court of competent jurisdiction, such decision shall not affect the validity of any of the remaining provisions of this Ordinance.

Section 108. Compatibility With Other Ordinance Requirements

Approvals issued and actions taken under this Ordinance do not relieve the Applicant of the responsibility to secure required permits or approvals for activities by any other code, law, regulation or ordinance.

ARTICLE II-DEFINITIONS

Section 201. Interpretation

For the purposes of this Ordinance, certain terms and words used herein shall be interpreted as follows:

A. Words used in the present tense include the future tense; the singular number includes the plural, and the plural number includes the singular; words of masculine gender include feminine gender; and words of feminine gender include masculine gender.

B. The word "includes" or "including" shall not limit the term to the specific example, but is intended to extend its meaning to all other instances of like kind and character.

C. The word "person" includes an individual, firm, association, organization, partnership, trust, company, corporation, unit of government, or any other similar entity.

D. The words "shall" and "must" are mandatory; the words "may" and "should" are permissive.

E. The words "used or occupied" include the words "intended, designed, maintained, or arranged to be used, occupied or maintained."

Section 202. Definitions

Accelerated Erosion - The removal of the surface of the land through the combined action of man's activity and the natural processes of a rate greater than would occur because of the natural process alone.

Agricultural Activities - The work of producing crops and raising livestock including tillage, plowing, disking, harrowing, pasturing and installation of conservation measures. For purposes of regulation by this Ordinance construction of new buildings or impervious area is not considered an agricultural activity.

Alteration - As applied to land, a change in topography as a result of the moving of soil and rock from one location or position to another; also the changing of surface conditions by causing the surface to be more or less impervious; land disturbance.

As-built drawings - Those maintained by the Contractor as he constructs the project and upon which he documents the actual locations of the building components and changes to the original contract documents. These, or a copy of same, are turned over to the Engineer at the completion of the project

Applicant - A person who has filed an application for approval to engage in any Regulated Activities as defined in **Section 105** of this Ordinance.

Bankfull - The channel at the top-of-bank or point where water begins to overflow onto a floodplain.

Base Flow - Portion of stream discharge derived from groundwater; the sustained discharge that does not result from direct runoff or from water diversions, reservoir releases, piped discharges, or other human activities.

Bioretention - A stormwater retention area which utilizes woody and herbaceous plants and soils to remove pollutants before infiltration occurs.

BMP (Best Management Practice) - Methods, measures or practices to prevent or reduce surface runoff and/or water pollution, including but not limited to, structural and non-structural stormwater management practices and operation and maintenance procedures. See also Non-structured Best Management Practice (BMP).

Buffer - The area of land immediately adjacent to any stream, measured perpendicular to and horizontally from the top-of-bank on both sides of a stream.

Carbonate Bedrock (Areas) - Rock consisting chiefly of carbonate minerals, such as limestone and dolomite; specifically a sedimentary rock composed of more than 50% by weight of carbonate minerals that underlies soil or other unconsolidated, superficial material.

Channel - A drainage element in which stormwater flows with an open surface. Open channels include, but shall not be limited to, natural and man-made drainage ways, swales, streams, ditches, canals, and pipes flowing partly full.

Channel Erosion - The widening, deepening, and headward cutting of small channels and waterways, caused by stormwater runoff or bankfull flows.

Cistern - An underground reservoir or tank for storing rainwater.

Conservation District - The Berks County Conservation District.

Culvert - A structure with appurtenant works, which carries water under or through an embankment or fill.

Dam - An artificial barrier, together with its appurtenant works, constructed for the purpose of impounding or storing water or another fluid or semifluid, or a refuse bank, fill or structure for highway, railroad or other purposes which does or may impound water or another fluid or semifluid.

Department - The Pennsylvania Department of Environmental Protection.

Designee - The agent of the Berks County Planning Commission, Berks County Conservation District and/or agent of the governing body involved with the administration, review or enforcement of any provisions of this ordinance by contract or memorandum of understanding.

Design Professional (Qualified) - Any person licensed by the Pennsylvania Department of State or otherwise qualified by law to perform the work required by the Ordinance

Design Storm - The magnitude and temporal distribution of precipitation from a storm event measured in probability of occurrence (e.g., a 5-year storm) and duration (e.g., 24-hours), used in the design and evaluation of stormwater management systems.

Designated Watershed (ACT 167) - A Watershed which is listed under the Pennsylvania Department of Environmental Protection's "Index of Designated Watersheds (Stormwater Management)" pursuant to the Stormwater Management Act P.L. 864, No. 167, October 4, 1978, and published in the Pennsylvania Bulletin on May 31, 1980 and August 9, 1980, as amended on November 19, 1991, April 21, 1992, June 21, 1994, April 16, 1996, April 15, 1997 and December 16, 1997).

Detention Basin - An impoundment designed to collect and retard stormwater runoff by temporarily storing the runoff and releasing it at a predetermined rate. Detention basins are designed to drain completely shortly after any given rainfall event and are dry until the next rainfall event.

Detention District - Those subareas in which some type of detention is required to meet the plan requirements and the goals of Act 167.

Developer - A person that seeks to undertake any Regulated Earth Disturbance activities at a project site in the Township of Maidencreek.

Development - See "Earth Disturbance Activity." The term includes redevelopment.

Development Site - The specific tract of land where any Earth Disturbance activities in the Township of Maidencreek are planned, conducted or maintained.

Diffused Drainage Discharge - Drainage discharge not confined to a single point location or channel, such as sheet flow or shallow concentrated flow.

Discharge - To release water from a project, site, aquifer, drainage basin or other point of interest (verb); The rate and volume of flow of water such as in a stream, generally expressed in cubic feet per second (volume per unit of time) (noun). See also Peak Discharge.

Discharge Point - The point where stormwater flow into.

Disturbed Areas - Unstabilized land area where an earth disturbance activity is occurring or has occurred.

Ditch - An artificial waterway for irrigation or stormwater conveyance.

Downslope Property Line - That portion of the property line of the lot, tract, or parcels of land being developed located such that overland or pipe flow from the site would be directed towards it.

Drainage Conveyance Facility - A Stormwater Management Facility designed to transmit stormwater runoff and shall include channels, swales, pipes, conduits, culverts, storm sewers, etc.

Drainage Easement - A right granted by a landowner to a grantee, allowing the use of private land for stormwater management purposes.

Drainage Permit - A permit issued by the Municipal governing body after the drainage plan has been approved.

Drainage Plan - The documentation of the stormwater management system, if any, to be used for a given development site, the contents of which are established in Section 403.

Earth Disturbance Activity - A construction or other human activity which disturbs the surface of land, including, but not limited to, clearing and grubbing, grading, excavations, embankments, land development, agricultural plowing or tilling, timber harvesting activities, road maintenance activities, mineral extraction, and the moving, depositing, stockpiling, or storing of soil, rock or earth materials.

Emergency Spillway - A conveyance area that is used to pass peak discharge greater than the maximum design storm controlled by the stormwater facility.

Encroachment - A structure or activity that changes, expands or diminishes the course, current or cross section of a watercourse, floodway or body of water.

Erosion - The process by which the surface of the land, including channels, is worn away by water, wind, or chemical action.

Erosion and Sediment Control Plan - A plan for a project site which identifies BMPs to minimize accelerated erosion and sedimentation.

Exceptional Value Waters - Surface waters of high quality which satisfy Pennsylvania Code Title 25 Environmental Protection, Chapter 93, Water Quality Standards, § 93.4b(b) (relating to anti-degradation).

Existing Conditions - The initial condition of a project site prior to the proposed alteration. If the initial condition of the site is undeveloped land, the land use shall be considered as "meadow" unless the natural land cover is proven to generate lower curve numbers or Rational "C" value, such as forested lands.

Flood - A temporary condition of partial or complete inundation of land areas from the overflow of streams, rivers, and other waters of this Commonwealth.

Floodplain - Any land area susceptible to inundation by water from any natural source or delineated by applicable Department of Housing and Urban Development, Federal Insurance Administration Flood Hazard Boundary - Mapped as being a special flood hazard area.

Floodway - The channel of the watercourse and those portions of the adjoining floodplains, which are reasonably required to carry and discharge the 100-year frequency flood. Unless otherwise specified, the boundary of the floodway is as indicated on maps and flood insurance studies provided by FEMA. In an area where no FEMA maps or studies have defined the boundary of the 100-year frequency floodway, it is assumed - absent evidence to the contrary - that the floodway extends from the stream to 50 feet from the top-of-bank.

Fluvial Geomorphology - The study of landforms associated with river channels and the processes that form them.

Forest Management/Timber Operations - Planning and activities necessary for the management of forest land with no change of land use proposed. These include timber inventory and preparation of forest management plans, silvicultural treatment, cutting budgets, logging road design and construction, timber harvesting and reforestation.

Freeboard - A vertical distance between the elevation of the design high-water and the top of a dam, levee, tank, basin, swale, or diversion berm. The space is required as a safety margin in a pond or basin.

Grade - A slope, usually of a road, channel or natural ground specified in percent and shown on plans as specified herein. (To) Grade - to finish the surface of a roadbed, top of embankment or bottom of excavation.

Grassed Waterway - A natural or constructed waterway, usually broad and shallow, covered with erosion-resistant grasses, used to convey surface water.

Groundwater - Water beneath the earth's surface, often between saturated soil and rock that supplies wells and springs.

Groundwater Recharge - Replenishment of existing natural underground water supplies without degrading groundwater quality.

HEC-HMS - The U.S. Army Corps of Engineers, Hydrologic Engineering Center (HEC) - Hydrologic Modeling System (HMS). This model was used to model the Maiden Creek watershed during the ACT 167 Plan development and was the basis for the Standards and Criteria of this Ordinance.

High Quality Waters - Surface waters having quality which exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water by satisfying Pennsylvania Code Title 25 Environmental Protection, Chapter 93 Water Quality Standards, § 93.4b(a).

Hotspots - Areas where land use or activities generate highly contaminated runoff, with concentrations of pollutants in excess of those typically found in stormwater.

Hydrograph - A graph of discharge versus time for a selected point in the drainage system.

Hydrologic Regime (natural) - The hydrologic cycle or balance that sustains quality and quantity of stormwater, baseflow, storage, and groundwater supplies under natural conditions.

Hydrologic Soil Group, - A classification of soils by the Natural Resources Conservation Service, formerly the Soil Conservation Service, into four runoff potential groups. The groups range from A soils, which are very permeable and produce little runoff, to D soils, which are not very permeable and produce much more runoff.

Impervious Surface - A surface that prevents the infiltration of water into the ground. Impervious surface includes, but is not limited to, any roof, parking or driveway areas, and any new streets and sidewalks. Any surface areas designed to be gravel or crushed stone shall be assumed to be impervious surfaces.

Impoundment - A retention or detention basin designed to retain stormwater runoff and release it at a controlled rate.

Infill - Development that occurs on smaller parcels that remain undeveloped but are within or very close proximity to urban areas. The development relies on existing infrastructure and does not require an extension of water, sewer or other public utilities.

Infiltration - Movement of surface water into the soil, where it is absorbed by plant roots, evaporated into the atmosphere, or percolates downward to recharge groundwater.

Infiltration Structures - A structure designed to direct runoff into the underground water (e.g., french drains, seepage pits, seepage trench).

Inlet - The upstream end of any structure through which water may flow.

Intermittent Stream - A stream that flows only part of the time. Flow generally occurs for several weeks or months in response to seasonal precipitation, due to groundwater discharge.

Land Development - (i) the improvement of one lot or two or more contiguous lots, tracts, or parcels of land for any purpose involving (a) a group of two or more residential or nonresidential buildings, whether proposed initially or cumulatively, or a single nonresidential building on a lot or lots regardless of the number of occupants or tenure or (b) the division or allocation of land or space, whether initially or cumulatively, between or among two or more existing or prospective occupants by means of, or for the purpose of streets, common areas, leaseholds, condominiums, building groups, or other features; (ii) A subdivision of land; (iii) development in accordance with Section 503(1.1) of the PA Municipalities Planning Code.

Limiting zone - A soil horizon or condition in the soil profile or underlying strata which includes one of the following:

(i) A seasonal high water table, whether perched or regional, determined by direct observation of the water table or indicated by soil mottling.

(ii) A rock with open joints, fracture or solution channels, or masses of loose rock fragments, including gravel, with insufficient fine soil to fill the voids between the fragments.

(iii) A rock formation, other stratum or soil condition which is so slowly permeable that it effectively limits downward passage of effluent.

Lot - A part of a subdivision or a parcel of land used as a building site or intended to be used for building purposes, whether immediate or future, which would not be further subdivided.

Main Stem (Main Channel) - Any stream segment or other runoff conveyance facility used as a reach in the Maiden Creek hydrologic model.

Manning Equation (Manning formula) - A method for calculation of velocity of flow (e.g., feet per second) and flow rate (e.g., cubic feet per second) in open channels based upon channel shape, roughness, depth of flow and slope. "Open channels" may include closed conduits so long as the flow is not under pressure.

Municipal Engineer - A professional engineer licensed as such in the Commonwealth of Pennsylvania, duly appointed as the engineer for a municipality, planning agency or joint planning commission.

Municipality - Township of Maidencreek, Berks County, Pennsylvania.

Natural Hydrologic Regime (see hydrologic regime)

Natural Recharge Area - Undisturbed surface area or depression where stormwater collects, and a portion of which infiltrates and replenishes the underground and groundwater.

Non-point Source Pollution - Pollution that enters a water body from diffuse origins in the watershed and does not result from discernible, confined, or discrete conveyances.

Non Stormwater Discharges - Water flowing in stormwater collection facilities, such as pipes or swales, which is not the result of a rainfall event or snowmelt.

Nonstructural Best Management Practice (BMPs) - Methods of controlling stormwater runoff quantity and quality, such as innovative site planning, impervious area and grading reduction, protection of natural depression areas, temporary ponding on site and other techniques.

NPDES - National Pollutant Discharge Elimination System, the federal government's system for issuance of permits under the Clean Water Act, which is delegated to DEP in Pennsylvania.

NRCS - Natural Resource Conservation Service (previously SCS).

Outfall - "Point source" as described in 40 CFR § 122.2 at the point where the Township of Maidencreek's storm sewer system discharges to surface waters of the Commonwealth.

Outlet - Points of water disposal to a stream, river, lake, tidewater or artificial drain.

Parent Tract - The parcel of land from which a land development or subdivision originates, determined from the date of municipal adoption of this ordinance.

Parking Lot Storage - Involves the use of parking areas as temporary impoundments with controlled release rates during rainstorms.

Peak Discharge - The maximum rate of stormwater runoff from a specific storm event.

Penn State Runoff Model - The computer-based hydrologic model developed at the Pennsylvania State University.

Pipe - A culvert, closed conduit, or similar structure (including appurtenances) that conveys stormwater.

Planning Commission - The planning commission of the Township of Maidencreek.

Point Source - any discernible, confined and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, or conduit from which stormwater is or may be discharged, as defined in State regulations at 25 Pa. Code § 92.1.

Post Construction - Period after construction where disturbed areas are stabilized, stormwater controls are in place and functioning and all proposed improvements in the approved land development plan are completed.

Predevelopment - Undeveloped/Natural Condition.

Pretreatment - Techniques employed in stormwater BMPs to provide storage or filtering to trap coarse materials and other pollutants before they enter the system, but not necessarily meet the water quality volume requirements of **306**.

Project Site - The specific area of land where any Regulated Earth Disturbance activities in the Township of Maidencreek are planned, conducted or maintained.

Rational Formula - A rainfall-runoff relation used to estimate peak flow.

Recharge - The replenishment of groundwater through the infiltration of rainfall, other surface waters, or land application of water or treated wastewater.

Record Drawings - Original documents revised to suit the as-built conditions and subsequently provided by the Engineer to the Client. The Engineer takes the Contractor's as-builts, reviews them in detail with his/her own records for completeness, then either turns these over to the Client or transfers the information to a set of reproducibles, in both cases for the Client's permanent records.

Redevelopment - The demolition, construction, reconstruction, alteration, or improvement exceeding 2,000 square feet of land disturbance performed on sites where existing land use is commercial, industrial, institutional, or multifamily residential. Maintenance activities such as top-layer grinding and re-paving are not considered to be redevelopment. Interior remodeling projects and tenant improvements are also not considered to be redevelopment. Utility trenches in streets are not considered redevelopment unless more than 50% of the street width is removed and re-paved.

Regulated Activities - Any actions or proposed actions that involve the alteration or development of land in a manner that may affect stormwater runoff.

Regulated Earth Disturbance Activity - Activity involving Earth Disturbance subject to regulation under 25 PA Code Chapters 92, Chapter 102, or the Clean Streams Law.

Release Rate - The percentage of existing conditions peak rate of runoff from a site or subarea to which the proposed condition peak rate of runoff must be reduced to protect downstream areas.

Retention Basin - A structure in which stormwater is stored and not released during the storm event. Retention basins do not have an outlet other than recharge and must infiltrate stored water in no more than 4 days.

Return Period - The average interval, in years, within which a storm event of a given magnitude can be expected to recur. For example, the 25-year return period rainfall would be expected to recur on the average of once every twenty-five years.

Riser - A vertical pipe extending from the bottom of a pond that is used to control the discharge rate from the pond for a specified design storm.

Road Maintenance - earth disturbance activities within the existing road cross-section, such as grading and repairing existing unpaved road surfaces, cutting road banks, cleaning or clearing drainage ditches and other similar activities.

Roof Drains - A drainage conduit or pipe that collects water runoff from a roof and leads it away from the structure.

Rooftop Detention - Temporary ponding and gradual release of stormwater falling directly onto flat roof surfaces by incorporating controlled-flow roof drains into building designs.

Runoff - Any part of precipitation that flows over the land surface.

SALDO - Subdivision and Land Development Ordinance.

Sediment Basin - A barrier, dam, retention or detention basin located and designed to retain rock, sand, gravel, silt, or other material transported by water during construction.

Sediment Pollution - The placement, discharge or any other introduction of sediment into the waters of the Commonwealth.

Sedimentation - The process by which mineral or organic matter is accumulated or deposited by the movement of water or air.

Seepage Pit/Seepage Trench - An area of excavated earth filled with loose stone or similar coarse material, into which surface water is directed for infiltration into the underground water.

Separate Storm Sewer System - A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels or storm drains) primarily used for collecting and conveying stormwater runoff.

Shallow Concentrated Flow - Stormwater runoff flowing in shallow, defined ruts prior to entering a defined channel or waterway.

Sheet Flow - A flow process associated with broad, shallow water movement on sloping ground surfaces that is not channelized or concentrated.

Soil-Cover Complex Method - A method of runoff computation developed by the NRCS that is based on relating soil type and land use/cover to a runoff parameter called Curve Number (CN).

Source Water Protection Areas (SWPA) - The zone through which contaminants, if present, are likely to migrate and reach a drinking water well or surface water intake.

Special Geologic Features - Carbonate bedrock features, including but not limited to closed depressions, existing sinkholes, fracture traces, lineaments, joints, faults, caves and pinnacles, which may exist and must be identified on a site when stormwater management BMPs are being considered.

Special Protection Subwatersheds - Watersheds for which the receiving waters are exceptional value (EV) or high quality (HQ) waters.

Spillway - A conveyance that is used to pass the peak discharge of the maximum design storm controlled by the stormwater facility.

State Water Quality Requirements - The regulatory requirements to protect, maintain, reclaim and restore water quality under PA Code Title 25 and the Clean Streams Law.

Storage Indication Method - A reservoir routing procedure based on solution of the continuity equation (inflow minus outflow equals the change in storage) with outflow defined as a function of storage volume and depth.

Storm Frequency - The number of times that a given storm "event" occurs or is exceeded on the average in a stated period of years. See "Return Period".

Storm Sewer - A system of pipes and/or open channels that convey intercepted runoff and stormwater from other sources, but excludes domestic sewage and industrial wastes.

Stormwater - The surface runoff generated by precipitation reaching the ground surface.

Stormwater Management Facility - Any structure, natural or man-made, that, due to its condition, design, or construction, conveys, stores, or otherwise affects stormwater runoff quality, rate or

quantity. Typical stormwater management facilities include, but are not limited to, detention and retention basins, open channels, storm sewers, pipes, and infiltration structures.

Stormwater Management Plan - The plan for managing those land use activities that will influence stormwater runoff quality and quantity and that would impact the Maiden Creek Watershed adopted by Berks County, and Lehigh County as required by the Act of October 4, 1978, P.L. 864, (Act 167), and known as the "Maiden Creek Watershed Act 167 Stormwater Management Plan".

Stormwater Management Site Plan - The plan prepared by the Applicant or his representative indicating how stormwater runoff will be managed at the particular site of interest according to this Ordinance.

Stream - A natural watercourse.

Stream Buffer - The land area adjacent to each side of a stream, essential to maintaining water quality. (See Buffer)

Stream Enclosure - A bridge, culvert or other structure in excess of 100 feet in length upstream to downstream which encloses a regulated water of this Commonwealth.

Subarea (Subwatershed) - The smallest drainage unit of a watershed for which stormwater management criteria have been established in the Stormwater Management Plan.

Subdivision - The division or redivision of a lot, tract, or parcel of land by any means into two or more lots, tracts, parcels or other divisions of land including changes in existing lot lines for the purpose, whether immediate or future, of lease, partition by the court for distribution to heirs or devisees, transfer of ownership, or building or lot development: Provided, however, that the subdivision by lease of land for agricultural purposes into parcels of more than ten acres, not involving any new street or easement of access or any residential dwelling, shall be exempted.

Surface Waters of the Commonwealth - Any and all rivers, streams, creeks, rivulets, ditches, watercourses, storm sewers, lakes, dammed water, wetlands, ponds, springs, and all other bodies or channels of conveyance of surface, or parts thereof, whether natural or artificial, within or on the boundaries of this Commonwealth.

Swale - A low lying stretch of land which gathers or carries surface water runoff.

Timber Operations - See Forest Management.

Time-of-Concentration (Tc) - The time for surface runoff to travel from the hydraulically most distant point of the watershed to a point of interest within the watershed. This time is the combined total of overland flow time and flow time in pipes or channels, if any.

Top-of-Bank - Highest point of elevation in a stream channel cross section at which a rising water level just begins to flow out of the channel and over the floodplain.

Vernal Pond - Seasonal depressional wetlands that are covered by shallow water for variable periods from winter to spring, but may be completely dry for most of the summer and fall.

Watercourse - A channel or conveyance of surface water having defined bed and banks, whether natural or artificial, with perennial or intermittent flow.

Waters of the Commonwealth - Any and all rivers, streams, creeks, rivulets, ditches, watercourses, storm sewers, lakes, dammed water, wetlands, ponds, springs, and all other bodies or channels of conveyance of surface and underground water, or parts thereof, whether natural or artificial, within or on the boundaries of this Commonwealth.

Watershed - Region or area drained by a river, watercourse or other body of water, whether natural or artificial.

Wellhead - 1. a structure built over a well, 2. the source of water for a well.

Wellhead Protection Area - The surface and subsurface area surrounding a water supply well, well field, spring or infiltration gallery supplying a public water system, through which contaminants are reasonably likely to move toward and reach the water source.

Wet Basin - Pond for urban runoff management that is designed to detain urban runoff and always contains water.

Wetland - Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, fens, and similar areas.

ARTICLE III-STORMWATER MANAGEMENT

Section 301. General Requirements

A. Applicants proposing regulated activities in Maiden Creek Watershed which do not fall under the exemption criteria shown in **Section 402** shall submit a drainage plan consistent with the Maiden Creek Watershed Stormwater Management Plan to the Township of Maidencreek for review. These criteria shall apply to the total proposed development even if development is to take place in stages

B. The Applicant is required to evaluate practicable alternatives to the surface discharge of stormwater, the creation of impervious surfaces and the degradation of waters of the Commonwealth, and must maintain as much as possible the natural hydrologic regime

C. The Drainage Plan must be designed consistent with the sequencing provisions of **Section 304** to ensure maintenance of the natural hydrologic regime and to promote groundwater recharge and protect groundwater and surface water quality and quantity. The Drainage Plan designer must proceed sequentially in accordance with Article III of this ordinance.

D. The existing points of concentrated drainage that discharge onto adjacent property shall not be altered in any manner which could cause property damage without permission of the affected property owner(s) and shall be subject to any applicable discharge criteria specified in this Ordinance.

E. Areas of existing diffused drainage discharge shall be subject to any applicable discharge criteria in the general direction of existing discharge, whether proposed to be concentrated or maintained as diffused drainage areas, except as otherwise provided by this ordinance. If diffused drainage discharge is proposed to be concentrated and discharged onto adjacent property, the Applicant must document that adequate downstream conveyance facilities exist

to safely transport the concentrated discharge, or otherwise prove that no erosion, sedimentation, flooding or other impacts will result from the concentrated discharge.

F. Where a development site is traversed by existing watercourses, drainage easements shall be provided conforming to the line of such watercourses. The terms of the easement shall conform to the stream buffer requirements contained in **Section 306.F** of this Ordinance.

G. Any stormwater management facilities regulated by this Ordinance that would be located in or adjacent to waters of the Commonwealth or wetlands shall be subject to approval by PaDEP through the Joint Permit Application process, or, where deemed appropriate by PaDEP, the General Permit process. When there is a question whether wetlands may be involved, it is the responsibility of the Applicant or his agent to show that the land in question cannot be classified as wetlands, otherwise approval to work in the area must be obtained from PaDEP.

H. Any alteration that affects stormwater flow directly or indirectly toward a PennDOT facility shall be subject to PennDOT regulations.

I. Minimization of impervious surfaces and infiltration of runoff through seepage beds, infiltration trenches, etc. are encouraged, where soil conditions permit, to reduce the size or eliminate the need for detention facilities or other structural BMPs.

J. Roof drains shall not be connected to impervious surfaces in order to promote overland flow and infiltration/ percolation of stormwater where advantageous to do so. When site conditions preclude infiltration/percolation, then it shall be permitted on a case by case basis by the municipality.

K. All stormwater runoff shall be treated for water quality.

L. Transference of runoff to or from an EV/HQ watershed is prohibited unless otherwise authorized by DEP, DRBC or SRBC.

Section 302. Permit Requirements by Other Government Entities

Permits must comply with any and all applicable local, county, state and federal regulations.

Section 303. Erosion and Sediment Control During Regulated Earth Disturbance Activities

A. No Regulated Earth Disturbance activities within the Township of Maidencreek shall commence until the Township of Maidencreek receives an approval from the Conservation District of an Erosion and Sediment Control Plan for construction activities.

B. DEP has regulations that require an Erosion and Sediment Control Plan for any earth disturbance activity of 5,000 square feet or more, under 25 Pa. Code § 102.4(b).

C. In addition, under 25 Pa. Code Chapter 92, a DEP "NPDES Construction Activities" permit is required for Regulated Earth Disturbance activities.

D. Evidence of any necessary permit(s) for Regulated Earth Disturbance activities from the appropriate DEP regional office or County Conservation District must be provided to the Township of Maidencreek. The issuance of an NPDES Construction Permit (or permit coverage under the statewide General Permit (PAG-2) satisfies the requirements subsection 303.A.

E. A copy of the Erosion and Sediment Control plan and any required permit, as required by DEP regulations, shall be available at the project site at all times.

F. Additional erosion and sediment control design standards and criteria are recommended to be applied where infiltration BMPs are proposed shall include the following:

1. Areas proposed for infiltration BMPs shall be protected from sedimentation and compaction during the construction phase to maintain maximum infiltration capacity.

2. Infiltration BMPs shall not be constructed nor receive runoff until the entire contributory drainage area to the infiltration BMP has achieved final stabilization

Section 304. Nonstructural Project Design (Sequencing to Minimize Stormwater Impacts)

A. For projects disturbing one (1) acre or more, the design of all Regulated Activities shall include evaluation of practicable alternatives to the surface discharge of stormwater, the creation of impervious surfaces, and the degradation of waters of the Commonwealth, and must maintain as much as possible the natural hydrologic regime of the site.

1. An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology and logistics in light of overall project purposes, and other municipal requirements.

2. All practicable alternatives to the discharge of stormwater are presumed to have less adverse impact on quantity and quality of waters of the Commonwealth unless otherwise demonstrated.

B. The Applicant shall demonstrate that the design of the Regulated Activities that disturb one (1) acre or more include consideration of the following issues:

1. Prepare an Existing Resource and Site Analysis Map (ERSAM), showing environmentally sensitive areas including, but not limited to, steep slopes, ponds, lakes, streams, wetlands, hydric soils, vernal pools, flood plains, stream buffer zones, hydrologic soil groups A and B (areas conducive to infiltration), special geologic features, any existing recharge areas and any other requirements outlined in the municipal Subdivision and Land Development ordinance.

2. Establish appropriate buffers for each of the delineated environmentally sensitive areas per the municipal zoning ordinance (See Section 306.D for stream buffers and Section 305.K for special geologic feature buffers).

3. Prepare a draft project layout avoiding sensitive areas identified in **Section 304.B.1**.

4. Identify site specific existing conditions drainage areas, discharge points, recharge areas and hydrologic soil groups A and B.

5. Evaluate Nonstructural Stormwater Management Alternatives
   a. Minimize earth disturbance
   b. Minimize impervious surfaces
   c. Break up large impervious surfaces.

6. Satisfy infiltration objective (Section 305) and provide for stormwater pretreatment prior to infiltration. Pretreatment may not be necessary for rooftop runoff which enters the infiltration facility directly from a roof leader (rain spout/drain).

7. Satisfy water quality (Section 306) and streambank erosion protection objective (Section 307).

8. Determine what Management District the site falls into (Appendix D) and conduct an existing conditions runoff analysis.

9. Prepare final project design to maintain existing conditions drainage areas and discharge points, to minimize earth disturbance and impervious surfaces, and to the maximum extent possible, to ensure the remaining site development has no surface or point discharge.

10. Conduct a proposed condition runoff analysis based on the final design and to meet the release rate and in turn the overbank flow and extreme event requirements (**Section 308**).

11. Manage any remaining runoff through treatment prior to discharge, as part of detention, bioretention, direct discharge or other structural control.

Section 305. Ground Water Recharge (Infiltration/Recharge/Bioretention)

Design of the infiltration stormwater management facilities shall give consideration to providing ground water recharge to compensate for the reduction in the percolation that occurs when the ground surface is disturbed or impervious surface is created. It is recommended that roof runoff be directed to infiltration BMPs which can be over-designed to compensate for the infiltration requirements of the parking areas. However, the runoff from the parking lot would still be required to meet the water quality provisions of this ordinance, Section 306. These measures are required to be consistent with **Section 103**, and take advantage of utilizing any existing recharge areas.

Infiltration may not be feasible on every site due to site-specific limitations such as soil type. If it cannot be physically accomplished, due to seasonal high water table, soil permeability rate, soil depth or setback distances from special geologic features, then the design professional shall be responsible to show that this cannot be **physically** accomplished. If it can be physically accomplished, then the volume of runoff to be infiltrated shall be determined from Sections 305.A.3 depending on demonstrated site conditions and shall be the greater of the two volumes.

A. Infiltration BMPs shall meet the following minimum requirements:

1. Infiltration Requirements:

a. Regulated activities will be required to infiltrate, where site conditions permit, a portion of the runoff created by the development as part of an overall stormwater management plan designed for the site. The volume of runoff to be infiltrated shall be determined from Sections 305.A.3.a. or 305.A.3.b, depending upon demonstrated site conditions.

2. Infiltration BMPs intended to receive runoff from developed areas shall be selected based on suitability of soils and site conditions and shall be constructed on soils that have the following characteristics:

   a. A minimum depth of 24 inches between the bottom of the BMP and the limiting zone.

   b. An infiltration and/or percolation rate sufficient to accept the additional stormwater load and drain completely as determined by field tests conducted by the Applicant's design professional.

   c. The infiltration facility shall be capable of completely infiltrating the required retention (infiltration) volume within 4 days (96 hours).

   d. Pretreatment shall be provided prior to infiltration.

3. The size of the infiltration facility shall be based upon the following volume criteria:

   a. NRCS Curve Number equation.

      The NRCS runoff equation shall be utilized to calculate infiltration requirements (I) in inches.

I (Infiltration requirement, in inches) = (200 / CN) – 2	Eqn: 305.1

      where:
      CN = SCS (NRCS) curve number of existing conditions contributing to the infiltration facility.

      This equation is displayed graphically in, and the infiltration requirement can be determined from Figure 305.1.

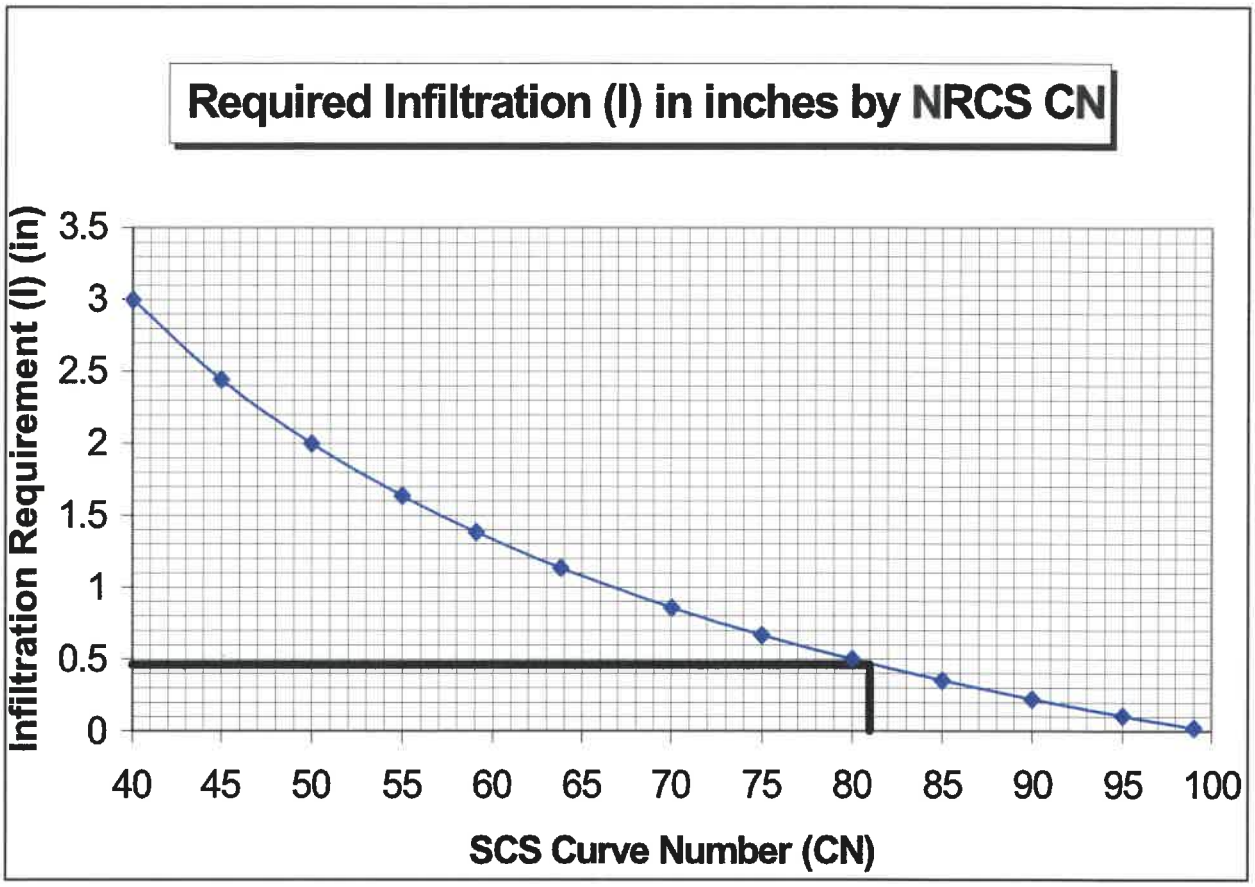


Figure 305.1. Infiltration requirement based upon NRCS Curve Number.

The retention (infiltration) volume (Re_v) required to meet the infiltration requirement would therefore be computed as:

Re_v (Cubic Feet) = I * impervious area (square feet) / (12 in/ft)	Eqn: 305.2

Where:

I = infiltration requirements (in inches)

b. Annual Recharge – Water Budget Approach.

It has been determined that infiltrating 0.46 inches of runoff from the impervious areas will aid in maintaining the hydrologic regime of the watershed. If the goals of Sections 306.A.2.a cannot be achieved, then 0.46 inches of rainfall shall be infiltrated from all impervious areas, up to a an existing site conditions curve number of 81. Above a curve number of 81, Equation 305.1 or the curve in Figure 305.1 should be used to determine the infiltration requirement.

B. Soils - A detailed soils evaluation of the project site shall be required where practicable to determine the suitability of infiltration facilities. The evaluation shall be performed by a

qualified design professional, and at a minimum, address soil permeability, depth to bedrock and subgrade stability. The general process for designing the infiltration BMP shall be:

1. Analyze hydrologic soil groups as well as natural and man-made features within the site to determine general areas of suitability for infiltration practices. In areas where development on fill material is under consideration, conduct geotechnical investigations of sub-grade stability; infiltration is not permitted to be ruled out without conducting these tests.

2. Provide field tests such as double ring infiltrometer or hydraulic conductivity tests (at the level of the proposed infiltration surface) to determine the appropriate hydraulic conductivity rate. Percolation tests are not recommended for design purposes.

3. Design the infiltration structure for the required retention (Re_v) volume based on field determined capacity at the level of the proposed infiltration surface.

4. If on-lot infiltration structures are proposed by the Applicant's design professional, it must be demonstrated to the Township of Maidencreek that the soils are conducive to infiltrate on the lots identified.

C. Carbonate Areas – The Applicant shall investigate non-carbonate areas of the site for the suitability of infiltration and, if feasible, proceed to undertake infiltration pursuant to Section 305.A. If infiltration in non-carbonate areas is not feasible, the Applicant shall investigate areas of the site underlain by carbonate bedrock for infiltration purposes. If a suitable area is identified that meets the requirements of this provision and Table B-5, infiltration shall be conducted in accordance with the requirements of this ordinance. Only if infiltration proves infeasible in both carbonate and non-carbonate areas of the site may the applicant be granted a waiver from the infiltration requirements of the ordinance without structural BMP's.

Infiltration BMP loading rate percentages in Table B-5 in Ordinance Appendix B shall be calculated as follows:

$$\left(\frac{\text{Area tributary to the infiltration BMP}}{\text{Base Area of the infiltration BMP}}\right)*100\%$$

The area tributary to the infiltration BMP shall be weighted as follows:

Area Description	Weighting
All disturbed area to be made impervious	100%
All disturbed areas to be made pervious	50%
All undisturbed impervious areas	100%
All undisturbed pervious areas	0%

Soil thickness is to be measured from the bottom of any proposed infiltration BMP. The effective soil thickness in Table B-5 in Ordinance Appendix B is the measured soil thickness multiplied by the thickness factor based on soil permeability, as follows:

Permeability Range	Thickness Factor
6.0 to 12.0 inches/hr	0.8
2.0 to 6.0 inches / hr	1.0
1.0 to 2.0 inches/hr	1.4
0.75 to 1.0 inches/hr	1.2
0.5 to 0.75 inches/hr	1.0

The design of all facilities over Karst shall include an evaluation of measures to minimize adverse effects.

D. Stormwater Hotspots – Following is a list of examples of designated hotspots. If a site is designated as a hotspot, it has important implications for how stormwater is managed. First and foremost, untreated stormwater runoff from hotspots shall not be allowed to recharge into groundwater where it may contaminate water supplies. Therefore, the Rev requirement shall NOT applied to development sites that fit into the hotspot category (the entire WQv must still be treated). Second, a greater level of stormwater treatment shall be considered at hotspot sites to prevent pollutant washoff after construction. EPA's NPDES stormwater program requires some industrial sites as well as 923 municipalities and other entities to prepare and implement a stormwater pollution prevention plan.

Examples of Hotspots:

- Vehicle salvage yards and recycling facilities
- Vehicle fueling stations
- Vehicle service and maintenance facilities
- Vehicle and equipment cleaning facilities
- Fleet storage areas (bus, truck, etc.)
- Industrial sites (based on Standard Industrial Codes)
- Marinas (service and maintenance)
- Outdoor liquid container storage
- Outdoor loading/unloading facilities
- Public works storage areas
- Facilities that generate or store hazardous materials
- Commercial container nursery
- Other land uses and activities as designated by an appropriate review authority

The following land uses and activities are not normally considered hotspots:

- Residential streets and rural highways
- Residential development
- Institutional development
- Office developments
- Non-industrial rooftops
- Pervious areas, except golf courses and nurseries (which may need an Integrated Pest Management (IPM) Plan).

While large highways (average daily traffic volume (ADT) greater than 30,000) are not designated as a stormwater hotspot; however, it is important to ensure that highway stormwater management plans adequately protect groundwater.

E. Caution shall be exercised where infiltration is proposed in Source Water Protection Areas as defined by the local Municipality or Water Authority.

F. Infiltration facilities shall be used in conjunction with other innovative or traditional stormwater control facilities that are found within the PADEP State BMP Manual.

G. Caution shall be exercised where salt or chloride (municipal salt storage) would be a pollutant since soils do little to filter this pollutant and it may contaminate the groundwater. The qualified design professional shall evaluate the possibility of groundwater contamination from the proposed infiltration facility and perform a hydrogeologic justification study if necessary. A hydrogeologic justification study would entail: Field reconnaissance, in which local geology, topographic features, local wall characteristics, surface water flows, potential contamination, and nature of impermeable areas are determined. Data review of collected pertinent information such as geologic information, hydrologic data concerning both surface and groundwater, and geophysical data. With the collected data, a hydrologic model may be developed to determine the extent to which salt or chloride effects the groundwater.

H. The infiltration requirement in High Quality or Exceptional Value waters shall be subject to the Department's Chapter 93 Antidegradation Regulations.

I. Dependant upon certain landuse or hotspots an impermeable liner will be required in detention basins where the possibility of groundwater contamination exists. A detailed hydrogeologic investigation may be required by the Township of Maidencreek.

J. The Township of Maidencreek shall require the Applicant to provide safeguards against groundwater contamination for land uses that may cause groundwater contamination should there be a mishap or spill.

K. For projects that disturb one (1) acre or more, unless otherwise specified in the zoning ordinance, the following setbacks for infiltration facilities shall apply:

- 100 feet from water supply wells
- 10 feet downslope or 100 feet upslope from building foundations
- 50 feet from septic system drainfields
- 50 feet from a geologic contact with carbonate bedrock, unless a preliminary site investigation is done in the carbonate bedrock to show the absence of special geologic features within 50 feet of the proposed infiltration area;
- 100 feet from the property line unless documentation is provided to show all setbacks from wells, foundations and drainfields on the neighboring property will be met.

Section 306. Water Quality Requirements

The applicant shall comply with the following water quality requirements of this Article.

A. Developed areas shall provide adequate storage and treatment facilities necessary to capture and treat stormwater runoff. The infiltration volume computed under **Section 305** may be a component of the water quality volume if the Applicant chooses to manage both components in a single facility. If the infiltration volume is less than the water quality volume, the remaining water quality volume may be captured and treated by methods other than infiltration BMPs. The required water quality volume (WQ_v) is the storage capacity needed to capture and treat a portion of stormwater runoff from the developed areas of the site. To achieve this goal, the following criterion is established:

The following calculation formula is to be used to determine the water quality storage volume, (WQ_v), in acre-feet of storage for the Maiden Creek watershed:

$$WQv=[(P)(R_v)(A)]/12 \qquad \text{Eqn: 306.1}$$

WQ_v = Water Quality Volume (acre-feet)
P = 1 inch
A = Total contributing drainage area to the water quality BMP (acres)
$R_v = 0.05 + 0.009(I)$ where I is the percent of the area that is impervious surface ((impervious area/A)*100)

This volume requirement can be accomplished by the permanent volume of a wet basin or the detained volume from other BMPs.

Release of water can begin at the start of the storm (i.e., the invert of the water quality orifice is at the invert of the facility). The design of the facility shall provide for protection from clogging and unwanted sedimentation.

B. For areas within defined Special Protection subwatersheds which include Exceptional Value (EV) and High Quality (HQ) waters, Cold Water Fishery (CWF) the temperature and quality of water and streams shall be maintained.

C. To accomplish the above, the Applicant shall use innovative or traditional stormwater control facilities that are found within the PADEP State BMP Manual.

D. If a perennial or intermittent stream passes through the site, the applicant shall create a stream buffer extending a minimum of fifty (50) feet to either side of the top-of-bank of the channel. The buffer area shall be maintained with appropriate native vegetation (Reference to Appendix F of Pennsylvania Handbook of Best Management Practices for Developing Area for plant lists). If the applicable rear or side yard setback is less than fifty (50) feet, the buffer width may be reduced to twenty-five (25) percent of the setback to a minimum of ten (10) feet. If an existing buffer is legally prescribed (i.e. deed, covenant, easement, etc.) and it

exceeds the requirements of this Ordinance, the existing buffer shall be maintained. This does not include lakes or wetlands.

E. Evidence of any necessary permit(s) for regulated earth disturbance activities from the appropriate DEP regional office must be provided to the Township of Maidencreek. The issuance of an NPDES Construction Permit (or permit coverage under the statewide General Permit satisfies the requirements of subsection 306.A.

Section 307. Streambank Erosion Requirements

In addition to control of the water quality volume, in order to minimize the impact of stormwater runoff on downstream streambank erosion, the primary requirement is to design a BMP to detain the proposed condition 2-year, 24-hour design storm to the existing conditions 1-year peak flow using the SCS Type II distribution. Additionally, provisions shall be made (such as adding a small orifice at the bottom of the outlet structure) so that the proposed condition 1-year storm takes a minimum of 24 hours to drain from the facility from a point where the maximum volume of water from the 1-year storm is captured. (i.e., the maximum water surface elevation is achieved in the facility). Release of water can begin at the start of the storm (i.e., the invert of the water quality orifice is at the invert of the facility).

The minimum orifice size in the outlet structure to the BMP shall be a three (3) inch diameter orifice and a trash rack shall be installed to prevent clogging. On sites with small contributing drainage areas to this BMP that do not provide enough runoff volume to allow a 24 hour attenuation with the 3 inch orifice, the calculations shall be submitted showing this condition. Orifice sizes less than 3 inches can be utilized provided that the design will prevent clogging of the intake.

Section 308. Stormwater Management Districts

A. The Maiden Creek Watershed has been divided into stormwater management districts as shown on the Management District Map in Appendix D. Corresponding release rate percentages associated with each Stormwater Management District is provided as well.

In addition to the requirements specified in Table 308.1 below, the groundwater recharge (Section 305), water quality (Section 306), and streambank erosion control (Section 307), requirements shall be implemented.

Standards for managing runoff from each subarea in the Maiden Creek Watershed for the 2.33, 10 and 50-year design storms are shown in Table 308.1. Development sites located in each of the Districts must control proposed condition runoff rates to existing conditions runoff rates for the design storms in accordance with Table 308.1.

TABLE 308.1 – Water Quantity Requirements

Management District	Proposed Condition Design Storm		Existing Condition Design Storm	Equivalent Release Rate
A	2 - year	Reduce To	1 - year	-
	5 - year		5 - year	100 %
	10 - year		10 - year	100 %
	25 - year		25 - year	100 %
	100 - year		100 - year	100 %
B-1	2 - year	Reduce To	1 - year	-
	10 - year		5 - year	75 %
	25 - year		10 - year	75 %
	50 - year		25 - year	75 %
	100 - year		100 - year	100 %
B-2	2 - year	Reduce To	1 - year	-
	5 - year		2 - year	30 %
	25 - year		5 - year	50 %
	50 - year		10 - year	50 %
	100 - year		100 - year	100 %
B-3	2 - year	Reduce To	1 - year	-
	5 - year		2 - year	30 %
	10 - year		5 - year	75 %
	50 - year		25 - year	75 %
	100 - year		100 - year	100 %
C*	2-year	Reduce To	1-year	100%
	5-year		5-year	100%
	10-year		10-year	100%
	25-year		25-year	100%
	50-year		50-year	100%
	100-year		100-year	100%

**The minimum performance standard for development sites in District C is that stormwater management controls must be provided to limit the post-development peak rate of stormwater runoff to a rate that is equal to or less than the existing peak rate of stormwater runoff. This minimum performance criteria was set through a policy directive of the Pennsylvania Department of Environmental Protection. However, in the previous development of the Act 167 Plan, this district was originally established as a conditional no-detention district such that development sites which could discharge directly to the main channel of the Maiden Creek and its major tributaries, or indirectly to the main channel through an existing stormwater drainage system (i.e., storm sewer or open channel) could do so without control of the post-development peak rate of runoff.*

All areas, regardless of the release rate, must still meet the requirements of the groundwater recharge criteria (Section 305), water quality criteria (Section 306), and streambank erosion criteria (Section 307).

B. General - Proposed condition rates of runoff from any regulated activity shall not exceed the peak release rates of runoff prior to development for the design storms specified on the Stormwater Management District Watershed Map (Ordinance Appendix D) and **Section 308**, of this Ordinance.

C. District Boundaries - The boundaries of the Stormwater Management Districts are shown on an official map that is available for inspection at the municipal office. A copy of the official map at a reduced scale is included in the Ordinance Appendix D. The exact location of the Stormwater Management District boundaries as they apply to a given development site shall be determined by mapping the boundaries using the two-foot topographic contours (or most accurate data required) provided as part of the Drainage Plan.

D. Sites Located in More Than One District - For a proposed development site located within two or more stormwater management district category subareas, the peak discharge rate from any subarea shall meet the Management District Criteria for which the discharge is located, as indicated in **Section 308**. The calculated peak discharges shall apply regardless of whether the grading plan changes the drainage area by subarea. An exception to the above may be granted if discharges from multiple subareas recombine in proximity to the discharge site. In this case, peak discharge in any direction shall follow Management District A criteria provided that the overall site discharge meets the Management District Criteria for which the discharge is located.

E. Off-Site Areas - Off-site areas that drain through a proposed development site are not subject to release rate criteria when determining allowable peak runoff rates. However, on-site drainage facilities shall be designed to safely convey off-site flows through the development site.

F. Site Areas - Where the site area to be impacted by a proposed development activity differs significantly from the total site area, only the proposed impact area utilizing stormwater management measures shall be subject to the Management District Criteria. In other words, unimpacted areas bypassing the stormwater management facilities would not be subject to the Management District Criteria.

Section 309. Design Criteria for Stormwater Management and Conveyance BMPs

A. Applicants may select a combination of runoff control techniques that are most suitable to control stormwater runoff from the site. All controls shall be subject to approval of the Township of Maidencreek. The municipal engineer may request specific information on design and/or operating features of the proposed stormwater controls in order to determine their suitability and adequacy in terms of the standards of this Section.

B. The Applicant shall consider the effect of the proposed stormwater management techniques on any special soil conditions or geological hazards that may exist on the development site. In the event such conditions are identified on the site, the municipal engineer may require in-depth studies by a Geotechnical Engineer.

C. Basins and Impoundments: Any BMP that is a dam, as defined in 25 Pa. Code Chapter 105, shall be designed according to the requirements in those regulations. Any stormwater BMP that does not constitute a dam under 25 Pa. Code Chapter 105, but is designed to store runoff and requires a berm or earthen embankment (i.e. detention basin), shall be designed to comply with the following:

1. Basins with earthen embankments shall be designed with an emergency spillway that has capacity and stability to accommodate the 100-year post-development hydrograph, in a manner that will not damage the integrity of the facility and will not create a downstream hazard. Emergency spillway design shall assume that all other basin outlets are non-functional. Where practical, the emergency spillway shall be constructed in undisturbed ground, and locations in fill should be avoided. Regardless of location, appropriate stabilization measures shall be provided.

2. The height of the embankment shall be designed to provide a minimum 1.0 foot of freeboard above the maximum elevation computed when the 100-year peak post-development flow passes through the emergency spillway. Embankment heights shall not exceed 15 feet, unless approved by the Township of Maidencreek.

3. The minimum top width of earthen embankments shall be equal to three-fourths (3/4) of the embankment height, but in no case shall the top width be less than eight feet (8').

4. Interior and exterior embankment side slopes shall not be greater than three (3) horizontal to one (1) vertical.

5. All pipes, conduits, etc. passing through basin embankments shall have properly spaced concrete anti-seep collars. Minimum collar projection beyond the pipe shall be two feet (2'), and maximum collar spacing is 14 times the projection. The joint between collar and pipe shall be watertight.

6. A key trench of relatively impervious material shall be provided within all basin embankments. The key trench shall be at least two feet (2') deep, or extend down to stable subgrade, whichever is deeper. Minimum bottom width for key trench shall be four feet (4'). Maximum side slopes for the key trench shall be one (1) horizontal to one (1) vertical. A compacted impervious core at least three feet (3') wide at the top, having maximum side slopes of one (1) horizontal to one (1) vertical shall extend for the full length of the embankment, and the top elevation shall be set at the 10-year design water surface elevation.

7. All basins shall be structurally sound and shall be constructed of durable materials. The completed structure and the foundation of all basins shall be stable under all probable conditions of operation. Embankments shall be placed in maximum eight-inch (8") lifts to a minimum of 95 percent of maximum dry density, as established by ASTM D-1557. Compaction test results shall be provided to the Township of Maidencreek upon request. Embankments shall be constructed six inches (6") above design elevations to allow for settlement.

8. All basins not including groundwater recharge and/or water quality storage shall include an outlet structure to permit draining the basin to a completely dry condition within twenty-four (24) hours following the end of the design rainfall.

9. All discharge control devices with appurtenances (except discharge pipes) shall be made of reinforced concrete and stainless or hot dip galvanized steel. Bolts/fasteners and any orifice plates are to be stainless or galvanized steel. Outlet barrels/pipes shall have a minimum diameter of fifteen (15) inches and shall be made of reinforced concrete pipe with watertight joints, or approved equivalent. Where installation conditions merit, structural calculations that address the actual design requirements will be required.

10. All basins employing small orifices (i.e., less than six inches diameter or equivalent area), shall be provided with an apron of concrete or similar durable material which abuts the orifice invert and extends a minimum of 18 inches in all directions from the orifice, to prevent potential blockage by vegetative growth or debris, and to allow for easy cleaning of the area approaching the orifice. Appropriate trash racks are required for all orifice openings.

11. Low flow channels shall be provided from each water carrying facility to the outlet structure for all basins that do not include Groundwater Recharge and/or Water Quality storage. Low flow channels shall be one (1) percent minimum slope and shall be designed to enable ease of maintenance. All basins that do include Groundwater Recharge and/or Water Quality storage shall not be required to have a low flow channel.

12. Minimum slope within a basin that does not include Groundwater Recharge and/or Water Quality storage shall be two (2) percent positive grade to the low flow channel.

13. Design storms for the computation of retention basin volumes shall be based upon a 24-hour storm with 100 year return period (SCS Type II storm).

14. The effect on downstream areas if the basin embankment fails shall be considered in the design of all basins. The basin shall be designed to minimize the potential damage caused by such failure of the embankment.

15. All structures (detention basins, cisterns, etc.), other than those used for Groundwater Recharge Volume and Water Quality Volume, must completely drain within 24 hours after the end of the design storm.

16. Soils used for the construction of basins shall have low erodibility factors ("K" factors).

17. Minimum floor elevations for all structures that would be affected by a basin, other temporary impoundments, or open conveyance systems where ponding may occur shall be two (2) feet above the 100-year water surface. If basement or underground facilities are proposed, detailed calculations addressing the effects of stormwater ponding on the structure and water-proofing and/or flood-proofing design information shall be submitted for approval.

D. Stormwater Collection and Conveyance Systems: Gutters, inlets, pipes, conduits, swales, ditches and any other means for collecting and/or conveying stormwater shall be designed to comply with the following:

1. All storm sewer pipes, culverts and bridges (excluding detention and retention basin outfall structures), gutters and swales conveying water originating only from within the boundaries of the development site shall be designed for a twenty-five (25) year storm event. All storm sewer pipes, culverts and bridges (excluding detention and retention basin outfall structures) conveying water originating from off-site shall be designed for a fifty (50) year storm event. Facilities that convey runoff to stormwater management facilities (e.g., detention basins, etc.) shall be designed for the 100-year storm event, unless adequate alternate means for conveying 100-year flow to the facilities are provided. Drainage easements having widths no less than 20 feet shall be provided to contain and convey the 100-year frequency flood throughout the development site. Easements shall begin at the furthest upstream property line of the proposed development site in a watershed.

2. Water obstructions shall convey runoff from the 25-year design storm with a minimum of 2.0 feet of freeboard measured below the lowest point along the top of the roadway, without damage to the drainage structure or the roadway, unless more restrictive local, state and/or federal regulations apply. A concentrated discharge of stormwater to an adjacent property shall be within an existing watercourse or otherwise an easement and appropriate agreements shall be required.

3. Storm sewer pipes other than those used as roof drains, detention basin underdrains, and street subbase underdrains, shall have a minimum diameter of fifteen (15) inches and be either Class III reinforced concrete pipe (RCP) or smooth-lined corrugated high-density polyethylene pipe (HDPE). Corrugated metal pipe is not permitted. HDPE pipe joints shall be silt-tight at a minimum (e.g., ADS N-12 ST/IB, or equal), and RCP joints shall have pre-lubed O-ring gaskets. Water-tight specification is required in areas of carbonate geology and elsewhere as may be specified by the municipality. Where installation conditions merit (e.g., deep fills), structural calculations that address the actual design requirements will be required.

4. Storm sewer pipes and culverts shall be installed on sufficient slopes to provide a minimum velocity of three (3) feet per second when flowing full.

5. Storm sewers shall be placed within in the cartway of curbed streets and parallel to the road shoulders of streets without curbs. At curbed street intersections, inlets shall be placed on the tangent and not on the curved portion of the curbing. Storm sewer crossings of streets shall be perpendicular to the street centerline to the maximum extent practicable.

6. Storm facilities not located within a public right-of-way shall be contained in and centered within an easement not less than 20 feet wide. Easements shall follow property boundaries where possible.

7. Manning "n" values used for design of pipes and culverts shall be in accordance with generally accepted engineering practice. Adequate documentation shall be provided in support of the chosen values.

8. All storm sewer pipe and culverts shall have a minimum cover of 18 inches. Embedment for all storm sewer pipe and culverts shall consist of AASHTO No. 8 (1B) aggregate from a minimum of six (6) inches of bedding beneath the pipe, to a minimum of 12 inches over the pipe. Aggregate requirements for street construction shall take precedence over the 1B specification, but in no case shall total aggregate cover over the pipe be less than 12 inches. Compaction shall be in conformance with manufacturer's specifications. Select backfill shall complete the trench to pavement subgrade or topsoil layer in grassed areas.

9. Curves, tees, elbows and wyes are not permitted in pipes other than those used as roof drains, detention basin underdrains, and street subbase underdrains. Manholes or inlets are required to facilitate such configurations.

10. Manholes and inlets shall not be spaced more than 400 feet apart for pipes with diameters of 24 inches and less, and not more than 500 feet apart for pipes of greater diameter. Ladder rungs shall be placed in manholes and inlets with depths exceeding five feet (5').

11. When there is a change in the pipe size in a manhole or inlet, the elevations of the top of the pipes shall be the same, or the smaller pipe(s) higher. A minimum drop of one-tenth foot (0.1') shall be provided from the inlet invert elevation(s) to the outlet invert elevation.

12. Manholes, inlets, headwalls, endwalls and end sections proposed for dedication or located along streets or subject to vehicular traffic, shall conform to the requirements of PennDOT, or to specifications as otherwise modified by the Township of Maidencreek. Manhole covers shall have the word "STORM" cast clearly on the lid.

13. Inlets along curbed streets shall be spaced to limit depth along the curb to a maximum of three inches (3") during a 10-year storm. Inlet capacities and by-pass calculations shall be determined by PennDOT design techniques.

14. Pipe underdrains and/or pavement base drains shall be provided in areas known or otherwise documented to have a seasonal high water table, and as directed by the Township of Maidencreek Engineer.

15. Appropriate headwalls, endwalls or end sections shall be used where stormwater runoff enters or leaves the storm sewer horizontally from a natural or manmade channel. Such facilities shall conform to the requirements of PennDOT, or to specifications as otherwise modified by the Township of Maidencreek.

16. Adequate erosion and sediment control protection shall be provided along all open channels, and at all points of discharge.

17. Stormwater roof drains, sump pumps, and pipes shall not directly discharge water into a street right-of-way or discharge into a sanitary sewer or storm sewer.

18. All existing and natural watercourses, channels, drainage systems, wetlands and areas of surface water concentration shall be maintained in their existing condition unless an

alteration is approved by the Township of Maidencreek and any other necessary approving body.

19. Flow velocities from any storm sewer may not result in erosion of the receiving channel.

20. Energy dissipaters shall be placed at the outlets of all storm sewer pipes, culverts, and bridges where flow velocities exceed maximum permitted channel velocities as specified in the PADEP Erosion and Sediment Pollution Control Manual, as amended.

21. The following conditions shall be met for all swales:

    a. Capacities and velocities shall be computed using the Manning equation. Stabilization (i.e., linings, etc.) shall be as specified in the PADEP Erosion and Sediment Pollution Control Manual, as amended.

    b. All vegetated swales shall have a minimum slope of one (1) percent unless approved by the municipality.

    c. "n" factors shall be based upon accepted engineering design practices as approved by the Municipality.

    d. All swales shall be designed to concentrate low flows to minimize siltation and meandering.

Section 310. Calculation Methodology

A. Stormwater runoff from all development sites with a drainage area of greater than 200 acres shall be calculated using a generally accepted calculation technique that is based on the NRCS soil cover complex method. Table 310-1 summarizes acceptable computation methods and the method selected by the design professional shall be based on the individual limitations and suitability of each method for a particular site. The Township of Maidencreek may allow the use of the Rational Method to estimate peak discharges from drainage areas that contain less than 200 acres. The Soil Complex Method shall be used for drainage areas greater than 200 acres.

TABLE 310-1
Acceptable Computation Methodologies For
Stormwater Management Plans

METHOD	METHOD DEVELOPED BY	APPLICABILITY
TR-20 (or commercial computer package based on TR-20)	USDA NRCS	Applicable where use of full hydrology computer model is desirable or necessary.
TR-55 (or commercial computer package based on TR-55)	USDA NRCS	Applicable for land development plans within limitations described in TR-55.
HEC-1 / HEC-HMS	US Army Corps of Engineers	Applicable where use of full hydrologic computer model is desirable or necessary.
PSRM	Penn State University	Applicable where use of a hydrologic computer model is desirable or necessary; simpler than TR-20 or HEC-1.
Rational Method or commercial computer package based on Rational Method)	Emil Kuichling(1889)	For sites less than 200 acres and with time of concentration less than 60 minutes (tc< 60 min), or as approved by the Municipality
Other Methods	Varies	Other computation methodologies approved by the Municipality

*** Note: Successors to the above methods are also acceptable. These successors include WINNTR55 for TR55 and WINTR20 for TR20 and SWMM.**

B. All calculations consistent with this Ordinance using the soil cover complex method shall use the appropriate design rainfall depths for the various return period storms according to the region in which they are located as presented in Table B-1 in Appendix B of this Ordinance. If a hydrologic computer model such as PSRM or HEC-1 / HEC-HMS is used for stormwater runoff calculations, then the duration of rainfall shall be 24 hours. The SCS 'S' curve shown in Figure B-1, Appendix B of this Ordinance shall be used for the rainfall distribution.

C. For the purposes of existing conditions flow rate determination, undeveloped land shall be considered as "meadow" in good condition, unless the natural ground cover generates a lower curve number or Rational 'C' value (i.e., forest), as listed in Table B-2 or B-3 in Appendix B of this Ordinance.

D. All calculations using the Rational Method shall use rainfall intensities consistent with appropriate times-of-concentration for overland flow and return periods from the Design Storm Curves from PA Department of Transportation Design Rainfall Curves (1986) and NOAA Atlas 14 (Figures B-2 to B-3). Times-of-concentration for overland flow shall be calculated using the methodology presented in Chapter 3 of Urban Hydrology for Small Watersheds, NRCS, TR-55 (as amended or replaced from time to time by NRCS). Times-of-concentration for channel and pipe flow shall be computed using Manning's equation. NRCS lag equation divided by 0.6 as acceptable method for Tc in undeveloped areas.

E. Runoff Curve Numbers (CN) for both existing and proposed conditions to be used in the soil cover complex method shall be obtained from Table B-2 in Appendix B of this Ordinance.

F. Runoff coefficients (C) for both existing and proposed conditions for use in the Rational method shall be obtained from Table B-3 in Appendix B of this Ordinance.

G. Where uniform flow is anticipated, the Manning equation shall be used for hydraulic computations, and to determine the capacity of open channels, pipes, and storm sewers. Values for Manning's roughness coefficient (n) shall be consistent with Table B-4 in Appendix B of the Ordinance. Full flow shall be assumed for closed conduits.

H. Outlet structures for stormwater management facilities shall be designed to meet the performance standards of this Ordinance using any generally accepted hydraulic analysis technique or method.

I. The design of any stormwater detention facilities intended to meet the performance standards of this Ordinance shall be verified by routing the design storm hydrograph through these facilities using the Storage-Indication Method. For drainage areas greater than 200 acres in size, the design storm hydrograph shall be computed using a calculation method that produces a full hydrograph (i.e. TR-20, TR-55, HEC-1, PSRM). The municipality may approve the use of any generally accepted full hydrograph approximation technique that shall use a total runoff volume that is consistent with the volume from a method that produces a full hydrograph.

Section 311. Other Requirements

A. All wet basin designs shall incorporate biologic minimization controls consistent with the West Nile Guidance found in Appendix G.

B. Any facilities that constitute water obstructions (e.g., culverts, bridges, outfalls, or stream enclosures), water encroachments, and any work involving wetlands governed by PaDEP Chapter 105 regulations (as amended or replaced from time to time by PaDEP), are subject to PaDEP Chapter 105 regulations.

C. Adequate erosion protection shall be provided along all open channels, and at all points of discharge (DEP erosion and Erosion, Sediment and Pollution Control Manual).

D. The Township of Maidencreek reserves the right to disapprove any design that would result in the construction in or continuation of a stormwater problem area.

E. No stormwater detention facility shall be placed within fifty (50) feet of a special geologic feature. No subsurface stormwater conveyance facility shall be constructed within fifty (50) feet of a special geologic feature, unless it is constructed of durable pipe utilizing watertight joints.

ARTICLE IV-DRAINAGE PLAN REQUIREMENTS

Section 401. General Requirements

For any of the activities regulated by this Ordinance, the preliminary or final approval of subdivision and/or land development plans, the issuance of any building or occupancy permit, or the commencement of any earth disturbance activity may not proceed until the Property Owner or Applicant or his/her agent has received written approval of a Drainage Plan from the Township of Maidencreek unless the project qualifies for an exemption from the requirements to submit a Drainage Plan.

Section 402. Exemptions

A. General Exemptions

The following land use activities are exempt from the drainage plan submission requirements of this ordinance.

1. Use of land for gardening for home consumption.

2. Agricultural plowing and tilling are exempt from the rate control and stormwater management site plan preparation requirements of this ordinance provided the activities are performed according to the requirements of 25 PA Code, Chapter 102.

3. Forest Management and timber operations are exempt from the rate control and stormwater management site plan preparation requirements of this ordinance provided the activities are performed according to the requirements of 25 PA Code, Chapter 102.

B. Stormwater Quantity Control Exemption

Any Regulated Activity that meets the impervious area exemption criteria in Table 402-1 shall not be required to implement the stormwater quantity controls, specified in Section 308 of this Ordinance. These criteria shall apply to the total development even if development is to take place in phases. The date of the municipal Ordinance adoption shall be the starting point from which to consider tracts as "parent tracts" in which future subdivisions and respective impervious area computations shall be cumulatively considered. Impervious areas existing on the "parent tract" prior to adoption of this Ordinance shall not be considered in cumulative impervious area calculations for exemption purposes.

TABLE 402-1
Impervious Area Exemption Criteria

Total Parcel Size	Impervious Area Exemption (sq.ft.)
0 to <0.125 ac	1,000 sq. ft.
0.125 to <0.5 ac	2,500 sq. ft.
0.5 to <1 ac	5,000 sq. ft.
1 to <2 ac	7,500 sq. ft.
2 to <3 ac	10,000 sq. ft.
3 to <4 ac	12,500 sq. ft.
≥ 4 ac	15,000 sq. ft.

Submissions for projects that utilize the exemption under section 402.B shall reference Ordinance Appendix H to meet the requirements of groundwater recharge (Section 305), water quality (Section 306), and streambank erosion (Section 307) controls of this Ordinance. Drainage plans in accordance with Sections 403 A.2, 403 B.7, 8, 11, 15, and 22 and 403.D.2. must still be submitted. Any exemption must first be approved by the Township of Maidencreek.

C. Additional Exemption Requirement:

1. Exemption does not relieve the Applicant from the responsibility to secure required permits or approvals for activities regulated by any other applicable code, rule, act, or ordinance. Nor does exemption relieve the Applicant from meeting the water quality requirements of this Ordinance.

2. Exemption responsibilities – An exemption shall not relieve the Applicant from implementing such measures as are necessary to protect the public health, safety, and property. An exemption shall not relieve the Applicant from providing adequate stormwater management for Regulated Activities to meet the purpose of this Ordinance; however, drainage plans will not have to be submitted to the municipality.

3. HQ and EV streams - This exemption shall not relieve the Applicant from meeting the special requirements for watersheds draining to high quality (HQ) or exceptional value (EV) waters, identified and Source Water Protection Areas (SWPA) and requirements for nonstructural project design sequencing (Section 304), groundwater recharge (Section 305), water quality (Section 306), and streambank erosion (Section 307). The volume and rate of the net increase in stormwater runoff from Regulated Activities must be managed to prevent the physical degradation of receiving waters from such effects as scour and streambank destabilization, to satisfy State Water Quality Requirements;

   All regulated activities occurring in drainage areas tributary to waters designated HQ/EV pursuant to 25 PA Code, Chapter 93, shall not change any biological, chemical, or physical characteristics, including volume, rate, velocity, course, current, cross section, or temperature of the waters, unless the activity is specifically permitted in accordance with the environmental laws of the Commonwealth.

4. Drainage Problems - If a drainage problem is documented or known to exist downstream of, or expected from the proposed activity, then the municipality may require a drainage plan submittal.

5. Subdivision plans for three lots or fewer are exempt from the requirement to submit a Drainage Plan at the time of the subdivision; however, development of the individual lots created by the subdivision is subject to all other provisions of this Ordinance.

Section 403. Drainage Plan Contents

The Drainage Plan shall consist of a general description of the project including sequencing items described in **Section 304**, calculations, maps and plans. A note on the maps shall refer to the associated computations and erosion and sediment control plan by title and date. The cover sheet of the computations and erosion and sediment control plan shall refer to the associated maps by title

and date. All Drainage Plan materials shall be submitted to the Township of Maidencreek in a format that is clear, concise, legible, neat, and well organized; otherwise, the Drainage Plan shall not be accepted for review and shall be returned to the Applicant.

The following items shall be included in the Drainage Plan:

A. General

1. General description of the project including those areas described in **Section 304.**

2. General description of permanent stormwater management techniques, including construction specifications of the materials to be used for stormwater management facilities.

3. Complete hydrologic, hydraulic, and structural computations for all stormwater management facilities.

4. An Erosion and Sediment Control Plan, including all reviews and approvals by the Conservation District.

5. A general description of nonpoint source pollution controls.

B. Maps

Map(s) of the project area shall be submitted on 24-inch x 36-inch sheets and/or shall be prepared in a form that meets the requirements for recording at the offices of the Recorder of Deeds of Berks County. If the Subdivision and Land Development Ordinance (SALDO) has more stringent criteria then the more stringent criteria shall apply. The contents of the map(s) shall include, but not be limited to:

1. The location of the project relative to highways, municipalities or other identifiable landmarks.

2. Existing contours at intervals of two feet. In areas of steep slopes (greater than 15 percent), five-foot contour intervals may be used.

3. Existing streams, lakes, ponds or other Waters of the Commonwealth within the project area..

4. Other physical features including flood hazard boundaries, stream buffers, existing drainage courses, areas of natural vegetation to be preserved, and the total extent of the upstream area draining through the site.

5. The locations of all existing and proposed utilities, sanitary sewers, and water lines within fifty (50) feet of property lines.

6. An overlay showing soil names and boundaries.

7. Limits of earth disturbance, including the type and amount of impervious area that would be added.

8. Proposed structures, roads, paved areas, and buildings.

9. Final contours at intervals of two feet. In areas of steep slopes (greater than 15 percent), five-foot contour intervals may be used.

10. The name of the development, the name and address of the owner of the property, and the name of the individual or firm preparing the plan.

11. The date of submission.

12. A graphic and written scale of one (1) inch equals no more than fifty (50) feet; for tracts of twenty (20) acres or more, the scale shall be one (1) inch equals no more than one hundred (100) feet.

13. A north arrow.

14. The total tract boundary and size with distances marked to the nearest foot and bearings to the nearest degree.

15. Existing and proposed land use(s).

16. A key map showing all existing man-made features beyond the property boundary that would be affected by the project.

17. Location of all open channels.

18. Overland drainage patterns and swales.

19. A twenty (20) foot wide access easement around all stormwater management facilities that would provide ingress to and egress from a public right-of-way.

20. The location of all erosion and sediment control facilities.

21. A note on the plan indicating the location and responsibility for maintenance of stormwater management facilities that would be located on/off-site. All on/off-site facilities shall meet the performance standards and design criteria specified in this Ordinance.

22. A statement, signed by the landowner, acknowledging that any revision to the approved Drainage Plan must be approved by the Township of Maidencreek and the Conservation District.

23. The following signature block for the Design Engineer:

    "I, (Design Engineer), on this date (date of signature), hereby certify that the Drainage Plan meets all design standards and criteria of the Maiden Creek Watershed Act 167 Stormwater Management Ordinance."

C. Supplemental Information

1. A written description of the following information shall be submitted.

    a. The overall stormwater management concept for the project designed in accordance with **Section 304**.
    b. Stormwater runoff computations as specified in this Ordinance.

c. Stormwater management techniques to be applied both during and after development.
d. Expected project time schedule.
e. Development stages (project phases) if so proposed.
f. An operation and maintenance plan in accordance with **Section 702** of this Ordinance.

2. An erosion and sediment control plan.

3. The effect of the project (in terms of runoff volumes and peak flows) on adjacent properties and on any existing municipal stormwater collection system that may receive runoff from the project site.

D. Stormwater Management Facilities

1. All stormwater management facilities must be located on a plan and described in detail.

2. When infiltration facilities such as seepage pits, beds or trenches are used, the locations of existing and proposed septic tank infiltration areas and wells must be shown.

3. All calculations, assumptions, and criteria used in the design of the stormwater management facilities must be shown.

E. Responsibilities for Operations and Maintenance of Stormwater Controls and BMPs

1. No Regulated Earth Disturbance activities within the Township of Maidencreek shall commence until approval by the Township of Maidencreek of a Stormwater Control and BMP Operations and Maintenance plan which describes how the permanent (e.g., post-construction) stormwater controls and BMPs will be properly operated and maintained.

2. The following items shall be included in the Stormwater Control and BMP Operations and Maintenance Plan:

a. Map(s) of the project area, in a form that meets the requirements for recording at the offices of the Recorder of Deeds of Berks County, and shall be submitted on 24-inch x 36-inch sheets. The contents of the maps(s) shall include, but not be limited to:

1). Clear identification of the location and nature of permanent stormwater controls and BMPs,
2). The location of the project site relative to highways, municipal boundaries or other identifiable landmarks,
3). Existing and final contours at intervals of two feet, or others as appropriate,
4). Existing streams, lakes, ponds, or other bodies of water within the project site area,
5). Other physical features including flood hazard boundaries, sinkholes, streams, existing drainage courses, and areas of natural vegetation to be preserved,
6). The locations of all existing and proposed utilities, sanitary sewers, and water lines within fifty (50) feet of property lines of the project site,

7). Proposed final changes to the land surface and vegetative cover, including the type and amount of impervious area that would be added,
8). Proposed final structures, roads, paved areas, and buildings, and
9). A twenty (20) foot wide access easement around all stormwater controls and BMPs that would provide ingress to and egress from a public right-of-way.

b. A description of how each permanent stormwater control and BMP will be operated and maintained, and the identity of the person(s) responsible for operations and maintenance,

c. The name of the project site, the name and address of the owner of the property, and the name of the individual or firm preparing the plan, and

d. A statement, signed by the landowner, acknowledging that the stormwater controls and BMPs are fixtures that can be altered or removed only after approval by the Township of Maidencreek.

3. The Stormwater Control and BMP Operations and Maintenance Plan for the project site shall establish responsibilities for the continuing operation and maintenance of all permanent stormwater controls and BMPs, as follows:

a. If a plan includes structures or lots which are to be separately owned and in which streets, sewers and other public improvements are to be dedicated to the Township of Maidencreek, stormwater controls and BMPs may also be dedicated to and maintained by the Township of Maidencreek;

b. If a plan includes operations and maintenance by a single ownership, or if sewers and other public improvements are to be privately owned and maintained, then the operation and maintenance of stormwater controls and BMPs shall be the responsibility of the owner or private management entity.

4. The Township of Maidencreek shall make the final determination on the continuing operations and maintenance responsibilities. The Township of Maidencreek reserves the right to accept or reject the operations and maintenance responsibility for any or all of the stormwater controls and BMPs.

F. Municipality Review of Stormwater Control and BMP Operations and Maintenance Plan

1. The Township of Maidencreek shall review the Stormwater Control and BMP Operations and Maintenance Plan for consistency with the purposes and requirements of this ordinance, and any permits issued by DEP.

2. The Township of Maidencreek shall notify the Applicant in writing whether the Stormwater Control and BMP Operations and Maintenance Plan is approved.

3. The Township of Maidencreek may require a "Record Drawing" of all stormwater controls and BMPs, and an explanation of any discrepancies with the Operations and Maintenance Plan.

Section 404. Plan Submission

The Township of Maidencreek shall require receipt of a complete plan, as specified in this Ordinance.

For any activities that require an NPDES Permit for Stormwater Discharges from Construction Activities, a PaDEP Joint Permit Application, a PennDOT Highway Occupancy Permit, or any other permit under applicable state or federal regulations are regulated under Chapter 105 (Dam Safety and Waterway Management) or Chapter 106 (Floodplain Management) of PaDEP's Rules and Regulations, or, the proof of application for said permit(s) or approvals shall be part of the plan. The plan shall be coordinated with the state and federal permit process and the municipal SALDO review process.

A. For projects which require SALDO approval, the Drainage Plan shall be submitted by the Applicant as part of the Preliminary Plan submission where applicable for the Regulated Activity.

B. For these regulated activities that do not require SALDO approval, See **Section 401**, General Requirements.

C. Six (6) copies of the Drainage Plan shall be submitted and distributed as follows:

1. Two (2) copies to the Township of Maidencreek accompanied by the requisite Municipal Review Fee, as specified in this Ordinance.

2. Two (2) copies to the Conservation District.

3. One (1) copy to the Municipal Engineer.

4. One (1) copy to the Berks County Planning Commission.

Section 405. Drainage Plan Review

A. The Township of Maidencreek shall review the Drainage Plan for consistency with the adopted Maiden Creek Watershed Act 167 Stormwater Management Plan. Any found incomplete shall not be accepted for review and shall be returned to the Applicant.

B. For activities regulated by this Ordinance, the Township of Maidencreek shall notify the Applicant in writing, within (recommend 90) calendar days, whether the Drainage Plan is consistent with the Stormwater Management Plan.

1. Should the Drainage Plan be determined to be consistent with the Stormwater Management Plan, the Municipal Engineer shall forward an approval letter to the Municipal Secretary who will then forward a copy to the Applicant.

2. Should the Drainage Plan be determined to be inconsistent with the Stormwater Management Plan, the Municipal Engineer shall forward a disapproval letter to the Municipal Secretary who will then forward a copy to the Applicant. The disapproval letter shall cite the reason(s) and specific Ordinance sections for the disapproval.

Disapproval may be due to inadequate information to make a reasonable judgment as to compliance with the stormwater management plan. Any disapproved Drainage Plans may be revised by the Applicant and resubmitted consistent with this Ordinance.

C. For Regulated Activities specified in **Section 104** of this Ordinance, which require a building permit, the Municipal Engineer shall notify the Municipal Building Permit Officer in writing, within a time frame consistent with the Municipal Building Code and/or Municipal Subdivision Ordinance, whether the Drainage Plan is consistent with the Stormwater Management Plan and forward a copy of the approval/disapproval letter to the Applicant. Any disapproved drainage plan may be revised by the Applicant and resubmitted consistent with this Ordinance.

D. For regulated activities under this ordinance that require an NPDES Permit Application, the Applicant shall forward a copy of the Municipal Engineer's letter stating that the Drainage Plan is consistent with the stormwater management plan to the Conservation District. PaDEP and the Conservation District may consider the Municipal Engineer's review comments in determining whether to issue a permit.

E. The Township of Maidencreek shall not grant approval or grant preliminary approval to any subdivision or land development for Regulated Activities specified in **Section 105** of this Ordinance if the Drainage Plan has been found to be inconsistent with the Stormwater Management Plan, as determined by the Township of Maidencreek. All required permits from PaDEP must be obtained prior to approval of any subdivision or land development.

F. The Applicant shall be responsible for completing record drawings of all stormwater management facilities included in the approved Drainage Plan. The record drawings and an explanation of any discrepancies with the design plans shall be submitted to the Township of Maidencreek for final approval. The Township of Maidencreek may withhold approval of the record drawings until the Township of Maidencreek receives a copy of an approved Highway Occupancy Permit from the PennDOT District Office, NPDES Permit, and any other applicable permits or approvals, from PaDEP or the Conservation District. The above permits and approvals must be based on the record drawings.

G. The Township of Maidencreek's approval of a Drainage Plan shall be valid for a period not to exceed 5 years. Commencing on the date that the Township of Maidencreek signs the approved Drainage Plan. If stormwater management facilities included in the approved Drainage plan have not been constructed, or if constructed, and record drawings of these facilities have not been approved within this 5 year time period, then the Township of Maidencreek may consider the Drainage plan disapproved and may revoke any and all permits. Drainage Plans that are considered disapproved by the Township of Maidencreek shall be resubmitted in accordance with **Section 407** of this Ordinance.

H. For municipalities located in the Lehigh County portion of the watershed, the Drainage Plan must be submitted to the Lehigh Planning Commission (LVPC) for review. The municipalities shall take the LVPC's comments into consideration.

Section 406. Modification of Plans

A. A modification to a Drainage Plan under review by the Township of Maidencreek for a development site that involves a change in stormwater management facilities or techniques, or that involves the relocation or re-design of stormwater management facilities, or that is necessary because soil or other conditions are not as stated on the Drainage Plan as determined by the Township of Maidencreek, shall require a resubmission of the modified Drainage Plan consistent with **Section 404** of this Ordinance and be subject to review as specified in **Section 405** of this Ordinance.

B. A modification to an already approved or disapproved Drainage Plan shall be submitted to the Township of Maidencreek, accompanied by the applicable Municipal Review and Inspection Fee. A modification to a Drainage Plan for which a formal action has not been taken by the Township of Maidencreek shall be submitted to the Municipality, accompanied by the applicable Municipal Review and Inspection Fee.

Section 407. Resubmission of Disapproved Drainage Plans

A disapproved Drainage Plan may be resubmitted, with the revisions addressing the Township of Maidencreek's concerns documented in writing and addressed to the Municipal Secretary in accordance with **Section 404** of this Ordinance and distributed accordingly and be subject to review as specified in **Section 405** of this Ordinance. The applicable Municipal Review and Inspection Fee must accompany a resubmission of a disapproved Drainage Plan.

ARTICLE V-INSPECTIONS

Section 501. Schedule of Inspections

A. The Township of Maidencreek or their designee shall inspect all phases of the installation of the permanent stormwater management facilities as deemed appropriate by the Township of Maidencreek.

B. During any stage of the work, if the Township of Maidencreek or their designee determines that the permanent stormwater management facilities are not being installed in accordance with the approved Stormwater Management Plan, the Township of Maidencreek shall revoke any existing building permits and issue a cease and desist order until a revised Drainage Plan is submitted and approved, as specified in this Ordinance.

C. A final inspection of all stormwater management facilities shall be conducted by the Township of Maidencreek or their designee and to confirm compliance with the approved Drainage Plan prior to the issuance of any Occupancy Permit.

ARTICLE VI-FEES AND EXPENSES

Section 601. Municipality Drainage Plan Review and Inspection Fee

Fees shall be established by the Township of Maidencreek to defray plan review and construction inspection costs incurred by the Township of Maidencreek. All fees shall be paid by the Applicant at the time of Drainage Plan submission. Review and Inspection Fee Schedule shall be established by resolution of the municipal governing body based on the size of the Regulated Activity and based on the Township of Maidencreek's costs for reviewing Drainage Plans and conducting inspections pursuant to **Section 501**. The Township of Maidencreek shall periodically update the Review and Inspection Fee Schedule to ensure that review costs are adequately reimbursed.

Section 602. Expenses Covered by Fees

The fees required by this Ordinance shall at a minimum cover:

A. Administrative costs.

B. The review of the Drainage Plan by the Township of Maidencreek or its consultant.

C. The site inspections.

D. The inspection of stormwater management facilities and drainage improvements during construction.

E. The final inspection upon completion of the stormwater management facilities and drainage improvements presented in the Drainage Plan.

F. Any additional work required to enforce any permit provisions regulated by this Ordinance, correct violations, and assure proper completion of stipulated remedial actions.

ARTICLE VII-MAINTENANCE RESPONSIBILITIES

Section 701. Performance Guarantee

A. For subdivisions and land developments the Applicant shall provide a financial guarantee to the Township of Maidencreek for the timely installation and proper construction of all stormwater management controls as: 1) Required by the approved drainage plan equal to or greater than the full construction cost of the required controls or 2) in the amount and method of payment provided for in the subdivision and land development ordinance.

B. For other regulated activities, the Township of Maidencreek may require a financial guarantee from the Applicant.

C. At the completion of the project, and as a prerequisite for the release of the performance guarantee, the Applicant or his representatives shall:

1. Provide a certification of completion from an engineer, architect, surveyor or other qualified person verifying that all permanent facilities have been constructed according to the plans and specifications and approved revisions thereto.

2. Provide a set of record drawings.

D. After the Township of Maidencreek receives the certification, a final inspection shall be conducted by the Township of Maidencreek or designee to certify compliance with this ordinance.

Section 702. Adherence to Approved Stormwater Control and BMP Operations and Maintenance Plan

It shall be unlawful to alter or remove any permanent stormwater control and BMP required by an approved Stormwater Control and BMP Operations and Maintenance Plan, or to allow the property to remain in a condition which does not conform to an approved Stormwater Control and BMP Operations and Maintenance Plan.

Section 703. Operations and Maintenance Agreement for Privately Owned Stormwater Controls and BMPs

A. The property owner shall sign an operations and maintenance agreement with the Township of Maidencreek covering all stormwater controls and BMPs that are to be privately owned. The agreement shall be substantially the same as the agreement in Appendix A of this Ordinance.

B. Other items may be included in the agreement where determined necessary to guarantee the satisfactory operation and maintenance of all permanent stormwater controls and BMPs. The agreement shall be subject to the review and approval of the Township of Maidencreek.

Section 704. Stormwater Management Easements

A. Stormwater management easements are required for all areas used for off-site stormwater control, unless a waiver is granted by the Township of Maidencreek.

B. Stormwater management easements shall be provided by the property owner if necessary for (1) access for inspections and maintenance, or (2) preservation of stormwater runoff conveyance, infiltration, and detention areas and other stormwater controls and BMPs, by persons other than the property owner. The purpose of the easement shall be specified in any agreement under **Section 703**.

Section 705. Maintenance Agreement for Privately Owned Stormwater Facilities

A. Prior to final approval of the site's Drainage Plan, the Applicant shall sign and record the Maintenance Agreement contained in Appendix A which is attached and made part hereof, covering all stormwater control facilities that are to be privately owned.

B. Other items may be included in the agreement where determined necessary to guarantee the satisfactory maintenance of all facilities. The Maintenance Agreement shall be subject to the review and approval of the municipal solicitor and governing body.

Section 706. Recording of Approved Stormwater Control and BMP Operations and Maintenance Plan and Related Agreements

A. The owner of any land upon which permanent stormwater controls and BMPs will be placed, constructed or implemented, as described in the Stormwater Control and BMP Operations and Maintenance Plan, shall record the following documents in the Office of the Recorder of Deeds for Berks County, within 15 days of approval of the Stormwater Control and BMP Operations Plan by the Municipality:

1. The Operations and Maintenance Plan, or a summary thereof,

2. Operations and Maintenance Agreements under **Section 703**, and

3. Easements under **Section 704**.

B. The Township of Maidencreek may suspend or revoke any approvals granted for the project site upon discovery of the failure of the owner to comply with this Section.

Section 707. Municipal Stormwater Control and BMP Operation and Maintenance Fund

A. Persons installing stormwater controls or BMPs shall be required to pay a specified amount to the Municipal Stormwater Control and BMP Operation and Maintenance Fund to help defray costs of periodic inspections and maintenance expenses. The amount of the deposit shall be determined as follows:

1. If the stormwater control or BMP is to be privately owned and maintained, the deposit shall cover the cost of periodic inspections performed by the Township of Maidencreek for a period of ten (10) years, as estimated by the municipal engineer. After that period of time, inspections will be performed at the expense of the Township of Maidencreek.

2. If the stormwater control or BMP is to be owned and maintained by the Township of Maidencreek, the deposit shall cover the estimated costs for maintenance and inspections for ten (10) years. The municipal engineer will establish the estimated costs utilizing information submitted by the Applicant.

3. The amount of the deposit to the fund shall be converted to present worth of the annual series values. The municipal engineer shall determine the present worth equivalents, which shall be subject to the approval of the governing body.

B. If a stormwater control or BMP is proposed that also serves as a recreation facility (e.g., ballfield, lake), the Township of Maidencreek may reduce or waive the amount of the maintenance fund deposit based upon the value of the land for public recreation purpose.

C. If at some future time a stormwater control or BMP (whether publicly or privately owned) is eliminated due to the installation of storm sewers or other storage facility, the unused portion

of the maintenance fund deposit will be applied to the cost of abandoning the facility and connecting to the storm sewer system or other facility. Any amount of the deposit remaining after the costs of abandonment are paid will be returned to the depositor.

D. If stormwater controls or BMPs are accepted by the Township of Maidencreek for dedication, the Township of Maidencreek may require persons installing stormwater controls or BMPs to pay a specified amount to the Municipal Stormwater Control and BMP Operation and Maintenance Fund, to help defray costs of operations and maintenance activities. The amount may be determined as follows:

1. If the stormwater control or BMP is to be owned and maintained by the Township of Maidencreek, the amount shall cover the estimated costs for operations and maintenance for ten (10) years, as determined by the Township of Maidencreek.

2. The amount shall then be converted to present worth of the annual series values.

E. If a stormwater control or BMP is proposed that also serves as a recreation facility (e.g. ball field, lake), the Township of Maidencreek may adjust the amount due accordingly.

F. Long-Term Maintenance – The Township of Maidencreek shall require applicants to pay a fee to the Municipal Stormwater Maintenance Fund to cover long term maintenance of stormwater control and best management practices.

G. Stormwater Related Problems - The Township of Maidencreek may require applicants to pay a fee to the Municipal Stormwater Maintenance Fund to cover stormwater related problems which may arise from the land development and earth disturbance

ARTICLE VIII - PROHIBITIONS

Section 801. Prohibited Discharges and Connections

A. Any drain or conveyance, whether on the surface or subsurface, which allows any non-stormwater discharge including sewage, process wastewater, and wash water to enter the waters of this Commonwealth is prohibited.

B. No person shall allow, or cause to allow, discharges into surface waters of this Commonwealth which are not composed entirely of stormwater, except (1) as provided in subsection C below, and (2) discharges allowed under a state or federal permit.

C. The following discharges are authorized unless they are determined to be significant contributors to pollution to the waters of this Commonwealth:

- Discharges from fire fighting activities	- Flows from riparian habitats and wetlands
- Potable water sources including water line flushing	- Uncontaminated water from foundations or from footing drains
- Irrigation drainage	- Lawn watering
- Air conditioning condensate	- Dechlorinated swimming pool discharges
- Springs	- Uncontaminated groundwater
- Water from crawl space pumps	- Water from individual residential car washing
- Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spill material has been removed) and where detergents are not used	- Routine external building wash down (which does not use detergents or other compounds)

D. In the event that the Township of Maidencreek or DEP determines that any of the discharges identified in Subsection C, significantly contribute to pollution of the waters of this Commonwealth, the Township of Maidencreek or DEP will notify the responsible person(s) to cease the discharge.

Section 802. Roof Drains

Roof drains and sump pumps shall discharge to infiltration or vegetative BMPs and to the maximum extent practicable satisfy the criteria for Disconnected Impervious Areas.

Section 803. Alteration of Stormwater Management BMPs

No person shall modify, remove, fill, landscape, or alter any stormwater management BMPs, facilities, areas, or structures, without the written approval of the Township of Maidencreek.

ARTICLE IX-ENFORCEMENT AND PENALTIES

Section 901. Right-of-Entry

A. Upon presentation of proper credentials, duly authorized representatives of the Township of Maidencreek may enter at reasonable times upon any property within the Township of Maidencreek to inspect the implementation, condition, or operation and maintenance of the stormwater controls or BMPs in regard to any aspect governed by this Ordinance.

B. Stormwater control and BMP owners and operators shall allow persons working on behalf of the Township of Maidencreek ready access to all parts of the premises for the purposes of determining compliance with this Ordinance.

C. Persons working on behalf of the Township of Maidencreek shall have the right to temporarily locate on any stormwater control or BMP in the Township of Maidencreek such devices as are necessary to conduct monitoring and/or sampling of the discharges from such stormwater control or BMP.

D. Unreasonable delays (>24 hrs.) in allowing the Township of Maidencreek access to a stormwater control or BMP is a violation of this Article.

Section 902. Public Nuisance

A. The violation of any provision of this ordinance is hereby deemed a Public Nuisance.

B. Each day that a violation continues shall constitute a separate violation.

Section 903. Enforcement Generally

A. Whenever the Township of Maidencreek finds that a person has violated a prohibition or failed to meet a requirement of this Ordinance, the Township of Maidencreek may order compliance by written notice to the responsible person. Such notice may require without limitation:

1. The performance of monitoring, analyses, and reporting;
2. The elimination of prohibited connections or discharges;
3. Cessation of any violating discharges, practices, or operations;
4. The abatement or remediation of stormwater pollution or contamination hazards and the restoration of any affected property;
5. Payment of a fine to cover administrative and remediation costs;
6. The implementation of stormwater controls and BMPs; and
7. Operation and maintenance of stormwater controls and BMPs.

B. Such notification shall set forth the nature of the violation(s) and establish a time limit for correction of these violations(s). Said notice may further advise that, if applicable, should the violator fail to take the required action within the established deadline, the work will be done by the Township of Maidencreek or designee and the expense thereof shall be charged to the violator.

C. Failure to comply within the time specified shall also subject such person to the penalty provisions of this Ordinance. All such penalties shall be deemed cumulative and shall not prevent the Municipality from pursuing any and all other remedies available in law or equity.

Section 904. Suspension and Revocation of Permits and Approvals

A. Any building, land development or other permit or approval issued by the Township of Maidencreek may be suspended or revoked, in whole or in part, by the Township of Maidencreek for:

1. Non-compliance with or failure to implement any provision of the permit;
2. A violation of any provision of this Ordinance; or

3. The creation of any condition or the commission of any act during construction or development which constitutes or creates a hazard or nuisance, pollution or which endangers the life or property of others.

B. A suspended permit or approval may be reinstated by the Township of Maidencreek, in whole or in part, when:

1. The Township of Maidencreek or designee has inspected and approved the corrections to the stormwater controls and BMPs, or the elimination of the hazard or nuisance, and/or;

2. The Township of Maidencreek is satisfied that the violation of the Ordinance, law, or rule and regulation has been corrected.

C. A permit or approval which has been revoked in whole or in part, by the Township of Maidencreek cannot be reinstated. The applicant may apply for a new permit under the procedures outlined in this Ordinance.

Section 905. Penalties

A. Any violation of the provisions of this Ordinance shall be enforced by action brought before a District Justice in the same manner provided for the enforcement of summary offenses under the Pennsylvania Rules of Criminal Procedure. The Municipal Solicitor may assume charge of the prosecution without the consent of the District Attorney as required by Pa. R.Crim.P. No. 454 (relating to trial in summary cases). Upon conviction, the person shall be subject to a fine of not more than One Thousand Dollars ($1,000.00) for each violation, recoverable with costs, or imprisonment to the extent allowed by law for the punishment of summary offenses, or both. Each day that the violation continues shall be a separate offense.

B. In addition, the Township of Maidencreek, through its Solicitor, may institute injunctive, mandamus or any other appropriate action or proceeding at law or in equity for the enforcement of this Ordinance. Any court of competent jurisdiction shall have the right to issue restraining orders, temporary or permanent injunctions, mandamus or other appropriate forms of remedy or relief. The imposition of a fine or penalty for any violation of, or non-compliance with, this Ordinance shall not excuse the violation or non-compliance, or permit it to continue, and all such persons shall be required to correct or remedy such violations and non-compliances.

Section 906. Notification

In the event that a person fails to comply with the requirements of this Ordinance, or fails to conform to the requirements of any permit issued hereunder, the Municipality will provide notification of the violation. After notice is provided, failure to correct violations in a timely manner may result in additional violations.

Section 907. Enforcement

The Township of Maidencreek Board of Supervisors is hereby authorized and directed to enforce all of the provisions of this ordinance. All inspections regarding compliance with the drainage plan shall be the responsibility of the municipal engineer or other qualified persons designated by the Township of Maidencreek.

A. No person shall modify, remove, fill, landscape or alter any stormwater management BMPs, facilities, areas, or structures, without the written approval of the Township of Maidencreek.

B. Upon presentation of proper credentials, the Township of Maidencreek may enter at reasonable times upon any property within the Township of Maidencreek to inspect the condition of the stormwater structures and facilities in regard to any aspect regulated by this Ordinance.

C. It shall be unlawful for a person to undertake any Regulated Activity except as provided in an approved Stormwater Management Site Plan, unless specifically exempted from the requirement to submit a stormwater management Site Plan by this Ordinance.

D. The Developer shall be responsible for providing as-built plan of all stormwater management BMPs included in the approved stormwater management Site Plan. The as-built plans and an explanation of any discrepancies with the construction plans shall be submitted by the Developer to the Township of Maidencreek.

E. The as-built submission shall include a certification of completion signed by a Qualified Professional verifying that all permanent stormwater management BMPs have been constructed according to the approved plans and specifications. If any licensed Qualified Professionals contributed to the construction plans, then a licensed Qualified Professional must sign the completion certificate.

F. After receipt of the completion certificate by the Township of Maidencreek, the Township of Maidencreek may conduct a final inspection.

G. Inspections regarding compliance with the stormwater management Site Plan are a responsibility of the Township of Maidencreek.

H. The Township of Maidencreek may withhold an occupancy permit until a certificate of completion has been provided by the Developer.

Section 908. Appeals

A. Any person aggrieved by any action of the Township of Maidencreek or its designee may appeal to the Maidencreek Township Board of Supervisors within thirty (30) days of that action.

B. Any person aggrieved by any decision of the Maidencreek Township Board of Supervisors may appeal to the County Court of Common Pleas in the County where the activity has taken place within thirty (30) days of the municipal decision.

ENACTED and ORDAINED at a regular meeting of the _____ _____ on the _____ of _____, 20__. This Ordinance shall take effect immediately.

_____
[Name]

_____
[Title]

_____
[Name]

_____
[Title]

_____
[Name]

_____
[Title]

_____
[Name]

_____
[Title]

_____
[Name]

_____
[Title]

ATTEST:

_____
Secretary

I hereby certify that the foregoing Ordinance was advertised in the _____ on _____, 20__, a newspaper of general circulation in the municipality and was duly enacted and approved as set forth at a regular meeting of the municipality's governing body held on _____, 20__.

_____
Secretary

ORDINANCE APPENDIX A

STORMWATER CONTROLS AND BEST MANAGEMENT PRACTICES
OPERATIONS AND MAINTENANCE AGREEMENT

THIS AGREEMENT, made and entered into this _____ day of _____, 20__, by and between _____, (hereinafter the "Landowner"), and _____, _____ County, Pennsylvania, (hereinafter "Municipality");

WITNESSETH

WHEREAS, the Landowner is the owner of certain real property as recorded by deed in the land records of _____ County, Pennsylvania, Deed Book _____ at Page _____, (hereinafter "Property").

WHEREAS, the Landowner is proceeding to build and develop the Property; and

WHEREAS, the Stormwater Controls and BMP Operations and Maintenance Plan approved by the Municipality (hereinafter referred to as the "Plan") for the property identified herein, which is attached hereto as Appendix A and made part hereof, as approved by the Municipality, provides for management of stormwater within the confines of the Property through the use of Best Management Practices (BMPs); and

WHEREAS, the Municipality, and the Landowner, his successors and assigns, agree that the health, safety, and welfare of the residents of the Municipality and the protection and maintenance of water quality require that on-site stormwater Best Management Practices be constructed and maintained on the Property; and

WHEREAS, for the purposes of this agreement, the following definitions shall apply:

BMP – "Best Management Practice;" activities, facilities, designs, measures or procedures used to manage stormwater impacts from land development, to protect and maintain water quality and groundwater recharge and to otherwise meet the purposes of the Municipal Stormwater Management

Ordinance, including but not limited to infiltration trenches, seepage pits, filter strips, bioretention, wet ponds, permeable paving, rain gardens, grassed swales, forested buffers, sand filters and detention basins.

- Infiltration Trench – A BMP surface structure designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or groundwater aquifer,

- Seepage Pit – An underground BMP structure designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or groundwater aquifer,

- Rain Garden – A BMP overlain with appropriate mulch and suitable vegetation designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or underground aquifer, and

WHEREAS, the Municipality requires, through the implementation of the Plan, that stormwater management BMPs as required by said Plan and the Municipal Stormwater Management Ordinance be constructed and adequately operated and maintained by the Landowner, his successors and assigns. and

NOW, THEREFORE, in consideration of the foregoing promises, the mutual covenants contained herein, and the following terms and conditions, the parties hereto agree as follows:

1. The BMPs shall be constructed by the Landowner in accordance with the plans and specifications identified in the Plan.

2. The Landowner shall operate and maintain the BMP(s) as shown on the Plan in good working order acceptable to the Municipality and in accordance with the specific maintenance requirements noted on the Plan.

3. The Landowner hereby grants permission to the Municipality, its authorized agents and employees, to enter upon the property, at reasonable times and upon presentation of proper

identification, to inspect the BMP(s) whenever it deems necessary. Whenever possible, the Municipality shall notify the Landowner prior to entering the property.

4. In the event the Landowner fails to operate and maintain the BMP(s) as shown on the Plan in good working order acceptable to the Municipality, the Municipality or its representatives may enter upon the Property and take whatever action is deemed necessary to maintain said BMP(s). This provision shall not be construed to allow the Municipality to erect any permanent structure on the land of the Landowner. It is expressly understood and agreed that the Municipality is under no obligation to maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the Municipality.

5. In the event the Municipality, pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the Landowner shall reimburse the Municipality for all expenses (direct and indirect) incurred within 10 days of receipt of invoice from the Municipality.

6. The intent and purpose of this Agreement is to ensure the proper maintenance of the onsite BMP(s) by the Landowner; provided, however, that this Agreement shall not be deemed to create or effect any additional liability of any party for damage alleged to result from or be caused by stormwater runoff.

7. The Landowner, its executors, administrators, assigns, and other successors in interests, shall release the Municipality's employees and designated representatives from all damages, accidents, casualties, occurrences or claims which might arise or be asserted against said employees and representatives from the construction, presence, existence, or maintenance of the BMP(s) by the Landowner or Municipality. In the event that a claim is asserted against the Municipality, its designated representatives or employees, the Municipality shall promptly notify the Landowner and the Landowner shall defend, at his own expense, any suit based on the claim. If any judgment or claims against the Municipality's employees or designated representatives shall be allowed, the Landowner shall pay all costs and expenses regarding said judgment or claim.

8. The Municipality shall inspect the BMP(s) at a minimum of once every three years to ensure their continued functioning.

This Agreement shall be recorded at the Office of the Recorder of Deeds of _____ County, Pennsylvania, and shall constitute a covenant running with the Property and/or equitable servitude, and shall be binding on the Landowner, his administrators, executors, assigns, heirs and any other successors in interests, in perpetuity.

ATTEST:

WITNESS the following signatures and seals:

(SEAL) For the Municipality:

_____

(SEAL) For the Landowner:

_____

ATTEST:

_____ (City, Borough, Township)

County of _____, Pennsylvania

I, _____, a Notary Public in and for the County and State aforesaid, whose commission expires on the _____ day of _____, 20__, do hereby certify that _____ whose name(s) is/are signed to the foregoing Agreement bearing date of the _____ day of _____, 20__, has acknowledged the same before me in my said County and State.

GIVEN UNDER MY HAND THIS _____ day of _____, 200_.

_____ _____

NOTARY PUBLIC **(SEAL)**

ORDINANCE APPENDIX B
STORMWATER MANAGEMENT DESIGN CRITERIA

TABLE B-1
REGION 4 - DESIGN STORM RAINFALL AMOUNT
Source: "Field Manual of Pennsylvania Department of Transportation"
STORM INTENSITY-DURATION-FREQUENCY CHARTS
P D T - I D F May 1986.

FIGURE B-1
NRCS TYPE II RAINFALL DISTRIBUTION – S CURVE
Source: NRCS, TR-55, June 1986

FIGURE B-2
PENNDOT DELINEATED REGIONS
Source: "Field Manual of Pennsylvania Department of Transportation"
STORM INTENSITY-DURATION-FREQUENCY CHARTS
P D T - I D F May 1986.

FIGURE B-3
PENNDOT REGION 4 STORM INTENSITY-DURATION-FREQUENCY CURVE
Source: "Field Manual of Pennsylvania Department of Transportation"
STORM INTENSITY-DURATION-FREQUENCY CHARTS
P D T - I D F May 1986.

TABLE B-2
RUNOFF CURVE NUMBERS
Source: NRCS (SCS) TR-55

TABLE B-3
RATIONAL RUNOFF COEFFICIENTS

TABLE B-4
MANNING ROUGHNESS COEFFICIENTS

TABLE B-5
INFILTRATION REQUIREMENTS IN CARBONATE AREAS

TABLE B-1
DESIGN STORM RAINFALL AMOUNT (INCHES)

The design storm rainfall amount chosen for design should be obtained from the PennDOT region in which the site is located according to Figure B-2.

Source: "Field Manual of Pennsylvania Department of Transportation"
STORM INTENSITY-DURATION-FREQUENCY CHARTS
P D T - I D F May 1986.

Region 4

Precipitation Depth (in)

Duration	1 Yr	1.5 Yr	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
5 min	0.30	0.33	0.35	0.41	0.45	0.50	0.55	0.61
15 min	0.58	0.63	0.68	0.80	0.93	1.03	1.13	1.25
1 hr	1.01	1.12	1.22	1.48	1.70	1.91	2.16	2.41
2 hr	1.24	1.37	1.50	1.84	2.14	2.46	2.80	3.18
3 hr	1.38	1.55	1.71	2.10	2.43	2.82	3.24	3.69
6 hr	1.68	1.86	2.04	2.52	3.06	3.60	4.14	4.74
12 hr	2.04	2.28	2.52	3.00	3.84	4.56	5.16	6.00
24 hr	2.40	2.64	2.88	3.60	4.56	5.76	6.48	7.44

FIGURE B-1
NRCS (SCS) TYPE II RAINFALL DISTRIBUTION - S CURVE

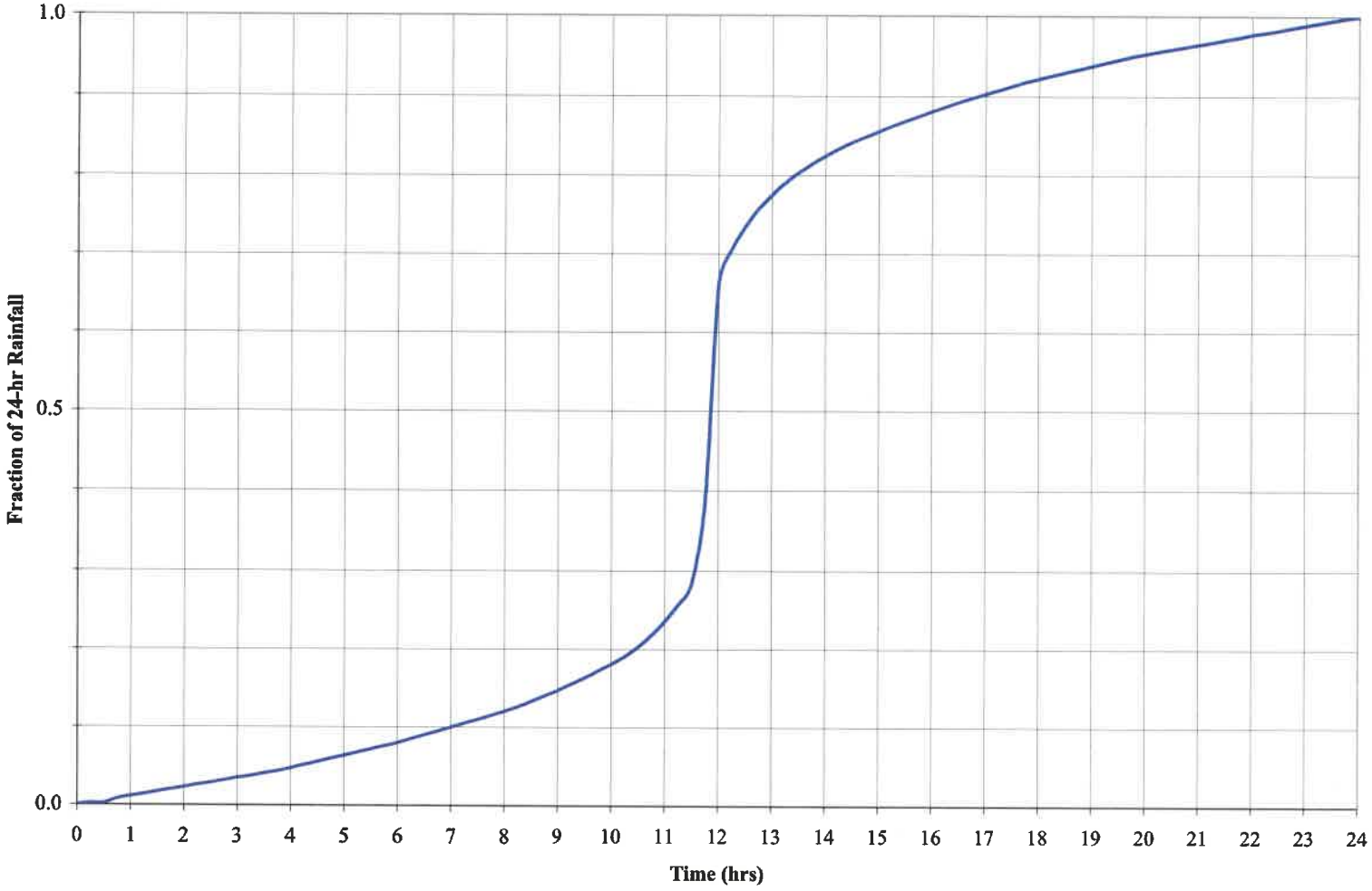


FIGURE B-2
PENNDOT DELINEATED REGIONS

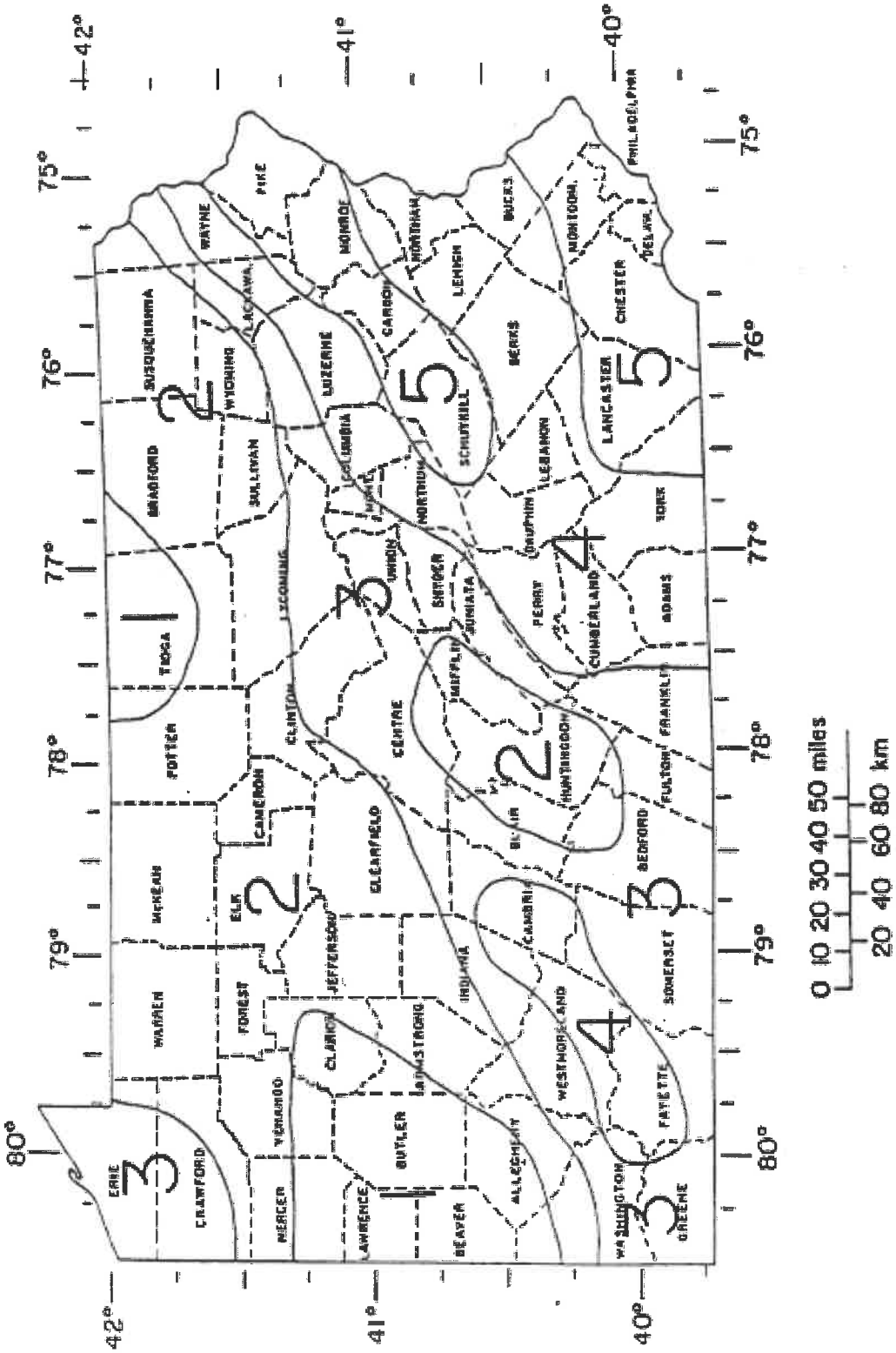


FIGURE B-3
PENNDOT REGION 4 STORM INTENSITY-DURATION-FREQUENCY CURVE

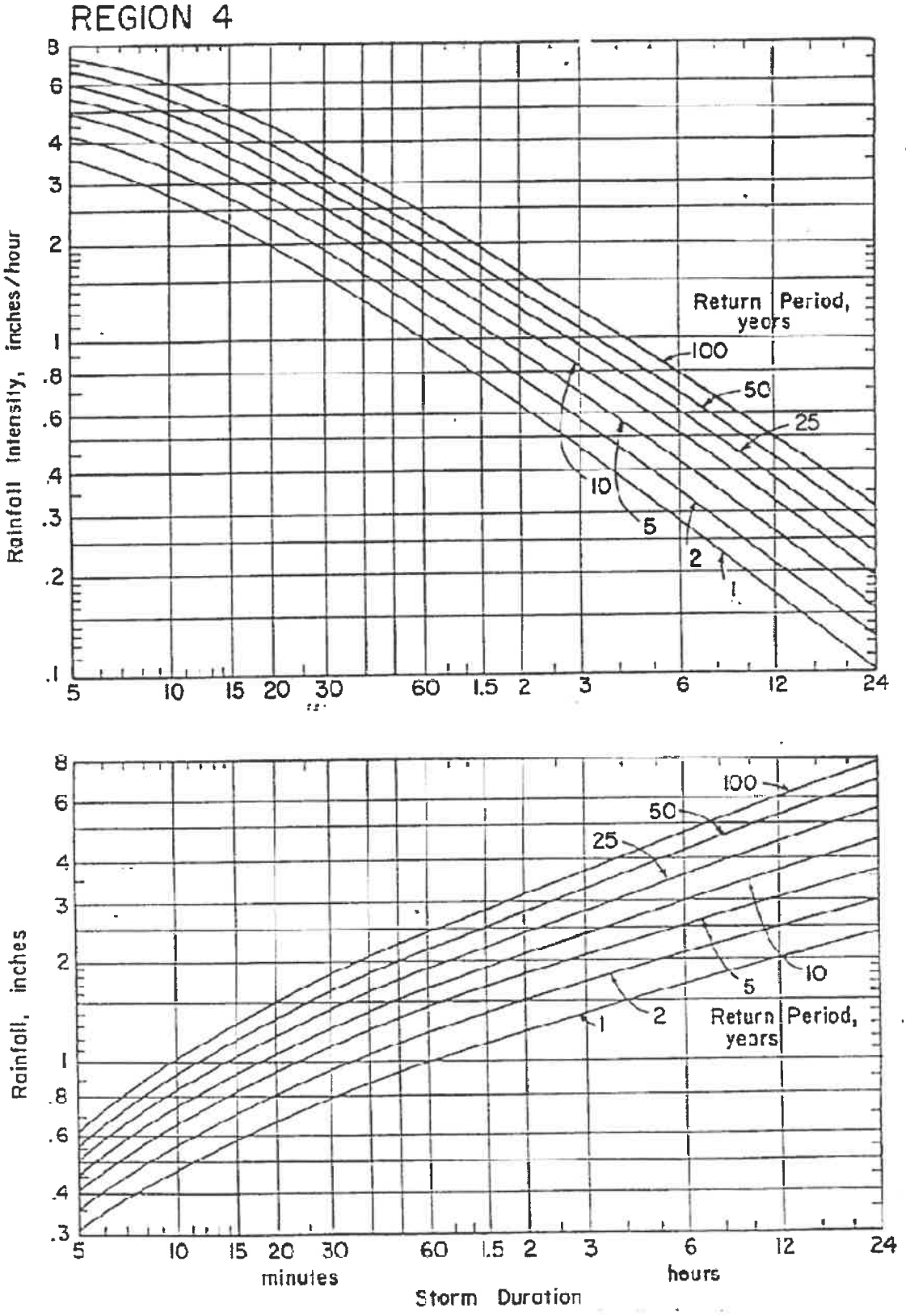


TABLE B-2
Runoff Curve Numbers
(From NRCS (SCS) TR-55)

LAND USE DESCRIPTION		HYDROLOGIC SOIL GROUP A	B	C	D
Open Space		44	65	77	82
Meadow / Orchard		30	58	71	78
Agricultural		59	71	79	83
Forest		36	60	73	79
Commercial	(85% Impervious)	89	92	94	95
Industrial	(72% Impervious)	81	88	91	93
Institutional	(50% Impervious)	71	82	88	90
Residential					
Average Lot Size	% impervious				
1/8 acre or less*	65	77	85	90	92
1/8 - 1/3 acre	34	59	74	82	87
1/3 - 1 acre	23	53	69	80	85
1 - 4 acres	12	46	66	78	82
Farmstead		59	74	82	86
Smooth Surfaces (Concrete, Asphalt, Gravel or Bare Compacted Soil)		98	98	98	98
Water		98	98	98	98
Mining/Newly Graded Areas (Pervious Areas Only)		77	86	91	94

* Includes Multi-Family Housing unless justified lower density can be provided.

Note: Existing site conditions of bare earth or fallow ground shall be considered as meadow when choosing a CN value.

TABLE B-3
RATIONAL RUNOFF COEFFICIENTS
By Hydrologic Soils Group and Overland Slope (%)

Land Use	A			B			C			D		
	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+
Cultivated Land	0.08[a]	0.13	0.16	0.11	0.15	0.21	0.14	0.19	0.26	0.18	0.23	0.31
	0.14[b]	0.18	0.22	0.16	0.21	0.28	0.20	0.25	0.34	0.24	0.29	0.41
Pasture	0.12	0.20	0.30	0.18	0.28	0.37	0.24	0.34	0.44	0.30	0.40	0.50
	0.15	0.25	0.37	0.23	0.34	0.45	0.30	0.42	0.52	0.37	0.50	0.62
Meadow	0.10	0.16	0.25	0.14	0.22	0.30	0.20	0.28	0.36	0.24	0.30	0.40
	0.14	0.22	0.30	0.20	0.28	0.37	0.26	0.35	0.44	0.30	0.40	0.50
Forest	0.05	0.08	0.11	0.08	0.11	0.14	0.10	0.13	0.16	0.12	0.16	0.20
	0.08	0.11	0.14	0.10	0.14	0.18	0.12	0.16	0.20	0.15	0.20	0.25
Residential												
Lot Size 1/8 Acre	0.25	0.28	0.31	0.27	0.30	0.25	0.30	0.33	0.38	0.33	0.36	0.42
	0.33	0.37	0.40	0.35	0.39	0.44	0.38	0.42	0.49	0.41	0.45	0.54
Lot Size 1/4 Acre	0.22	0.26	0.29	0.24	0.29	0.33	0.27	0.31	0.36	0.30	0.34	0.40
	0.30	0.34	0.37	0.33	0.37	0.42	0.36	0.40	0.47	0.38	0.42	0.52
Lot Size 1/3 Acre	0.19	0.23	0.26	0.22	0.26	0.30	0.25	0.29	0.34	0.28	0.32	0.39
	0.28	0.32	0.35	0.30	0.35	0.39	0.33	0.38	0.45	0.36	0.40	0.50
Lot Size 1/2 Acre	0.16	0.20	0.24	0.19	0.23	0.28	0.22	0.27	0.32	0.26	0.30	0.37
	0.25	0.29	0.32	0.28	0.32	0.36	0.31	0.35	0.42	0.34	0.38	0.48
Lot Size 1 Acre	0.14	0.19	0.22	0.17	0.21	0.26	0.20	0.25	0.31	0.24	0.29	0.35
	0.22	0.26	0.29	0.24	0.28	0.34	0.28	0.32	0.40	0.31	0.35	0.46
Industrial	0.67	0.68	0.68	0.68	0.68	0.69	0.68	0.69	0.69	0.69	0.69	0.70
	0.85	0.85	0.86	0.85	0.86	0.86	0.86	0.86	0.87	0.86	0.86	0.88
Commercial	0.71	0.71	0.72	0.71	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
	0.88	0.88	0.89	0.89	0.89	0.89	0.89	0.89	0.90	0.89	0.89	0.90
Streets	0.70	0.71	0.71	0.71	0.72	0.74	0.72	0.73	0.76	0.73	0.75	0.78
	0.76	0.77	0.79	0.80	0.82	0.84	0.84	0.85	0.89	0.89	0.91	0.95
Open Space	0.05	0.10	0.14	0.08	0.13	0.19	0.12	0.17	0.24	0.16	0.21	0.28
	0.11	0.16	0.20	0.14	0.19	0.26	0.18	0.23	0.32	0.22	0.27	0.39
Parking	0.85	0.86	0.87	0.85	0.86	0.87	0.85	0.86	0.87	0.85	0.86	0.87
	0.95	0.96	0.97	0.95	0.96	0.97	0.95	0.96	0.97	0.95	0.96	0.97

[a] Runoff coefficients for storm recurrence intervals less than 25 years.

[b] Runoff coefficients for storm recurrence intervals of 25 years or more.

Source : Rawls, W.J., S.L. Wong and R.H. McCuen, 1981, "Comparison of Urban Flood Frequency Procedures", Preliminary Draft, U.S. Department of Agriculture, Soil Conservation Service, Baltimore, MD.

TABLE B-4

Roughness Coefficients (Manning's "n") For Overland Flow (U.S. Army Corps Of Engineers, HEC-1 Users Manual)

Surface Description	n		
Dense Growth	0.4	-	0.5
Pasture	0.3	-	0.4
Lawns	0.2	-	0.3
Bluegrass Sod	0.2	-	0.5
Short Grass Prairie	0.1	-	0.2
Sparse Vegetation	0.05	-	0.13
Bare Clay-Loam Soil (eroded)	0.01	-	0.03
Concrete/Asphalt - very shallow depths (less than 1/4 inch)	0.10	-	0.15
- small depths (1/4 inch to several inches)	0.05	-	0.10

Roughness Coefficients (Manning's "n") For Channel Flow

Reach Description	n
Natural stream, clean, straight, no rifts or pools	0.03
Natural stream, clean, winding, some pools or shoals	0.04
Natural stream, winding, pools, shoals, stony with some weeds	0.05
Natural stream, sluggish deep pools and weeds	0.07
Natural stream or swale, very weedy or with timber underbrush	0.10
Concrete pipe, culvert or channel	0.012
Corrugated metal pipe	0.012-0.027(1)
High Density Polyethylene (HDPE) Pipe	
Corrugated	0.021-0.029(2)
Smooth Lined	0.012-0.020(2)

(1) Depending upon type, coating and diameter
(2) Values recommended by the American Concrete Pipe Association, check Manufacturer's recommended value.

TABLE B-5

INFILTRATION REQUIREMENTS IN CARBONATE AREAS

Effective Soil Thickness (ft.)	Test Pit Density (per acre of proposed infiltration area)*	Percolation Tests (per acre of proposed infiltration area)**	Auger Grid Spacing (Feet On-Center)
8	4	8	50
4 to 8	6	12	35
2 to 4	8	16	25

*No. of Test Pits required = Infiltration sq. ft./43,560 x test pit density from chart rounded up to the nearest whole number

**No. of Percolation Tests required = Infiltration sq. ft./43,560 x percolation tests from chart rounded up to the nearest whole number

ORDINANCE APPENDIX C
DRAINAGE PLAN APPLICATION

(To be attached to the "land subdivision plan or development plan review application or "minor land subdivision plan review application")

Application is hereby made for review of the Stormwater Management and Erosion and Sedimentation Control Plan and related data as submitted herewith in accordance with the _____Township Stormwater Management and Earth Disturbance Ordinance.

_____Final Plan _____Preliminary Plan _____Sketch Plan

Date of Submission _____Submission No._____

1. Name of subdivision or development_____

2. Name of Applicant _____ Telephone No._____

   (if corporation, list the corporation's name and the names of two officers of the corporation)
   _____Officer 1
   _____Officer 2

   Address_____
   Zip_____

   Applicants interest in subdivision or development
   (if other than property owner give owners name and address)

3. Name of property owner _____Telephone No._____

   Address_____
   Zip_____

4. Name of engineer or surveyor _____Telephone No._____

   Address_____
   Zip_____

5. Type of subdivision or development proposed:

____ Single-Family Lots	____ Townhouses	____ Commercial (Multi-Lot)
____ Two Family Lots	____ Garden Apartments	____ Commercial (One-Lot)
____ Multi-Family Lots	____ Mobile-Home Park	____ Industrial (Multi-Lot)
____ Cluster Type Lots	____ Campground	____ Industrial (One-Lot)
____ Planned Residential Development	____ Other (_____)	

6. Lineal feet of new road proposed_____ L.F.

7. Area of proposed and existing impervious area on entire tract.

   a. Existing (to remain) _____ S.F. _____% of Property
   b. Proposed _____ S.F. _____% of Property

8. Stormwater

   a. Does the peak rate of runoff from proposed conditions exceed that flow which occurred for existing conditions for the designated design storm?_____

   b. Design storm utilized (on-site conveyance systems) (24 hr.)_____
   No. of Subarea_____
   Watershed Name_____

   Explain:_____
   _____
   _____

   c. Does the submission and/or district meet the release rate criteria for the applicable subarea?
   _____

   d. Number of subarea(s) from Ordinance Appendix D of the Maiden Creek Watershed Stormwater Management Plan._____

   e. Type of proposed runoff control_____

   f. Does the proposed stormwater control criteria meet the requirement/guidelines of the Stormwater Ordinances?_____

   If not, what variances/waivers are requested?_____
   _____

   Reasons_____

   f. Does the plan meet the requirements of Article iii of the Stormwater Ordinances?____

   If not, what variances/waivers are requested?_____

   Reasons Why _____
   _____

   h. Was TR-55, June 1986 utilized in determining the time of concentration?_____
   _____

   i. What hydrologic method was used in the stormwater computations?_____
   _____

j. Is a hydraulic routing through the stormwater control structure submitted?_____
_____

k. Is a construction schedule or staging attached?_____

l. Is a recommended maintenance program attached?_____

9. Erosion and Sediment Pollution Control (E&S):

a. Has the stormwater management and E&S plan, supporting documentation and narrative been submitted to the _____Berks_____County Conservation District?_____

b. Total area of earth disturbance _____S.F.

10. Wetlands

a. Have the wetlands been delineated by someone trained in wetland delineation?_____

b. Have the wetland lines been verified by a state or federal permitting authority?_____

c. Have the wetland lines been surveyed?_____

d. Total acreage of wetland within the property _____

e. Total acreage of wetland disturbed_____

f. Supporting documentation_____

11. Filing

a. Has the required fee been submitted?_____

Amount_____

b. Has the proposed schedule of construction inspection to be performed by the Applicant's engineer been submitted?_____

c. Name of individual who will be making the inspections_____

d. General comments about stormwater management at the development_____
_____
_____

CERTIFICATE OF OWNERSHIP AND ACKNOWLEDGMENT OF APPLICATION:

COMMONWEALTH OF PENNSYLVANIA
COUNTY OF BERKS

On this the _____ day of _____, 20_____, before me, the undersigned officer, personally appeared _____who being duly sworn, according to law, deposes and says that _____owners of the property described in this application and that the application was made with _____ knowledge and/or direction and does hereby agree with the said application and to the submission of the same.

_____Property Owner

My Commission Expires_____20_____
Notary Public_____

THE UNDERSIGNED HEREBY CERTIFIES THAT TO THE BEST OF HIS KNOWLEDGE AND BELIEF THE INFORMATION AND STATEMENTS GIVEN ABOVE ARE TRUE AND CORRECT.

SIGNATURE OF APPLICANT_____

//

(Information Below This Line To Be Completed By The Municipality)

_____ (Name of) Municipality official submission receipt:

Date complete application received _____Plan Number_____

Fees _____ date fees paid _____ received by_____

Official submission receipt date _____

Received by_____

_____
Municipality

ORDINANCE APPENDIX D
STORMWATER MANAGEMENT DISTRICT
WATERSHED MAP

MAIDEN CREEK WATERSHED
ACT 167 STORMWATER MANAGEMENT PLAN

LOCATION MAP

Management District Legend

District	Equivalent Release Rate	Design Storm Proposed Conditions		Design Storm Existing Conditions
A	-	2-Year	Reduce To	1-Year
	100 %	5-Year		5-Year
	100 %	10-Year		10-Year
	100 %	25-Year		25-Year
	100 %	100-Year		100-Year
B1	-	2-Year	Reduce To	1-Year
	75 %	10-Year		5-Year
	75%	25-Year		10-Year
	100%	50-Year		25-Year
		100-Year		100-Year
B2	-	2-Year	Reduce To	1-Year
	30 %	5-Year		2-Year
	60%	25-Year		5-Year
	50%	50-Year		10-Year
	100%	100-Year		100-Year
B3	-	2-Year	Reduce To	1-Year
	30%	5-Year		2-Year
	75%	10-Year		5-Year
	75%	50-Year		25-Year
	100%	100-Year		100-Year
C*	*100% Release Rate			

N

WEST PENN
HEIDELBERG
LYNN
ALBANY
WEISENBERG
SCHUYLKILL COUNTY
BERKS COUNTY
LEHIGH COUNTY
BERKS COUNTY
LEHIGHTSVILLE
GREENWICH
WINDSOR
KUTZTOWN
PERRY
RICHMOND
MAXATAWNY
LYONS
MAIDENCREEK
FLEETWOOD
ROCKLAND
ONTELAUNEE
RUSCOMBMANOR
ALSACE

A
B1
B2
B2
B3
C
B2

1 0.5 0 1 2 3
Miles

ORDINANCE APPENDIX D MANAGEMENT DISTRICTS

Prepared For:
Berks County Planning Commission
County Services Center
633 Court Street
Reading, PA 19601
610-478-6300

Map Legend

- WATERSHED BOUNDARY
- STREAMS
- WATER BODIES
- COUNTY BOUNDARIES
- MUNICIPAL BOUNDARIES
- HIGHWAYS
- OTHER ROADS
- RAILROADS
- SUBWATERSHEDS
- LIMESTONE

NOTE:
Portions of this map were generated from existing data sources as listed below. This data is shown on the maps for spatial reference only. This data did not enter into any computations or affect the reliability of the hydrologic analysis. Borton-Lawson Engineering has found some inaccuracies in some of this data and has corrected the data in locations where discrepancies were obvious, however, it was not a part of this ACT 167 Plan to correct all of the mapping data.

DATA SOURCES
Watershed Boundary - PADEP/ Modified by Borton-Lawson
Streams - PaDEP
Lakes - US Fish and Wildlife Service (Extracted from NVI Coverages)
Roads - Berks Co. & Lehigh Valley Planning Commissions, PennDOT
Railroads - Berks Co. & Lehigh Valley Planning Commissions
Counties - Berks County Planning Commission
Municipalities - Berks Co. & Lehigh Valley Planning Commissions, PennDOT
Management Districts - Borton-Lawson

Borton Lawson ENGINEERING

Corporate Office
613 Baltimore Drive
Wilkes-Barre, PA 18702
Tel: 570-821-1999

Lehigh Valley Office
6614 Chrisphalt Drive
Bath, PA 18014
Tel: 610-837-5915

PREPARED BY: SJD CHECKED BY

DATE: 10/28/2005 PROJECT NO. 2003-1349-C1

FILE: W:\Data\Projects\2003\1349\DATA\Maiden Creek Watershed\App D Management Districts.mxd

ORDINANCE APPENDIX E
LOW IMPACT DEVELOPMENT (LID) PRACTICES

ALTERNATIVE APPROACH FOR MANAGING STORMWATER RUNOFF

Natural hydrologic conditions may be altered radically by poorly planned development practices, such as introducing unneeded impervious surfaces, destroying existing drainage swales, constructing unnecessary storm sewers, and changing local topography. A traditional drainage approach of development has been to remove runoff from a site as quickly as possible and capture it in a detention basin. This approach leads ultimately to the degradation of water quality as well as expenditure of additional resources for detaining and managing concentrated runoff at some downstream location.

The recommended alternative approach is to promote practices that will minimize proposed condition runoff rates and volumes, which will minimize needs for artificial conveyance and storage facilities. To simulate predevelopment hydrologic conditions, infiltration is often necessary to offset the loss of infiltration by creation of impervious surfaces. The ability of the ground to infiltrate depends upon the soil types and its conditions.

Preserving natural hydrologic conditions requires careful alternative site design considerations. Site design practices include preserving natural drainage features, minimizing impervious surface area, reducing the hydraulic connectivity of impervious surfaces, and protecting natural depression storage. A well-designed site will contain a mix of all those features. The following describes various techniques to achieve the alternative approach:

- **Preserving Natural Drainage Features**. Protecting natural drainage features, particularly vegetated drainage swales and channels, is desirable because of their ability to infiltrate and attenuate flows and to filter pollutants. However, this objective is often not accomplished in land development. In fact, commonly held drainage philosophy encourages just the opposite pattern -- streets and adjacent storm sewers typically are located in the natural headwater valleys and swales, thereby replacing natural drainage functions with a completely impervious system. As a result, runoff and pollutants generated from impervious surfaces flow directly into storm sewers with no opportunity for attenuation, infiltration, or filtration. Developments designed to fit site topography also minimizes the amount of grading on site.

- **Protecting Natural Depression Storage Areas**. Depressional storage areas have no surface outlet, or drain very slowly following a storm event. They can be commonly seen as ponded areas in farm fields during the wet season or after large runoff events. Traditional development practices eliminate these depressions by filling or draining, thereby obliterating their ability to reduce surface runoff volumes and trap pollutants.

The volume and release-rate characteristics of depressions should be protected in the design of the development site. The depressions can be protected by simply avoiding the depression or by incorporating its storage as additional capacity in required detention facilities.

- **Avoiding introduction of impervious areas**. Careful site planning should consider reducing impervious coverage to the maximum extent possible. Building footprints, sidewalks, driveways and other features producing impervious surfaces should be evaluated to minimize impacts on runoff.

- **Reducing the Hydraulic Connectivity of Impervious Surfaces**. Impervious surfaces are significantly less of a problem if they are not directly connected to an impervious conveyance system (such as storm sewer). Two basic ways to reduce hydraulic connectivity are routing of roof runoff over lawns and reducing the use of storm sewers. Site grading should promote increasing travel time of stormwater runoff, and should help reduce concentration of runoff to a single point in the development.

- **Routing Roof Runoff Over Lawns**. Roof runoff can be easily routed over lawns in most site designs. The practice discourages direct connections of downspouts to storm sewers or parking lots. The practice also discourages sloping driveways and parking lots to the street. By routing roof drains and crowning the driveway to run off to the lawn, the lawn is essentially used as a filter strip.

- **Reducing the Use of Storm Sewers**. By reducing use of storm sewers for draining streets, parking lots, and back yards, the potential for accelerating runoff from the development can be greatly reduced. The practice requires greater use of swales and may not be practical for some development sites, especially if there are concerns for areas that do not drain in a "reasonable" time. The practice requires educating local citizens and public works officials, who expect runoff to disappear shortly after a rainfall event.

- **Reducing Street Widths**. Street widths can be reduced by either eliminating on-street parking or by reducing roadway widths. Municipal planners and traffic designers should encourage narrower neighborhood streets which ultimately could lower maintenance.

- **Limiting Sidewalks to One Side of the Street**. A sidewalk on one side of the street may suffice in low-traffic neighborhoods. The lost sidewalk could be replaced with bicycle/recreational trails that follow back-of-lot lines. Where appropriate, backyard trails should be constructed using pervious materials.

- **Using Permeable Paving Materials**. These materials include permeable interlocking concrete paving blocks or porous bituminous concrete. Such materials should be considered as alternatives to conventional pavement surfaces, especially for

low use surfaces such as driveways, overflow parking lots, and emergency access roads.

- **Reducing Building Setbacks**. Reducing building setbacks reduces driveway and entry walks and is most readily accomplished along low-traffic streets where traffic noise is not a problem.

- **Constructing Cluster Developments**. Cluster developments can also reduce the amount of impervious area for a given number of lots. The biggest savings is in street length, which also will reduce costs of the development. Cluster development clusters the construction activity onto less-sensitive areas without substantially affecting the gross density of development.

In summary, a careful consideration of the existing topography and implementation of a combination of the above mentioned techniques may avoid construction of costly stormwater control measures. Other benefits include reduced potential of downstream flooding, water quality degradation of receiving streams/water bodies and enhancement of aesthetics and reduction of development costs. Beneficial results include more stable baseflows in receiving streams, improved groundwater recharge, reduced flood flows, reduced pollutant loads, and reduced costs for conveyance and storage.

ORDINANCE APPENDIX F
REFERENCES

BMP Manuals

California
California Stormwater BMP Handbook: New Development and Redevelopment (January 2003) – separate file available at http://www.cabmphandbooks.org/Development.asp
Georgia
Georgia Stormwater Management Manual Volume 2: Technical Handbook (August 2001) separate file (http://www.georgiastormwater.com/)
Maryland
2000 Maryland Stormwater Design Manual – http://www.mde.state.md.us/Programs/Waterprograms/SedimentandStormwater/stormwaterdesign/index.asp
Massachusetts
Stormwater Management, Volume Two: Stormwater Technical Handbook (Massachusetts, 1997) – separate file available at http://www.state.ma.us/dep/brp/stormwtr/stormpub.htm
Minnesota
Minnesota Urban Small Sites BMP Manual: Stormwater Best Management Practices for Cold Climates (July 2001) – http://www.metrocouncil.org/environment/Watershed/BMP/manual.htm
New Jersey
Revised Manual for New Jersey: Best Management Practices for Control of Non-point Source Pollution from Stormwater (Fifth Draft May 2000) – http://www.state.nj.us/dep/watershedmgt/bmpmanual.htm
New York
New York State Stormwater Management Design Manual (2001) – http://www.dec.state.ny.us/website/dow/swmanual/swmanual.html
Pennsylvania
Pennsylvania Association of Conservation Districts, Pennsylvania Handbook of Best Management Practices for Developing Areas, November 14, 1997.
Washington
Stormwater Management Manual for Western Washington (August 2001) – http://www.ecy.wa.gov/programs/wq/stormwater/manual.html
Federal
Stormwater Best Management Practices in an Ultra-Urban Setting: Selection and Monitoring (FHWA) – http://www.fhwa.dot.gov/environment/ultraurb/3fs1.htm
USEPA Infiltration Trench Fact Sheet (September 1999) – http://cfpub.epa.gov/npdes/stormwater/menuofbmps/post.cfm

Riparian Buffer References

Alliance for the Chesapeake Bay, Pennsylvania Department of Environmental Protection, September 2000. *Forest Buffer Toolkit*, Stream ReLeaf Program.

Penn State College of Agricultural Sciences, 1996. *Establishing Vegetative Buffer Strips Along Streams to Improve Water Quality.* Publication # AGRS-67.

Fike, Jean, June 1999. *Terrestrial & Palustrine Plant Communities of Pennsylvania,* Pennsylvania Natural Diversity Inventory, The Nature Conservancy, Western

Pennsylvania Conservancy, and Pennsylvania Department of Conservation and Natural Resources.

Pennsylvania Association of Conservation Districts, Inc., Keystone Chapter, Soil and Water Conservation Society, Pennsylvania Department of Environmental Protection, Natural Resources Conservation Service, 1998. P*ennsylvania Handbook of Best Management Practices for Developing Areas.* Prepared by CH2MHill.

Palone, R. S. and A. H. Todd (eds), 1997. *Chesapeake Bay Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers.* Chesapeake Bay Program and Northeastern Area State and Private Forestry. Natural Resources Conservation Service Cooperative State Research Education and Extension Services.

The Federal Interagency Stream Restoration Working Group (FISRWG, 10/1998). Stream Corridor Restoration Principles, Processes, and Practices. GPO Item No. 0120-A; SuDocs No. A57.6/2:EN3/PT.653. ISBN-0-934213-59-3. Published October 1998. Revised August 2000.

ORDINANCE APPENDIX G
West Nile Virus Guidance

(This source is from the Monroe County, PA Conservation District who researched the potential of West Nile Virus problems from BMPs due to a number of calls they were receiving)

Monroe County Conservation District Guidance:
Stormwater Management and West Nile Virus
Source: Brodhead McMichaels Creeks Watershed Act 167 Stormwater Management Ordinance Final Draft 2/23/04

The Monroe County Conservation District recognizes the need to address the problem of non-point source pollution impacts caused by runoff from impervious surfaces. The new stormwater policy being integrated into Act 167 Stormwater Management regulations by the PA Department of Environmental Protection (DEP) will make non-point pollution controls an important component of all future plans and updates to existing plans. In addition, to meet post-construction anti-degradation standards under the state National Pollution Discharge Elimination System (NPDES) permitting program, applicants will be required to employ Best Management Practices (BMPs) to address non-point pollution concerns.

Studies conducted throughout the United States have shown that wet basins and in particular constructed wetlands are effective in traditional stormwater management areas such as channel stability and flood control, and are one of the most effective ways to remove stormwater pollutants (United States Environmental Protection Agency 1991, Center for Watershed Protection 2000). From Maryland to Oregon, studies have shown that as urbanization and impervious surface increase in a watershed, the streams in those watersheds become degraded (CWP 2000). Although there is debate over the threshold of impervious cover when degradation becomes apparent (some studies show as little as 6% while others show closer to 20%), there is agreement that impervious surfaces cause non-point pollution in urban and urbanizing watersheds, and that degradation is ensured if stormwater BMPs are not implemented.

Although constructed wetlands and ponds are desirable from a water quality perspective there may be concerns about the possibility of these stormwater management structures becoming breeding grounds for mosquitoes. The Conservation District feels that although it may be a valid concern, **municipalities should not adopt ordinance provisions prohibiting wet basins for stormwater management.**

Mosquitoes

The questions surrounding mosquito production in wetlands and ponds have intensified in recent years by the outbreak of the mosquito-borne West Nile Virus. As is the case with all vector-borne maladies, the life cycle of West Nile Virus is complicated, traveling from mosquito to bird, back to mosquito and then to other animals including humans. *Culex pipiens* was identified as the vector species in the first documented cases from New York in 1999. This species is still considered the primary transmitter of the disease across its range. Today there are some 60 species of mosquitoes that inhabit Pennsylvania.

Along with *C. pipiens*, three other species have been identified as vectors of West Nile Virus while four more have been identified as potential vectors.

The four known vectors in NE Pennsylvania are *Culex pipiens*, *C. restuans*, *C. salinarius* and *Ochlerotatus japonicus*. All four of these species prefer, and almost exclusively use, artificial containers (old tires, rain gutters, birdbaths, etc.) as larval habitats. In the case of *C. pipiens*, the most notorious of the vector mosquitoes, the dirtier the water the better they like it. The important factor is that these species do not thrive in functioning wetlands where competition for resources and predation by larger aquatic and terrestrial organisms is high.

The remaining four species, *Aedes vexans*, *Ochlerotatus Canadensis*, *O. triseriatus* and *O. trivittatus* are currently considered potential vectors due to laboratory tests (except the *O. trivittatus*, which did have one confirmed vector pool for West Nile Virus in PA during 2002). All four of these species prefer vernal habitats and ponded woodland areas following heavy summer rains. These species may be the greatest threat of disease transmission around stormwater basins that pond water for more than four days. This can be mitigated however by establishing ecologically functioning wetlands.

Stormwater Facilities

If a stormwater wetland or pond is constructed properly and a diverse ecological community develops, mosquitoes should not become a problem. Wet basins and wetlands constructed as stormwater management facilities, should be designed to attract a diverse wildlife community. If a wetland is planned, proper hydrologic soil conditions and the establishment of hydrophytic vegetation will promote the population of the wetland by amphibians and other mosquito predators. In natural wetlands, predatory insects and amphibians are effective at keeping mosquito populations in check during the larval stage of development while birds and bats prey on adult mosquitoes.

The design of a stormwater wetland must include the selection of hydrophytic plant species for their pollutant uptake capabilities and for not contributing to the potential for vector mosquito breeding. In particular, species of emergent vegetation with little submerged growth are preferable. By limiting the vegetation growing below the water surface, larvae lose protective cover and there is less chance of anaerobic conditions occurring in the water.

Stormwater ponds can be designed for multiple purposes. When incorporated into an open space design a pond can serve as a stormwater management facility and a community amenity. Aeration fountains and stocked fish should be added to keep larval mosquito populations in check.

Publications from the PA Department of Health and the Penn State Cooperative Extension concerning West Nile Virus identify aggressive public education about the risks posed by standing water in artificial containers (tires, trash cans, rain gutters, bird baths) as the most effective method to control vector mosquitoes.

Conclusion

The Conservation District understands the pressure faced by municipalities when dealing with multifaceted issues such as stormwater management and encourages the incorporation of water quality management techniques into stormwater designs. As Monroe County continues to grow, conservation design, groundwater recharge and constructed wetlands and ponds should be among the preferred design options to reduce the impacts of

increases in impervious surfaces. When designed and constructed appropriately, the runoff mitigation benefits to the community from these design options will far out weigh their potential to become breeding grounds for mosquitoes.

ORDINANCE APPENDIX H

Stormwater Management Practices for projects which are exempt under Section 402 of this Ordinance.

STORMWATER MANAGEMENT PROCEDURES
FOR PROJECTS MEETING THE LAND COVER EXEMPTION CRITERIA

What are the Act 167 Stormwater Management Requirements?

Pennsylvania Act 167 was authorized on October 4, 1978 (32 P.S., P.L. 864) and gave Pennsylvania Municipalities the power to regulate activities that affect stormwater runoff, surface and groundwater quantity and quality.

Who is affected by these requirements?

The Act 167 Stormwater Management Requirements affect all NEW development in the Maiden Creek watershed. Individual home construction projects on single family lots which result are exempt under Section 402 of this Ordinance, are not required to submit formal drainage plans to the Municipality or County; however, they are still encouraged to address Water Quality and Groundwater Recharge criteria specified in the Maiden Creek Watershed Stormwater Ordinance (Ord. Sections 305 and 306).

Do I require professional services to meet these requirements?

This brochure has been developed to assist the individual homeowner in meeting the voluntary water quality and groundwater recharge goals of the Maiden Creek Watershed Stormwater Ordinance. If the guidelines presented in this brochure are followed, the individual homeowner will not require professional services to comply with these water quality and groundwater recharge.

What do I need to Send to the Municipality?

Even though a formal drainage plan is not required for individual lot owners, a brief description of the proposed infiltration facilities, including types of material to be used, total impervious areas and volume calculations as shown above, and a simple sketch plan showing the following information shall be submitted to the contractor prior to construction:

- Location of proposed structures, driveways or other paved areas with approximate size in square feet.
- Location of any existing or proposed on site septic system and/or potable water wells showing rough proximity to infiltration facilities.

Determination of Recharge Volume

The amount of recharge volume that should be provided can be determined by following the simple steps below. Impervious area calculations should include all areas on the individual lots that are covered by roof area or pavement which would prevent rain for naturally

percolating into the ground, including sidewalks, driveways or parking areas. Sidewalks, driveways or patios that are constructed with gravel or turf pavers and will not be blacktopped in the future, need not be included in this calculation.

Example Recharge Volume:

STEP 1 – Determine Total Impervious Surfaces:

House Roof (Front)	12 ft x 48 ft	=	576 sq. ft
House Roof (Rear)	12 ft x 48 ft	=	576 sq. ft.
Driveway	12 ft x 50 ft	=	600 sq. ft.
Parking Pad	12 ft x 12 ft	=	144 sq. ft.
Walkway	6 ft x 20 ft	=	120 sq. ft.

			2,016 sq. ft.

STEP 2 – Determine Require Infiltration Volume (Rv) Using the Following Equation

Rv = 1 inch x (total impervious area in square feet) = _____ cubic feet of recharge

Rv = 1.0 x 2,016 sq. ft. = 2,016 cu. ft.

STEP 3 – Sizing of Select Infiltration Method

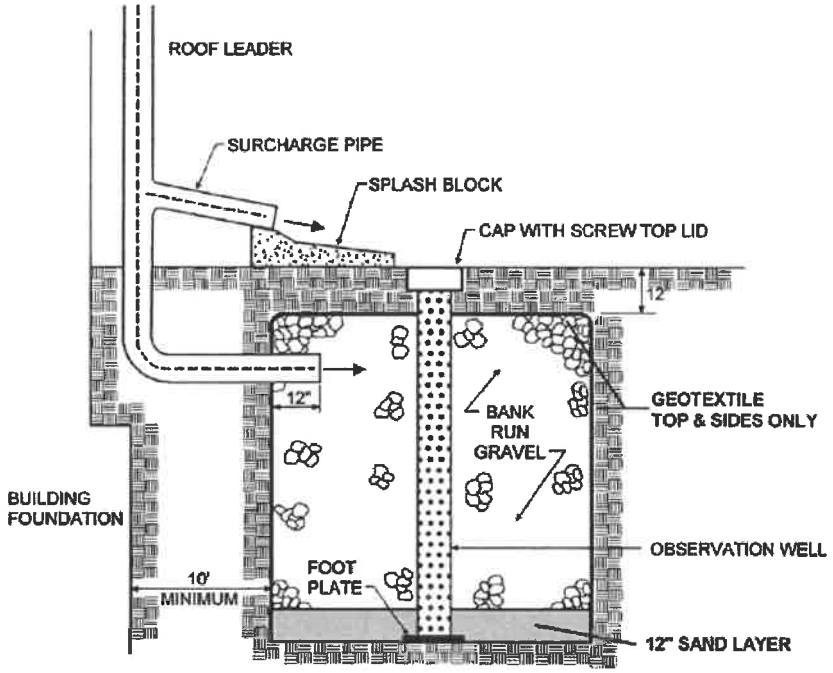
The following pages show several methods of infiltrating stormwater runoff from residential areas. Their appropriateness depends on the amount of infiltration volume required and the amount of land available. More than one method can be implemented on a site, depending on site constraints. Dry wells should be used only for receiving runoff from roof drains. Infiltration trenches are appropriate for receiving runoff from driveways, sidewalk or parking areas. Other methods may be appropriate, but these should be discussed with the municipal engineer prior to installation.

Dry Wells

Dry wells are effective methods of infiltrating runoff from roof leaders. These facilities should be located a minimum of 10 feet from the building foundation to avoid seepage problems. A dry well can be either a structural prefabricated chamber or an excavated pit filled with aggregate. Construction of a dry well should be performed after all other areas of the site are stabilized, to avoid clogging. During construction, compaction of the subgrade soil should be avoided and construction should be performed with only light machinery. Depth of dry wells in excess of 3 ½ feet should be avoided. Gravel fill should be an average 1.5 – 3.0 inches in diameter. Dry wells should be inspected at least four times annually as well as after large storm events.

FIGURE H-1

TYPICAL DRY WELL CONFIGURATION



Source: Maryland Stormwater Design Manual, 2000

Example Sizing:

STEP 1 – Determine Total Impervious Surfaces

House Roof Area: 12 ft x 48 ft = 576 sq. feet

STEP 2 – Determine Require Infiltration Volume using Equation

1.0 x 576 sq. ft. = 576 cu. ft.

STEP 3 – Sizing of Select Infiltration Method

Volume of facility = Depth x Width x Length

Set D = 3.5 ft; Set W = L for a square chamber

576 cu. ft. = 3.5 x L X L ; L = 10 ft

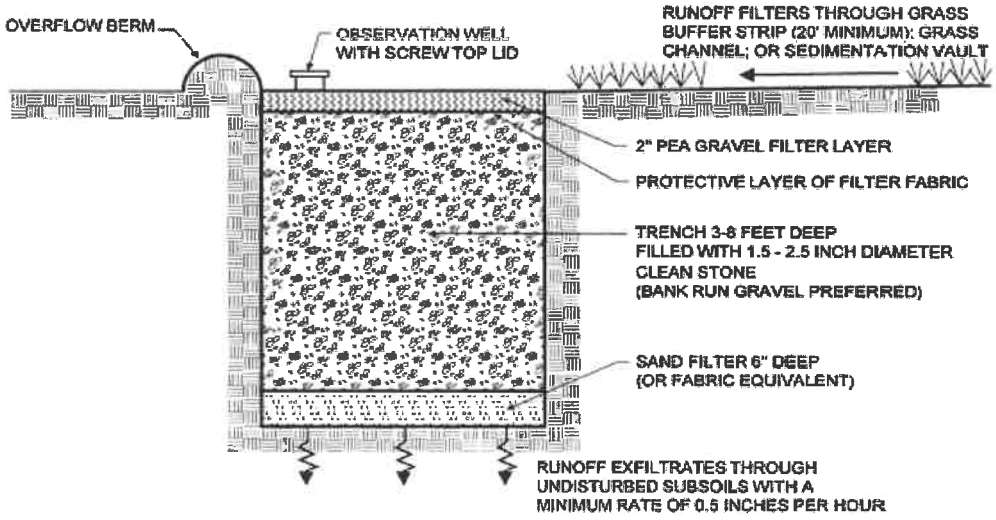
Final Facility Dimensions: 3.5 ft (D) x 12.8 ft (W) x 12.8 ft (L)

Infiltration Trenches

An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. Runoff is stored in the void space between the stones and infiltrates through the bottom and into the soil matrix. Infiltration trenches perform well for removal of fine sediment and associated pollutants. Pretreatment using buffer strips, swales, or detention basins is important for limiting amounts of coarse sediment entering the trench which can clog and render the trench ineffective.

FIGURE H-2

TYPICAL INFILTRATION TRENCH CONFIGUATION



Source: Maryland Stormwater Design Manual, 2000

Example Sizing:

STEP 1 – Determine Total Impervious Surfaces

Driveway	12 ft x 50 ft	=	600 sq. ft.
Parking Pad	12 ft x 12 ft	=	144 sq. ft.
Walkway	6 ft x 20 ft	=	120 sq. ft.
			----------
			864 sq. ft.

STEP 2 – Determine Require Infiltration Volume using Equation

1.0 inch x 864 sq. ft. = 864 cu. ft.

STEP 3 – Sizing of Select Infiltration Method

Volume of facility = Depth x Width x Length

Set D = 3.5 ft; Determine Required Surface Area of Trench

864 cu. ft. / 3.5 ft. = 247 sq. ft.

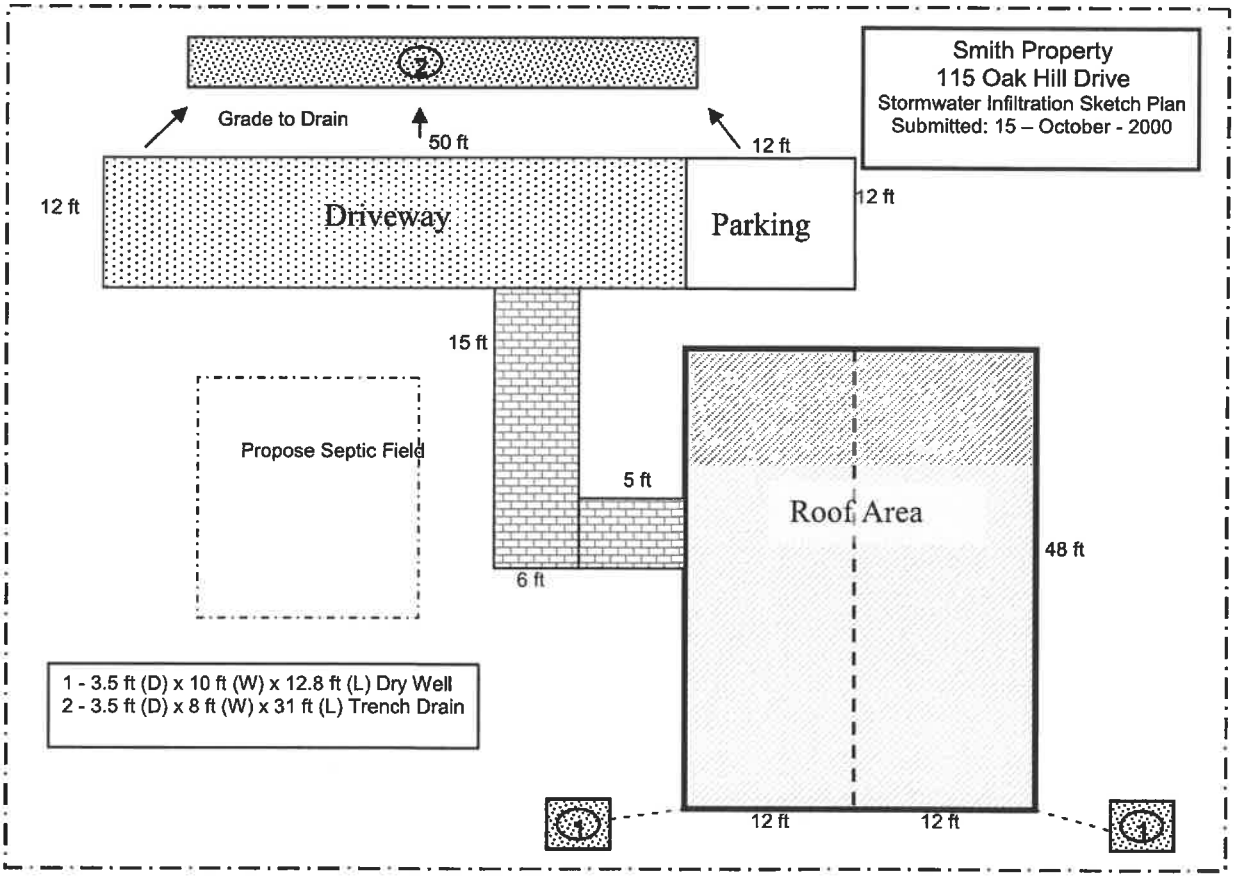
The width of the trench should be greater than 2 times it depth (2 x D); therefore in this example a trench width of 8 feet is selected;

Determine trench length: L = 247 sq. ft / 8 ft = 30.8 ft, say 31 ft.

Final Trench Dimensions: 3.5 ft (D) 8 ft (W) x 31 ft (L)

FIGURE H-3

SAMPLE SITE SKETCH PLAN



4.0 Construction Site Stormwater Runoff Control Program

4.1 Description

MCM #4 requires the MS4 municipality to:

4.1.1 If an NPDES permit is required for earth disturbance activities, do not issue a building permit or approval until confirmation that a valid NPDES permit is obtained.

4.1.2 Notify DEP or Berks County Conservation District within 5 days of the receipt of an application for a permit involving an earth disturbance activity consisting of one acre or more.

4.1.3 Enact, implement, and enforce an ordinance to require the implementation of erosion and sediment control BMPs, as well as sanctions to ensure compliance.

4.2 Memorandum of Understanding

Maidencreek Township has entered into an agreement with Berks County Conservation District (BCCD), via the Memorandum of Understanding (MOU) in Appendix H, which addresses items 1 and 2, above.

4.3 Records Retention

The Township will retain all correspondence from BCCD as part of this SWMP. Copies of all permits, inspections, complaints and any relevant stormwater information will also be retained as part of this SWMP. Permit-year copies of this correspondence appear in Appendix I.

4.4 Ordinance Adoption

Maidencreek Township adopted its Stormwater Management Ordinance, Ordinance Number 214, on June 12, 2008. The ordinance requires compliance with 25 PA Code, Chapter 102, regarding erosion and sediment control and NPDES permit requirements. Any ordinance updates will be properly advertised.

4.5 Plan Maintenance

Maidencreek Township will review and revise this Plan annually, as MOU provisions may change and ordinances are updated periodically.

APPENDIX I

MCM #4 – CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

BERKS COUNTY CONSERVATION DISTRICT/MAIDENCREEK TOWNSHIP MEMORANDUM OF UNDERSTANDING

MEMORANDUM OF UNDERSTANDING

Between the

BERKS COUNTY CONSERVATION DISTRICT

and

Maidencreek Township

Received
FEB 27 2017
Berks County
Conservation District

This Memorandum has been prepared jointly and agreed upon by each party for the following purposes:

To serve as a joint commitment by the signatory parties to control accelerated erosion and to prevent sediment pollution to the Waters of the Commonwealth which may result from the conduct of earth disturbance activities in Maidencreek Township ("Municipality").

I. In carrying out the intent of this Memorandum, the Berks County Conservation District ("District") shall:

1. Provide the Municipality with District project application packets and promptly notify Municipality of any changes in the plan review fee schedule.

2. Receive and review all Erosion and Sedimentation Control Plans ("E&S Plan" or "Plan") for earth disturbance activities 5,000 square feet or greater, which are required to be written in accordance with Chapter 102.4 of the PA Code.

3. Within ten (10) working days of completion of review, notify the consultant, the applicant, the Municipality, and the municipal engineer of all E&S Plan/NPDES Permit approvals, deficiencies, and all determinations including all project inspection reports and valid complaint inspection reports. Providing this information supports the Municipality with respect to Municipality's MS4 reporting requirements as required to satisfy Minimum Control Measure #4 related to services provided under this Memorandum.

4. Notify the consultant, the applicant, and the Municipality that a Plan submission has been returned based on either the lack of response within the specified time period or the lack of the development of a complete Plan in compliance with PA Department of Environmental Protection (PA DEP) Chapter 102 Erosion and Sediment Control Rules and Regulations.

5. Upon request, provide all applicants with the PA DEP Erosion and Sediment Pollution Control Program Manual and related forms, worksheets, checklists, etc., necessary to successfully prepare a Plan.

6. Upon the filing of a complaint by the Municipality and/or a third party, the following will occur:
a. The District will inspect the complaint within (10) ten calendar days of its receipt.
b. If warranted, the District will provide documentation of the associated findings. The source of the complaint shall remain anonymous in accordance with PA DEP policy.

7. Serve as the repository for all Plans, complaints, Earth Disturbance Inspection Reports, correspondence, etc., within the limitations stated by PA DEP, that involve earth disturbance activities within the said Municipality. All such information, except the complaint forms, shall be contained in a filing system which shall be available for inspection by Municipal officials upon receipt of a formal written request.

8. When requested by the landowner, provide technical assistance in the development of needed Agricultural E&S Plans and Manure Management Plans. 09/7/2016

In carrying out the intent of this Memorandum, the Municipality shall:

1. Retain a sufficient quantity of the District's project application packets and provide such packets to all parties for projects that require a review. The Municipality shall provide instructions to have the Plans (residential, commercial, industrial, timber harvest, agricultural expansion construction, etc.) for earth disturbance activities greater than or equal to 5,000 square feet, which are required to be written in accordance with Chapter 102.4 of the PA Code, submitted to the District for review per Chapter 102 of the PA Code.

2. Notify the District within (5) five days of receipt of an application for a project disturbing greater than or equal to (1) one acre, pursuant to Chapter 102.42.

3. Pursuant to Chapter 102.43, **the Municipality** shall not issue building or other permit or approval to those proposing or conducting earth disturbance activities requiring a PA DEP permit until the PA DEP or District has issued the E&S or individual NPDES Permit or approved coverage under the general NPDES Permit for Stormwater Discharges Associated with Construction Activities under Chapter 102.5.

4. Forward all questions pertaining to the preparation of Plans and applications to the District.

5. Forward all third party complaints about ongoing earth disturbance activities to the District for its inspection.

6. Not issue final close-out, or grant final release of improvement/E&S escrow until the applicant has submitted a Notice of Termination for all NPDES Permitted activates and received Permit termination correspondence from the District.

7. Forward to the District, any third party agricultural complaint relating to: nutrient pollution and sediment pollution.

8. The District highly recommends that the Municipality necessitate the development of written Agricultural E&S Plans, which are required under Chapter 102.4 for agricultural plowing or tilling activities and animal heavy use areas disturbing 5,000 square feet or greater of land, as well as necessitate the development of Manure Management Plans, before building permits for agricultural operations are approved. Manure Management Plans are required under 25 PA. Code Section 91.36 (b) for all farming operations that land apply manure or agricultural process wastewater, whether they generate the manure or import it from another operation. All farming operations that include an Animal Concentration Area (ACA) or pasture must also have a written Manure Management Plan. In addition, the Municipality should not issue a building permit, or other permit or approval, to those proposing to construct a liquid or semi-solid waste storage facility unless they have a design that has been approved and stamped by a professional engineer.

II. This Memorandum of Understanding shall become effective immediately. It shall be reviewed as the need arises by either or both parties, and may be amended by mutual consent of both parties. This Memorandum of Understanding may be terminated at any time, by either party, following a thirty (30) day written notice to the other party.

FOR Maidencreek Township (municipality)

By: [signature] DATE 2-9-17

Piper Shoemaker, Chair, BCCD

Attest: Diane Dellenbach date

FOR THE BERKS COUNTY CONSERVATION DISTRICT

[signature] 2/9/17

CHAIR DATE

BCCD 3/29/17

APPENDIX J

MCM #4 – CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

BERKS COUNTY CONSERVATION DISTRICT CORRESPONDENCE AND RELATED DOCUMENTATION

See MCM #5, Appendix M

APPENDIX K

MCM #4 – CONSTRUCTION SITE STORMWATER RUNOFF CONTROL

BMP #3 – ACT 167 AND MS4 ORDINANCE #214

See MCM #3, Appendix H

5.0 Post-Construction Stormwater Management (PCSM) in New and Redevelopment Areas Program

5.1 Description

MCM #5 requires the MS4 municipality to:

5.1.1 Enact, implement, and enforce an ordinance or other regulatory mechanism to address post-construction stormwater runoff from new development and redevelopment projects, as well as sanctions and penalties associated with non-compliance.

5.1.2 Develop and implement measures to encourage and expand the use of Low Impact Development (LID) in new development and redevelopment.

5.1.3 Ensure adequate operation and maintenance of all post-construction stormwater management BMPs installed at all development or redevelopment projects that disturb greater than or equal to one acre.

5.2 Ordinance Adoption

Maidencreek Township adopted its Stormwater Management Ordinance, Ordinance Number 214, on June 12, 2008. The ordinance requires contains technical standards that must be met for post-construction stormwater runoff and included penalties for non-compliance.

Maidencreek Township's Stormwater Management Ordinance contains guidance and requirements relative to Low Impact Development (LID). The ordinance also contains requirements for BMP inspections.

5.3 Memorandum of Understanding

Maidencreek Township has entered into an agreement with Berks County Conservation District, via the Memorandum of Understanding (MOU) in Appendix J, which addresses items 1 and 3, above.

5.4 PCSM BMP Inventory

The Township is required to maintain an inventory of all PCSM BMPs installed since March 10, 2003. There are currently no BMPs to account for during this period. The following information must be tracked at such time that PCSM BMPs are installed:

- All PCSM BMPs that were installed to meet requirements in NPDES Permits for Stormwater Discharges Associated with Construction Activities approved since March 10, 2003.
- The exact location of the PCSM BMP (e.g., latitude and longitude, with street address).
- Information (e.g., name, address, phone number(s)) for BMP owners and entities responsible for BMP O&M, if different from BMP owners.
- The type of BMP and the year it was installed.
- Maintenance required for the BMP type according to the Pennsylvania Stormwater BMP Manual or other manuals and resources.
- The actual inspection/maintenance activities conducted for each BMP.
- An assessment by the permittee if proper O&M has occurred during the year and if not, what actions the permittee has taken, or shall take, to address compliance with O&M requirements.

5.5 Records Retention

The Township will retain all correspondence from BCCD as part of this SWMP. Copies of all permits, inspections, complaints and any relevant stormwater information will also be retained as part of this SWMP. Permit-year copies of this correspondence appears in Appendix M.

5.6 Plan Maintenance

Maidencreek Township will review and revise this Plan annually, as MOU provisions may change, ordinances are updated periodically, and new PCSM BMPs may be constructed.

APPENDIX L

MCM #5 – POST-CONSTRUCTION STORMWATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT

BERKS COUNTY CONSERVATION DISTRICT/MAIDENCREEK TOWNSHIP MEMORANDUM OF UNDERSTANDING

MEMORANDUM OF UNDERSTANDING

Between the

BERKS COUNTY CONSERVATION DISTRICT

and

Maidencreek Township

Received
FEB 27 2017
Berks County
Conservation District

This Memorandum has been prepared jointly and agreed upon by each party for the following purposes:

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1. Provide the Municipality with District project application packets and promptly notify Municipality of any changes in the plan review fee schedule.

2. Receive and review all Erosion and Sedimentation Control Plans ("E&S Plan" or "Plan") for earth disturbance activities 5,000 square feet or greater, which are required to be written in accordance with Chapter 102.4 of the PA Code.

3. Within ten (10) working days of completion of review, notify the consultant, the applicant, the Municipality, and the municipal engineer of all E&S Plan/NPDES Permit approvals, deficiencies, and all determinations including all project inspection reports and valid complaint inspection reports. Providing this information supports the Municipality with respect to Municipality's MS4 reporting requirements as required to satisfy Minimum Control Measure #4 related to services provided under this Memorandum.

4. Notify the consultant, the applicant, and the Municipality that a Plan submission has been returned based on either the lack of response within the specified time period or the lack of the development of a complete Plan in compliance with PA Department of Environmental Protection (PA DEP) Chapter 102 Erosion and Sediment Control Rules and Regulations.

5. Upon request, provide all applicants with the PA DEP Erosion and Sediment Pollution Control Program Manual and related forms, worksheets, checklists, etc., necessary to successfully prepare a Plan.

6. Upon the filing of a complaint by the Municipality and/or a third party, the following will occur:
a. The District will inspect the complaint within (10) ten calendar days of its receipt.
b. If warranted, the District will provide documentation of the associated findings. The source of the complaint shall remain anonymous in accordance with PA DEP policy.

7. Serve as the repository for all Plans, complaints, Earth Disturbance Inspection Reports, correspondence, etc., within the limitations stated by PA DEP, that involve earth disturbance activities within the said Municipality. All such information, except the complaint forms, shall be contained in a filing system which shall be available for inspection by Municipal officials upon receipt of a formal written request.

8. When requested by the landowner, provide technical assistance in the development of needed Agricultural E&S Plans and Manure Management Plans. 09/7/2016

In carrying out the intent of this Memorandum, the Municipality shall:

1. Retain a sufficient quantity of the District's project application packets and provide such packets to all parties for projects that require a review. The Municipality shall provide instructions to have the Plans (residential, commercial, industrial, timber harvest, agricultural expansion construction, etc.) for earth disturbance activities greater than or equal to 5,000 square feet, which are required to be written in accordance with Chapter 102.4 of the PA Code, submitted to the District for review per Chapter 102 of the PA Code.

2. Notify the District within (5) five days of receipt of an application for a project disturbing greater than or equal to (1) one acre, pursuant to Chapter 102.42.

3. Pursuant to Chapter 102.43, **the Municipality** shall not issue building or other permit or approval to those proposing or conducting earth disturbance activities requiring a PA DEP permit until the PA DEP or District has issued the E&S or individual NPDES Permit or approved coverage under the general NPDES Permit for Stormwater Discharges Associated with Construction Activities under Chapter 102.5.

4. Forward all questions pertaining to the preparation of Plans and applications to the District.

5. Forward all third party complaints about ongoing earth disturbance activities to the District for its inspection.

6. Not issue final close-out, or grant final release of improvement/E&S escrow until the applicant has submitted a Notice of Termination for all NPDES Permitted activates and received Permit termination correspondence from the District.

7. Forward to the District, any third party agricultural complaint relating to: nutrient pollution and sediment pollution.

8. The District highly recommends that the Municipality necessitate the development of written Agricultural E&S Plans, which are required under Chapter 102.4 for agricultural plowing or tilling activities and animal heavy use areas disturbing 5,000 square feet or greater of land, as well as necessitate the development of Manure Management Plans, before building permits for agricultural operations are approved. Manure Management Plans are required under 25 PA. Code Section 91.36 (b) for all farming operations that land apply manure or agricultural process wastewater, whether they generate the manure or import it from another operation. All farming operations that include an Animal Concentration Area (ACA) or pasture must also have a written Manure Management Plan. In addition, the Municipality should not issue a building permit, or other permit or approval, to those proposing to construct a liquid or semi-solid waste storage facility unless they have a design that has been approved and stamped by a professional engineer.

II. This Memorandum of Understanding shall become effective immediately. It shall be reviewed as the need arises by either or both parties, and may be amended by mutual consent of both parties. This Memorandum of Understanding may be terminated at any time, by either party, following a thirty (30) day written notice to the other party.

FOR Maidencreek Township **(municipality)**

By: _____ DATE 2-9-17
Piper Zweidinger, Chair, BCCD

Attest: Diane Dellenbach date

FOR THE BERKS COUNTY CONSERVATION DISTRICT

_____ 2/9/17 BCCD 3/29/17
CHAIR DATE

APPENDIX M

MCM #5 – POST-CONSTRUCTION STORMWATER MANAGEMENT IN NEW DEVELOPMENT AND REDEVELOPMENT

BERKS COUNTY CONSERVATION DISTRICT CORRESPONDENCE AND RELATED DOCUMENTATION

Insert any BCCD correspondence and documents or state there wasn't any.

"None This Reporting Period"

6.0 Pollution Prevention/Good Housekeeping for Municipal Operations Program

6.1 Description

MCM #6 requires the MS4 to identify and document all operations that are owned or operated by the municipality and have the potential for generating stormwater runoff to the regulated MS4. Also required is the development and implementation of a written Operations and Maintenance (O&M) Program for all operations that could contributed to the discharge of pollutants to the MS4. Finally, MCM #6 requires the municipality to develop and implement an employee training program that addresses topics that further the goal of preventing or reducing the discharge of pollutants from operations to the regulated MS4.

This municipal O&M and employee training program is designed to teach municipal staff about potential sources of stormwater contamination and ways to minimize the water quality impact of municipal activities, such as park and open space maintenance, fleet and building maintenance, construction and land disturbances, and storm drain system maintenance. The training program includes a general stormwater awareness message, pollution prevention/good housekeeping measures, spill response and prevention, information about the operation and maintenance of structural best management practices (BMPs), and recognizing, tracking, and reporting illicit discharges.

6.2 Applicability

Municipal employees who are directly involved in potentially polluting activities should receive both general stormwater and targeted BMP training tailored to their activities. This will increase the likelihood that receiving waters and the storm drain system will be protected from inadvertent discharges and spills. It is important to train all municipal staff, however, regardless of field responsibilities, about general stormwater awareness and the detection of illicit discharges. Very often, municipal staff are residents as well, and improving the awareness of municipal employees may reduce residential impacts and increase reporting of illicit discharges, dumping, and spills. Also, because municipalities expect residents and business owners to practice pollution prevention and good housekeeping, municipal employees should set an example for the rest of the community to follow.

6.3 General Stormwater Awareness

Municipal employees need to understand the difference between stormwater and sewage, and that not all drains go to the same places. This basic fact is often taken for granted, as municipal staff is usually well-versed in the aspects of their infrastructure, but it does not hurt to drive the point home.

Stormwater is rain or snowmelt runoff and it is usually collected by gutters, swales, ditches, pipes and catch basins and conveyed by gravity to waterways. Therefore, any pollutants placed in those conveyances will invariably end up in a waterway. Pollutants include sediment (dirt, gravel, etc.), nutrients (fertilizers, pet wastes, etc.), bacteria (animal wastes, etc.), debris (trash, cigarette butts, etc.), and hazardous wastes (oils, solvents, cleansers, etc.). Waterways are protected against pollution by state and federal laws. Employees should be made aware that there is a municipal ordinance that prohibits certain types of discharges to the storm sewer system, and provides penalties for violators.

6.4 Pollution Prevention/Good Housekeeping

General municipal operations include activities such as street sweeping, trash collection, snow plowing/deicing, fleet maintenance, infrastructure upkeep and the like. Each of these activities has the potential to create pollution in waterways. Staff needs to be aware of the proper means to operate equipment, dispose of debris, and conduct other routine activities, as it relates to prevention of pollution. For example, street sweeping debris needs to be properly disposed of at a location designated and approved to receive such debris. Similarly, fleet maintenance needs to be conducted such that fuels, oils and greases are not spilled onto the ground where rain water can wash the materials into stormwater collection facilities. See Appendix N for the Township's Operation and Maintenance (O&M) Plan.

6.5 BMP Operation and Maintenance

The municipality may be responsible for maintenance of stormwater facilities and staff need to be aware of proper measures and frequencies to conduct such maintenance. For example, stormwater detention basins need to be inspected periodically to ensure erosion is not present and that outlet structures are functional. Ditches and swales need to be stable and not contributing to sedimentation through erosion. Catch basin grates need to be cleared. See Appendix N for the Township's Operation and Maintenance (O&M) Plan.

6.6 Illicit Discharge Tracking and Reporting

Municipal staff need to be trained to recognize illicit discharges within the storm sewer systems throughout the municipality. Outfall screenings are conducted annually, but illicit discharges can occur at any time. Activities such as dumping of motor oil into a storm drain, or filling in a swale, can lead to waterway pollution. The municipality has an ordinance that provides enforcement actions against violators.

6.7 Training Resources

A number of workshops are generally available for staff to attend throughout a given year. The Berks County MS4 Steering Committee provides information on training sessions available for municipal staff. Berks County Public Works Association periodically provides training specifically relating to stormwater. In-house training is also provided. Stormwater awareness is promoted via on the job reinforcement, display materials and new-employee training. Posting reminders, such as markers above drains prohibiting discharges of vehicle fluids and wastes, or signs above faucets reminding employees not to use water to clean up spills will remind employees of proper procedures. Stickers that list important information and contact numbers for reporting illicit discharges, dumping, or spills can be adhered to all municipal vehicles. Stenciling or marking all storm drains at municipal facilities will prompt employees to be conscious of discharges. Managers should monitor status of employees' participation in training and work performance.

6.8 Training Checklist

Training should be provided annually for all municipal staff members. Clerical and administrative staff should be proficient with all MCMs. Zoning, regulatory and public works staff should be well-versed in MCM #3 (IDD&E) and MCM #6 (Housekeeping), with general familiarity of MCMs #4 and #5, as they relate to BMP inspections. The following checklist can be used by municipal managers and/or staff leaders to ensure compliance with the municipal training requirement of the NPDES permit:

6.8.1 Stormwater Awareness – The employee understands that:

- Stormwater is rain or snowmelt runoff.
- Stormwater facilities have the potential to transmit pollutants directly into waterways.

6.8.2 Pollution Prevention/Good Housekeeping – The employee will:

- Ensure that street sweeping debris and materials cleaned from catch basins, gutters, etc. are disposed of only at facilities approved to receive that material.
- Monitor applications of road salt and/or anti-skid materials to ensure waterways are protected to the extent possible.
- Conduct maintenance of municipal vehicles in a manner that minimizes the potential for pollution incidents.

- Conduct infrastructure repairs (e.g., pipe replacements, stream cleaning, etc.) in accordance with permits and/or policies in place by state and federal regulatory agencies.

- Ensure that trash haulers comply with prevailing regulations relative to collection and disposal of waste.

6.8.3 BMP Operation and Maintenance – The employee will:

- Conduct maintenance activities on stormwater facilities on a regular basis, including mowing, cleaning and inspections.

6.8.4 Illicit Discharge Tracking and Reporting – The employee will:

- Understand that the municipal ordinance includes provisions for enforcement of illicit discharges.

- Be aware of and/or participate in the conduct of annual screenings of outfalls as per the IDD&E plan for the municipality.

- Contact superiors immediately upon discovery or suspicion of an illicit discharge, evident via visual (color, consistency, etc.), odor (solvents, paints, oils, etc.), or other observation.

6.8.5 Event Tracking – The municipality will:

- Document all training, as well as routine and non-routine activities in writing; for example, keep track of the following by date, location and/or written description:
    - street sweeping, disposal locations
    - mowing
    - salt/anti-skid spreading
    - vehicle maintenance conducted on municipal grounds
    - facility maintenance (gutters, ditches, swales, catch basins)
    - pollution incidents
    - outfall screenings
    - any other activities that have the ability to impact stormwater runoff

6.9 Additional Resources/References

The municipality should make the following list available to staff for additional information on the MS4 program:

- http://water.epa.gov/polwaste/npdes/swbmp/Municipal-Employee-Training-and-Education.cfm
- http://water.epa.gov/polwaste/npdes/swbmp/Pollution-Prevention-Good-Housekeeping-for-Municipal-Operatators.cfm
- http://www.ecy.wa.gov/programs/wq/stormwater/municipal/MUNIdocs/CWPmanualGdHskpg.pdf
- http://files.dep.state.pa.us/Water/BPNPSM/StormwaterManagement/MunicipalStormwater/MuniSWResources/SampleOMPlan.docx

APPENDIX N

MCM #6 – POLLUTION PREVENTION / GOOD HOUSKEEPING

BMP'S #1 & #2 FACILITIES INVENTORY AND OPERATIONS AND MAINTENANCE PLAN

Construction and Land Disturbance Pollution Prevention/Good Housekeeping Practices

IMPACTS: Sediment runoff such as silt and debris can affect fish reproduction and habitat. Removal of shade trees from stream banks can increase water temperature which can result in reduced dissolved oxygen content in streams.

GOOD HOUSE KEEPING PRACTICES:

1. Plan the construction and/or land clearing activities so that soil is not exposed for long periods of time.
2. Install sediment control devices before disturbing soil.
3. Stabilize site to protect against sediment runoff. Protect against sediment flowing into storm drains. Install sediment barriers on slopes or divert storm water.
4. Maintain native vegetation – this is especially important near waterways.

INSPECTION PROCEDURES: Schedule regular inspections of sediment control devices. Inspect during and after storms. Make all necessary repairs to devices.

Hazardous Materials Storage

IMPACTS: Failure to properly store hazardous materials increases the chance that they will end up in local waterways. Typical hazardous materials such as oil, paints, thinners, antifreeze, and fuels are toxic to aquatic plants and wildlife.

GOOD HOUSE KEEPING PRACTICES:

1. Train employees in spill prevention and proper disposal methods.
2. Ensure all materials are stored in closed labeled containers. Inside storage shall be away from floor drains. Outside storage, drums shall be placed on pallets and away from storm drains and swales. Store materials away from high traffic areas.
3. Never leave a vehicle unattended when fueling.
4. Use the least toxic material to perform the job. If possible, replace toxic materials with environmentally friendly, water based products.
5. All containers must be labeled.
6. Maintain MSDS sheets and inventory hazardous materials.
7. Perform preventive maintenance on fuel tanks.
8. Properly dispose of waste.

INSPECTION PROCEDURES: Inspection of material storage areas in addition to inspection of storm water discharge areas and floor drains shall be scheduled on a regular basis by the Road Master. Leaking or defective containers shall be replaced and labels shall be replaced as needed. Check for external corrosion and structural failure of fuel tanks.

SPILL PREVENTION AND CONTROL PLAN:

Municipal Vehicle/Equipment Maintenance and Washing

IMPACTS: Trace amounts of metals, hydrocarbons and other pollutants from fuel, antifreeze, batteries, motor oils, grease and parts cleaning solvents are typically found in maintenance operations.

GOOD HOUSE KEEPING PRACTICES:

1. Train employees in spill prevention and proper disposal methods.
2. Conduct maintenance work indoors. If work is conducted outdoors, guard against spills that could discharge to a storm drain. Dedicate one bay with a floor drain for vehicle washing.
3. Maintain a clean work area.
4. Rinse grass from lawn care equipment in grass areas.
5. Perform equipment washing with pressurized cold water, with biodegradable soap.
6. Store cracked batteries in a leak-proof secondary container.
7. Seal floor drains that discharge directly to the environment if possible. In the event of a spill cover drains with drain mats.
8. Clean up spills immediately using a "dry" method.
9. Keep all liquid cleaning at a centralized station to keep solvents in one area and locate drip pans to direct solvents back into a holding tank for reuse.
10. Identify recycling/disposal options for wastes.

INSPECTION PROCEDURES: Inspect floor drains and monitor parked vehicles/equipment for leaks.

Road Salt Storage

IMPACTS: Salt is soluble in water and in high concentrations have a negative impact on aquatic life.

GOOD HOUSE KEEPING PRACTICES:

1. Salt storage facilities shall be covered.
2. Salt spreaders shall be calibrated for proper application.
3. Salt shall be unloaded in the shed or if not possible, moved inside immediately
4. Service trucks and calibrate spreaders regularly.
5. Educate and train operators on the hazards of over salting to roads and the environment.

INSPECTION PROCEDURES: The salt shed should be inspected for leaks and structural problems. Inspect the salt for lumps or contaminants. Inspect the surface areas for evidence of alt runoff near and around the salt shed.

Deicing Alternates:

Calcium Chloride – not harmful to vegetation. Lowest practical temperature 5 degrees Fahrenheit.

Urea – Will not harm vegetation. Will work below 0 degrees Fahrenheit.

Calcium Magnesium Acetate – Low toxicity and biodegradable.

Roadway, Bridge, Storm Drain and Catch Basin Maintenance

IMPACTS: Road salt, particulate and debris from roads and bridges can impact aquatic life. Grit and debris captured in catch basins can discharge during rain and snow melt events. Swales if stripped of vegetation can deposit silt in receiving waters.

GOOD HOUSE KEEPING PRACTICES:

1. Stage road operations and maintenance (patching potholes for example) to reduce spillage. Cover catchbasins and storm drains during this activity.
2. Pave in dry weather only.
3. Clean up fluid spills immediately.
4. Sweep and vacuum roads and shoulders to remove debris.
5. Regularly pick up litter along roadsides.
6. Maintain roadside vegetation and vegetation in swales by mowing.
7. Clean bridges routinely and keep them free of debris.
8. Direct runoff from bridges to vegetated areas.
9. Clean storm drains and catch basins when the depths of deposits are greater than 1/3 the depth from the bottom of the basin to the invert of the lowest pipe opening. Drains must be checked in the spring to remove debris from winter maintenance and in fall to remove leaves.
10. Repair drains and catch basins.
11. Properly dispose of debris.

INSPECTION PROCEDURES: Inspect roads and bridges regularly. Inspect catch basins, storm drains and swales spring and fall and after major storm events. MS4 required inspections to be performed in addition to routine inspections.

APPENDIX O

MCM #6 – POLLUTION PREVENTION / GOOD HOUSKEEPING

BMP #3 EMPLOYEE TRAINING DOCUMENTATION

None this reporting period

APPENDIX P

MCM #6 – POLLUTION PREVENTION / GOOD HOUSKEEPING

PA DEP STREET SWEEPING MATERIAL REUSE POLICY

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Rev. 8/19/2015

Bureau of Waste Management

Disposal/Reuse of Street-Sweeping Debris and Antiskid

Street sweepings consist of antiskid (cinders, coal (bottom) ash, rock, and sand), salt, leaves, plastic, broken glass, small pieces of metal, litter and debris. Sweepings are removed from streets, parking lots and sidewalks to improve the appearance and safety of public roadways and prevent pollution of local waterways.

Municipalities are able to reuse antiskid provided that it is screened to separate all non-reusable debris, such as silt, trash, litter, leaves, etc., from the reusable antiskid material and visually checked for contaminants, staining or odors. If the visual examination shows no staining, odors or other evidence of contaminants, the antiskid may be managed as clean fill and used in an unrestricted manner, including the following:

- Reuse as antiskid.
- Remixed with new salt mixture for winter application to roads.
- As the sub-grade beneath a paved municipal road or parking lot.
- For filling potholes.
- As shoulder repair material along roads within the municipally or privately owned public right-of-way.
- Other fill.

If the visual examination shows staining, odors or other evidence of contaminants, the antiskid material must be tested to determine if it qualifies as clean fill. Testing must be performed in accordance with Appendix A of the *Management of Fill* policy (Document No. 258-2182-773). If testing reveals that the antiskid material contains regulated substances at concentrations that exceed the limits in Tables FP-1a and 1b, the material may be managed as regulated fill, provided the person proposing to use the material obtains authorization under Waste Management General Permit WMGR096. Otherwise, the material must be disposed of at a permitted landfill.

All non-reusable debris that has been removed from the antiskid, as well as catch-basin material, must be disposed of at a landfill. For additional information, please contact the Bureau of Waste Management, Division of Municipal and Residual Waste, at 717-787-7381.

APPENDIX Q

MCM #6 – POLLUTION PREVENTION / GOOD HOUSKEEPING

POLLUTANT REDUCTION PLAN (PRP)

Maidencreek Township, Berks County
POLLUTANT REDUCTION PLAN (PRP)
Willow Creek MS4

Prepared for

MAIDENCREEK TOWNSHIP
BOARD OF SUPERVISORS

1 Quarry Road
Blandon, PA 19510
Maidencreek Township, Berks County, PA

June 29, 2017
Updated December 10, 2018
Updated April 3, 2019

SDE SYSTEMS DESIGN ENGINEERING, INC

Project 19-0019-0191

"A Passion for Engineering Excellence"

sdei.net

Maidencreek Township, Berks County
POLLUTANT REDUCTION PLAN (PRP)
Willow Creek

1.0 Introduction

This MS4 Pollutant Reduction Plan (PRP) has been prepared by Systems Design Engineering, Inc. (SDE), for Maidencreek Township, Berks County, Pennsylvania (the Township), as part of the Township's obligations under its NPDES PAG-13 MS4 permit (Permit Number PAG-13-3521). Maidencreek Township has been operating under a permit since 2003.

The pollutant of concern in this PRP is "nutrients." A portion of the Township's MS4 discharges to a segment of Willow Creek that is impaired for nutrients, reportedly originating from an "industrial point source."

This plan will discuss implementation of best management practice (BMP) pollutant control measures within the storm sewersheds tributary to the impaired stream, with the intention of demonstrating a reduction in applicable pollutant loads as calculated using accepted methodologies.

2.0 Watershed/MS4 Characteristics

The MS4 area within Maidencreek Township is defined by the "Reading" Urbanized Area (UA) from the 2010 U.S. Census (see Figure 1). The UA is comprised mainly of residential developments, with some commercial development along the U.S. Route 222 and Park Road corridors, and more industry west of PA Route 73. No portion of Maidencreek Township is within the Chesapeake Bay watershed.

Maidencreek Township has two (2) impaired surface waters that need special plans, as they relate to regulated stormwater discharges: Lake Ontelaunee, which has a TMDL for nutrients and suspended sediment, and Willow Creek, a portion of which has an impairment for nutrients, as listed in the 2014 Pennsylvania Integrated Water Quality Monitoring and Assessment Report [303(d) List]. There are other reaches of Willow Creek and its unnamed tributaries that have various impairments according to the Integrated Report, but they do not currently pertain to regulated stormwater discharges.

Figure 2 depicts Maidencreek Township and its UA, as well as the impaired surface waters pertaining to regulated stormwater discharges (red segments of Willow Creek needing a PRP and yellow Lake Ontelaunee needing a TMDL Plan). Note that only the downstream segment of Willow Creek is affected by the MS4, because the UA does not include the upper tributary to Willow Creek. The downstream segment is approximately 0.5 mile in length.

Maidencreek Township's MS4 has 56 regulated outfalls and seven (7) observation points. Three (3) outfalls discharge to Lake Ontelaunee and the remainder to Willow Creek and its unnamed tributaries.

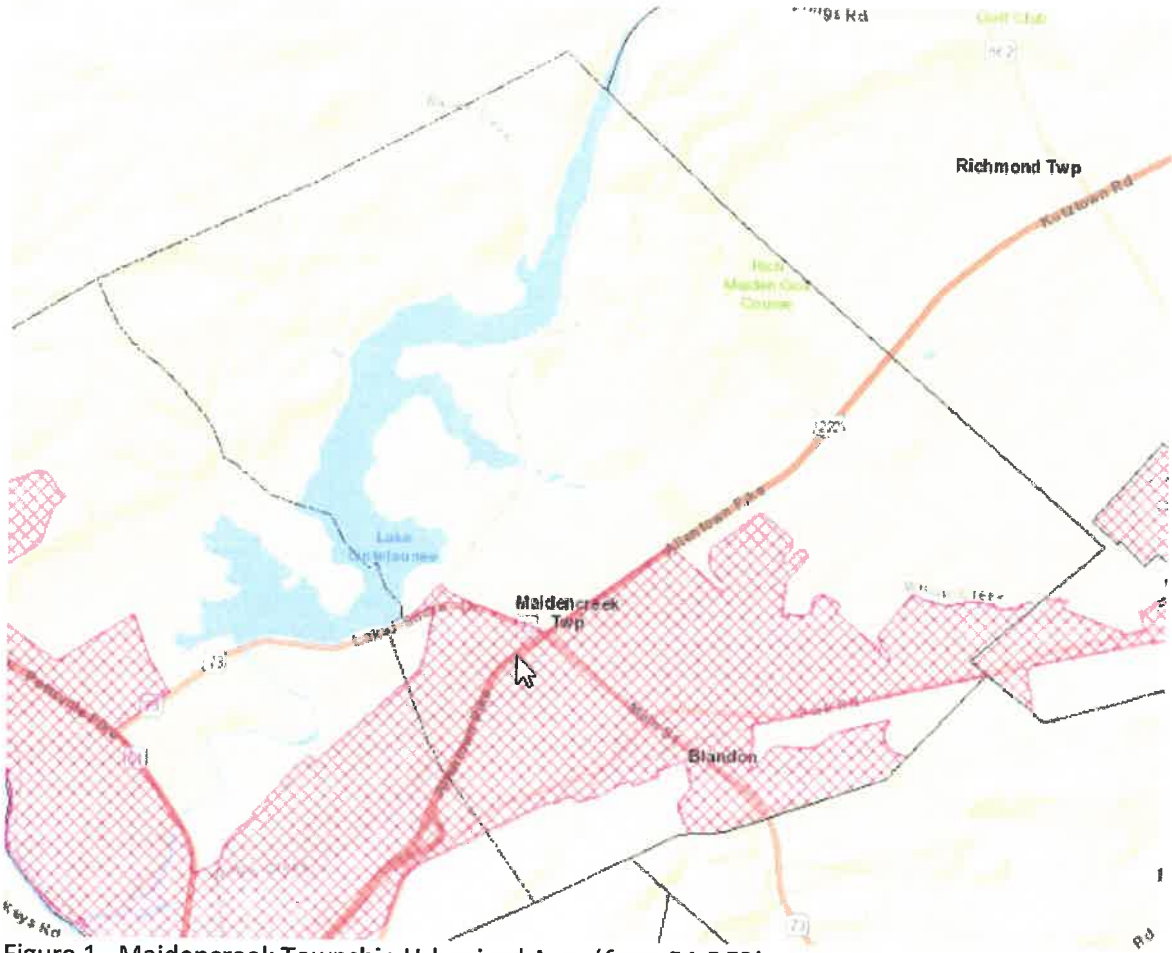


Figure 1. Maidencreek Township Urbanized Area (*from PA DEP's eMapPA online tool at http://www.depgis.state.pa.us/emappa/*)

2.1 303(d) Nutrient Listing Discussion

The 2014 Pennsylvania Integrated Water Quality Monitoring and Assessment Report lists the specific impairment to the portion of Willow Creek in question is listed as *"Industrial Point Source – Nutrients."* The Assessment ID is 2327. The only nearby potential nutrient-yielding industrial point source a private corporation's wastewater treatment facility that discharges to the Willow Creek, over one-half mile *downstream* of the stream segment identified as having the industrial point source. It is unclear to what source the "industrial point source" is attributed for the stream segment identified, as the vast majority of the storm sewersheds tributary to the segment are comprised primarily of residential properties.

3.0 PRP Calculations

The pollutant of concern in this PRP is "nutrients." Nutrients typically refer to total nitrogen and total phosphorus. However, for non-Chesapeake Bay PRPs, "nutrients" refers to total phosphorus (TP). The goal of this PRP is therefore to reduce TP by five percent (5%) through BMP implementation. It can be presumed that a sediment reduction of at least 10 percent will accomplish the 5% TP reduction.

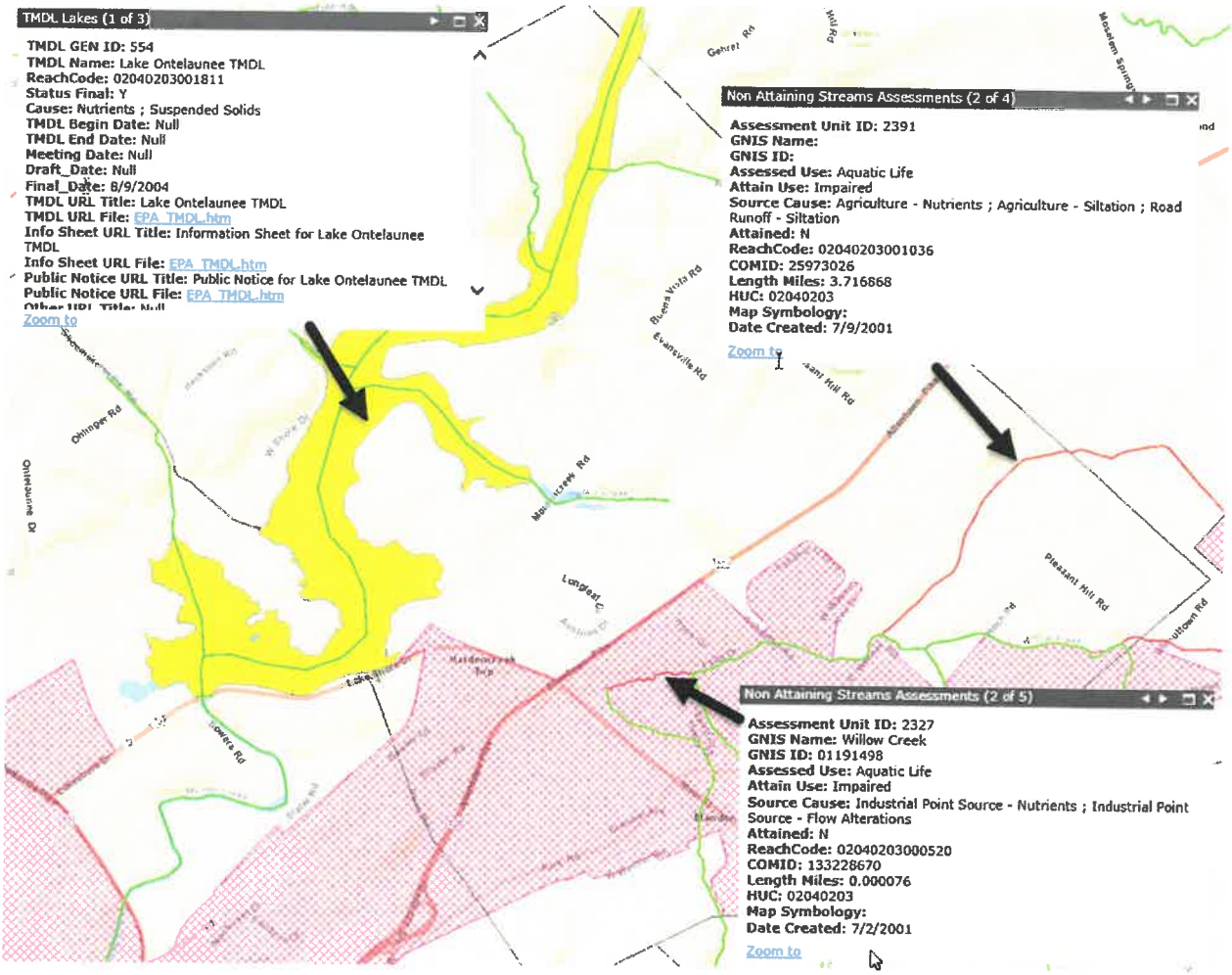


Figure 2. Maidencreek Township Impaired Surface Waters Pertaining to Stormwater Discharges (*from PA DEP's eMapPA online tool at http://www.depgis.state.pa.us/emappa/)*

3.1 Methodology

This PRP will establish existing pollutant loadings for TP. DEP's simplified method has been selected for the majority of the computations. According to Attachment B PA DEP's Pollutant Reduction Plan (PRP) Instructions (3800-PM-BCW0100k, rev. 3/20/17) in Appendix B, Berks County's loading rates for TP are 2.26 lbs/acre/yr and 0.98 lbs/acre/yr for impervious developed and pervious developed areas, respectively. For undeveloped areas outside of the UA, a loading rate of 0.33 lbs/acre/yr is to be used for TP. Loading rates derived from the Lake Ontelaunee TMDL document are used for two (2) specific storm sewersheds (O-015 and Willow Creek Riparian Buffer Area), where pervious areas needed to be evaluated for the actual existing and proposed covers (i.e., a more detailed analysis is needed than just a "pervious" classification, as is done in the simplified method).

In order to apply the existing pollutant loading rates throughout the MS4, storm sewersheds were delineated for the 56 outfalls and seven (7) observation points tributary to Willow Creek. Each storm sewershed was then divided into portions that are developed impervious and developed pervious, as well as undeveloped areas outside the UA. This data was entered into a spreadsheet which calculates total loading for each storm sewershed, as well as total gross loading overall. Again, storm sewersheds

O-015 and Willow Creek Riparian Buffer Area are the exceptions wherein actual agricultural, pasture/meadow and forest loading rates were used for existing and proposed conditions evaluations.

Several of the storm sewersheds also have existing BMPs (for example, dry extended detention basins, vegetated swales, forest buffers). Areas tributary to these BMPs are further evaluated for pollutant reductions and the cumulative result of these reductions is applied to the gross loading to determine a net loading that is used as the baseline for the required reduction. Refer to Appendix A for the spreadsheet tables utilized to compute existing and proposed loading.

3.2 Gross TP Loading

Gross TP loading is computed for each of the storm sewersheds using the methodology discussed above. Loading rates for each outfall's individual storm sewershed are then summed to arrive at the total gross loading. Gross loading does not take into account any existing BMPs within the storm sewersheds. Total gross TP loading for the storm sewersheds tributary to Willow Creek's nutrient-impaired segment is 1,872 pounds per year. Refer to Table 1 in Appendix A.

3.3 Net TP Loading

Net TP loading is computed by taking the gross TP loading values for each outfall's storm sewershed and applying reductions as appropriate for existing BMPs with the storm sewersheds. Not all storm sewersheds have existing BMPs, and some of the existing BMPs are ineligible to be counted for reductions to loading. Existing BMPs eligible for use in this PRP include Dry Extended Detention Basins, Forest Buffers, and Vegetated Open Channels. Each of these have specific effectiveness values, as provided in DEP's BMP Effectiveness Values table (3800-PM-BCW0100m, 5/2016), Appendix B.

Storm sewersheds are subdivided into areas that are tributary to the particular BMP for reduction, and areas that by-pass the BMP. Reductions, if available, are summed for each storm sewershed and are subtracted from gross TP loadings, to arrive at net TP loading for each storm sewershed. Individual net storm sewershed loadings are then summed to arrive at total net TP loading. Total net TP loading for the storm sewersheds tributary to Willow Creek's nutrient-impaired segment is 1,644 pounds per year. This is the baseline value to which the required five percent (5%) TP reduction is applied.

3.4 TP Reductions and BMP Effectiveness

With a net TP loading of 1,644 pounds per year, the required TP reduction at five percent (5%) is about 82 pounds. Proposed BMPs must be implemented over the five-year permit duration to achieve this minimum reduction. Proposed BMPs are described below (refer also to Tables 3 and 4 in Appendix A).

3.4.1 "CONVERT" – Ag Field Retirement/Conversion to Meadow

Storm sewershed 0-015 contains a farm field that has been purchased by Maidencreek Township for development of a community well. This farm field will be retired and left to return to meadow, with no chemical applications, due to wellhead protection requirements.

This BMP reduces sediment and nutrient pollution generically from "pervious" areas within the O-015 storm sewershed, but DEP's simplified method does not break down pervious areas into the specific cropland and meadow rates that need to be evaluated for BMP effectiveness in this case. Therefore,

loading rates for this storm sewershed were computed using representative source data from the Lake Ontelaunee TMDL document, because those sources are nearby and include cropland (which is the existing use for the farm field in O-015) and hay/pasture (which is the proposed use of the farm field, as converted).

Table ES-2 from the TMDL document is reproduced in the Table 4 data in Appendix A. Sources that are common between the Lake Ontelaunee watershed and the O-015 storm sewershed are listed in Table 4.a. Data from Table ES-2 are used in Table 4.a. to develop loading rates (lb/yr/ac) for each source. In Table 4.b., the actual areal extents of the common sources within the O-015 storm sewershed are multiplied by the loading rates computed in Table 4.a., to arrive at loadings in pounds per year for each O-015 source, in the existing (agricultural cropland) condition. The sum of the individual sources' loading masses (lb/yr) is used in Table 1 (Appendix A – TP gross overall), for O-015.

In Table 2, there are no existing BMPs in O-015 being used to reduce TP; therefore, net TP is the same as gross TP. The loading value is transferred to Table 3.

Table 3 depicts the effect of the proposed conversion of a portion of the O-015 storm sewershed from cropland to hay/pasture (i.e., the "CONVERT" BMP). The TP after reduction listed in Table 3 is based on computations in Table 4.c.

Table 4.c. is a variation of Table 4.b., wherein the "Cropland" source is reduced to an area of "zero," and the area formerly cropland is added to the hay/pasture source. This simulates the conversion BMP. As in Table 4.b., individual sources' loading masses (lb/yr) are totaled to arrive at a proposed load. This value is entered in Table 3 for O-015, as the "TP After BMP Reduction."

3.4.2 "CONVERT" – Riparian Buffer Area/Conversion from Meadow to Forest

The Willow Creek Riparian Buffer Area consists of approximately 34 Maidencreek Township-owned, contiguous acres between Schaeffer Road and PA Route 73, along the Willow Creek. Prior to its conversion to a forested riparian buffer, the land was primarily pasture and meadow. See BMP 3.4.3 below for a complete description of the buffer's origin and value.

The conversion of the 34 acres of this formerly pasture and meadow area to deciduous forest is a BMP that has nutrient-reducing capability. However, as in the "Cropland" conversion BMP, DEP's simplified method is insufficient to adequately quantify nutrient loading. Therefore, as above, loading rates for this storm sewershed were computed using representative source data from the Lake Ontelaunee TMDL document, because those sources are nearby and include hay/pasture (which is the pre-existing use for the riparian buffer area) and deciduous forest (which is the proposed use of the buffer area, as converted).

Table ES-2 from the TMDL document is reproduced in the Table 4 data in Appendix A. Sources that are common between the Lake Ontelaunee watershed and the Willow Creek Riparian Buffer Area are listed in Table 4.a. Data from Table ES-2 are used in Table 4.a. to develop loading rates (lb/yr/ac) for each source. In Table 4.d., the actual areal extents of the common sources within the Willow Creek Riparian Buffer Area are multiplied by the loading rates computed in Table 4.a., to arrive at loadings in pounds per year for each buffer area, in the existing (hay/pasture) condition. The sum of the individual sources' loading masses (lb/yr) is used in Table 1 (Appendix A – TP gross overall), for Willow Creek Riparian Area.

In Table 2, there are no existing BMPs in Willow Creek Riparian Area being used to reduce TP; therefore, net TP is the same as gross TP. The loading value is transferred to Table 3.

Table 3 depicts the effect of the proposed conversion of the Willow Creek Riparian Area from hay/pasture to deciduous forest. The TP after reduction listed in Table 3 is based on computations in Table 4.e.

Table 4.e. is a variation of Table 4.d., wherein the "Hay/Pasture" source is reduced to an area of "zero," and the area formerly hay/pasture is added to the deciduous forest source. This simulates the conversion BMP. As in Table 4.d., individual sources' loading masses (lb/yr) are totaled to arrive at a proposed load. This value is entered in Table 3 for Willow Creek Riparian Area, as the "TP After BMP Reduction."

3.4.3 "FOREST BUFFER" – Riparian Forest Buffer Along Willow Creek

Maidencreek Township, with nearly a dozen partners, is revegetating the approximately 34-acre riparian buffer along Willow Creek, between Schaeffer Road and PA Route 73. Since 2011, 1,735 trees have been planted throughout the buffer, in an effort to convert open meadow areas to a forest buffer. In-stream fish habitat enhancements, stream bank stabilization, educational signage and invasive species removal have also been implemented.

This is an ongoing, "living" BMP project that is a flagship example of community involvement and public education for a riparian improvement within an MS4. See Appendix C for a full report on the project.

It is acknowledged that DEP's PRP instructions restrict the use of previously installed BMPs as credit toward the proposed percentage reductions required for the particular pollutant of concern. However, this riparian buffer project is not a static BMP. It is an ongoing, constantly evolving managed "forest buffer" BMP, the benefits of which will continue to improve over the coming five (5) year permit period and beyond. Therefore, it is believed that the use of a "forest buffer" for a "proposed" BMP is justified.

The project began in 2011, however, no credit is sought for the buffer as an existing BMP. This is evident in Table 2. As a proposed Forest Buffer BMP, a 50 percent effectiveness value for TP reduction is used in Table 3.

Recent Chesapeake Bay guidelines place limitations upon the amount of area claimed for credit in treatment provided by riparian buffers. For phosphorus, the subject of this PRP, the area credit is two times the area of the riparian buffer. The Willow Creek Riparian Buffer Area is 34 acres; therefore, pollutant loading from 68 acres of tributary storm sewershed area can be credited with the 50 percent reduction specified in DEP's BMP effectiveness tables. Accordingly, Table 3 computes TP loading reductions for storm sewersheds O-007, O-008, O-010, O-012, O-016, O-023 and O-024 (these sewersheds total is 68 acres). Remaining sewersheds tributary to the riparian buffer receive no reduction credit in Table 3 (denoted as "FP[1]" in Table 3).

4.0 Pollutant Loading Reductions

As indicated above, the pollutant of concern in this PRP is Total Phosphorus (TP), based on nutrients from an "industrial point source." The preceding calculations depict the use of DEP's simplified method to compute existing loading, with existing BMP effectiveness netted out of the baseline. The calculations also demonstrate the effectiveness of the proposed BMPs on reducing TP loading.

Results of the analyses are tabulated below:

Existing Gross Loading lb/yr (Table 1)	Existing Net Loading lb/yr (Table 2)	Proposed Loading lb/yr	Reduction in Loading
1,871.72	1,644.15	1,554.14	5.47%

5.0 Plan Implementation

Maidencreek Township and/or its designee(s) will implement the PRP in the following manner:

Ag Field Conversion

Over the five-year permit term, allow natural meadow to return to cover former agricultural field. Do not apply chemicals, fertilizers, pesticides or herbicides. Maintain field in natural state. Mowing is acceptable as needed.

Forest Buffer

Over the five-year permit term, maintain established vegetation within the Willow Creek corridor. Maintain educational signage as needed. Refer to Appendix D for a full maintenance schedule.

6.0 Funding Mechanisms

Funding for the Ag Field Conversion and Forest Buffer BMPs will be as follows:

Ag Field Conversion

Funding for current and proposed operation and maintenance of the converted field is via the Township's General Fund. Given the passive, low-maintenance nature of this BMP, funding needs are expected to be minimal.

Forest Buffer

Funding for the Forest Buffer is as specified in Appendix C, which is the Project Description for the riparian project. Current and proposed funding for operation and maintenance of the BMPs is via the Township's General Fund.

7.0 Operation and Maintenance

Maidencreek Township owns each property upon which BMPs are proposed under this PRP. Accordingly, the Township will operate and maintain the BMPs.

Ag Field Conversion

Limited maintenance will include occasional mowing as needed. Removal of invasive species will be done case-by-case. Ground cover is to remain vegetated or otherwise stabilized to prevent soil erosion. There is to be no application of any material that is contrary to regulations supporting public drinking water wellhead protection, including but not limited to herbicides, pesticides or fertilizers.

Forest Buffer

Refer to Appendix D for the Management Plan.

APPENDIX A

POLLUTANT LOADING CALCULATION SPREADSHEETS

TABLE 1.
WILLOW CREEK PRP - MAIDENCREEK TOWNSHIP
MS4 OUTFALL STORM SEWERSHEDS - EXISTING POLLUTANT LOADING (GROSS BEFORE EXISTING BMPS)
APRIL 2019

			IMPERVIOUS DEVELOPED AREA			PERVIOUS DEVELOPED AREA			UNDEVELOPED AREA (OUTSIDE MS4)			
OUTFALL OR OBSERVATION POINT	STORM SEWERSHED AREA (SF)	STORM SEWERSHED AREA (AC)	% IMPERV DEV	IMPERV DEVELOPED (AC)	TP IMPERV DEV (lbs/yr)	% PERV-IOUS DEV	PERVIOUS DEVELOPED (AC)	TP PERV DEV (lbs/yr)	% UNDEV	UNDEV (AC)	TP UNDEV (lbs/yr)	TP GROSS OVERALL (lbs/yr)
0-001	1,879,646	43.15	40%	17.26	39.01	60%	25.89	25.37	0%	0.00	0.00	64.38
0-002	107,786	2.47	65%	1.61	3.63	35%	0.87	0.85	0%	0.00	0.00	4.48
0-003	12,169,849	279.38	25%	69.85	157.85	50%	139.69	136.90	25%	69.85	23.05	317.80
0-004	225,522	5.18	1%	0.05	0.12	0%	0.00	0.00	99%	5.13	1.69	1.81
0-005	1,226,799	28.16	5%	1.41	3.18	95%	26.76	26.22	0%	0.00	0.00	29.40
0-006	649,428	14.91	5%	0.75	1.68	95%	14.16	13.88	0%	0.00	0.00	15.56
0-007	555,388	12.75	45%	5.74	12.97	55%	7.01	6.87	0%	0.00	0.00	19.84
0-008	1,347,374	30.93	45%	13.92	31.46	55%	17.01	16.67	0%	0.00	0.00	48.13
0-009	637,572	14.64	20%	2.93	6.62	80%	11.71	11.48	0%	0.00	0.00	18.09
0-010	84,764	1.95	20%	0.39	0.88	80%	1.56	1.53	0%	0.00	0.00	2.41
0-011	1,303,450	29.92	10%	2.99	6.76	50%	14.96	14.66	40%	11.97	3.95	25.37
0-012	390,789	8.97	50%	4.49	10.14	50%	4.49	4.40	0%	0.00	0.00	14.53
0-013	83,105	1.91	55%	1.05	2.37	45%	0.86	0.84	0%	0.00	0.00	3.21
0-014	226,750	5.21	40%	2.08	4.71	60%	3.12	3.06	0%	0.00	0.00	7.77
0-015	2,764,452	63.46	See Table 4.b. for computation of existing gross loading.									85.66
0-016	324,495	7.45	40%	2.98	6.73	60%	4.47	4.38	0%	0.00	0.00	11.11
0-017	183,712	4.22	40%	1.69	3.81	60%	2.53	2.48	0%	0.00	0.00	6.29
0-018	185,123	4.25	40%	1.70	3.84	60%	2.55	2.50	0%	0.00	0.00	6.34
0-019	633,685	14.55	40%	5.82	13.15	60%	8.73	8.55	0%	0.00	0.00	21.70
0-020	188,630	4.33	60%	2.60	5.87	40%	1.73	1.70	0%	0.00	0.00	7.57
0-021	4,479,194	102.83	30%	30.85	69.72	65%	66.84	65.50	5%	5.14	1.70	136.92
0-022	3,668,549	84.22	30%	25.27	57.10	50%	42.11	41.27	20%	16.84	5.56	103.93
0-023	112,530	2.58	55%	1.42	3.21	45%	1.16	1.14	0%	0.00	0.00	4.35
0-024	131,152	3.01	55%	1.66	3.74	45%	1.35	1.33	0%	0.00	0.00	5.07
0-025	4,453,721	102.24	40%	40.90	92.43	60%	61.35	60.12	0%	0.00	0.00	152.55
0-026	13,421	0.31	50%	0.15	0.35	50%	0.15	0.15	0%	0.00	0.00	0.50

OUTFALL OR OBSERVATION POINT	STORM SEWERSHED AREA (SF)	STORM SEWERSHED AREA (AC)	IMPERVIOUS DEVELOPED AREA			PERVIOUS DEVELOPED AREA			UNDEVELOPED AREA (OUTSIDE MS4)			TP GROSS OVERALL (lbs/yr)
			% IMPERV DEV	IMPERV DEVELOPED (AC)	TP IMPERV DEV (lbs/yr)	% PERV-IOUS DEV	PERVIOUS DEVELOPED (AC)	TP PERV DEV (lbs/yr)	% UNDEV	UNDEV (AC)	TP UNDEV (lbs/yr)	
0-027	727,003	16.69	45%	7.51	16.97	55%	9.18	9.00	0%	0.00	0.00	25.97
0-028	730,642	16.77	45%	7.55	17.06	55%	9.23	9.04	0%	0.00	0.00	26.10
0-029	306,197	7.03	15%	1.05	2.38	85%	5.97	5.86	0%	0.00	0.00	8.24
0-030	107,060	2.46	45%	1.11	2.50	55%	1.35	1.32	0%	0.00	0.00	3.82
0-031	171,221	3.93	45%	1.77	4.00	55%	2.16	2.12	0%	0.00	0.00	6.12
0-032	42,901	0.98	45%	0.44	1.00	55%	0.54	0.53	0%	0.00	0.00	1.53
0-033	210,681	4.84	45%	2.18	4.92	55%	2.66	2.61	0%	0.00	0.00	7.53
0-034	56,981	1.31	45%	0.59	1.33	55%	0.72	0.71	0%	0.00	0.00	2.04
0-035	251,100	5.76	35%	2.02	4.56	65%	3.75	3.67	0%	0.00	0.00	8.23
0-036	762,441	17.50	30%	5.25	11.87	70%	12.25	12.01	0%	0.00	0.00	23.87
0-037	475,826	10.92	40%	4.37	9.87	60%	6.55	6.42	0%	0.00	0.00	16.30
0-038	183,879	4.22	45%	1.90	4.29	55%	2.32	2.28	0%	0.00	0.00	6.57
0-039	16,819	0.39	50%	0.19	0.44	50%	0.19	0.19	0%	0.00	0.00	0.63
0-040	826,746	18.98	5%	0.95	2.14	10%	1.90	1.86	85%	16.13	5.32	9.33
0-041	112,177	2.58	20%	0.52	1.16	80%	2.06	2.02	0%	0.00	0.00	3.18
0-042	417,913	9.59	15%	1.44	3.25	85%	8.15	7.99	0%	0.00	0.00	11.24
0-043	129,651	2.98	10%	0.30	0.67	0%	0.00	0.00	90%	2.68	0.88	1.56
0-044	2,698,750	61.95	25%	15.49	35.00	75%	46.47	45.54	0%	0.00	0.00	80.54
0-045	541,264	12.43	40%	4.97	11.23	60%	7.46	7.31	0%	0.00	0.00	18.54
0-046	1,329,921	30.53	10%	3.05	6.90	25%	7.63	7.48	65%	19.85	6.55	20.93
0-047	1,528,761	35.10	25%	8.77	19.83	60%	21.06	20.64	15%	5.26	1.74	42.20
0-048	2,095,147	48.10	15%	7.21	16.31	55%	26.45	25.92	30%	14.43	4.76	46.99
0-052	2,053,190	47.13	15%	7.07	15.98	80%	37.71	36.95	5%	2.36	0.78	53.71
0-053	7,001,386	160.73	20%	32.15	72.65	40%	64.29	63.01	40%	64.29	21.22	156.87
0-054	776,505	17.83	25%	4.46	10.07	75%	13.37	13.10	0%	0.00	0.00	23.17
0-055	189,443	4.35	25%	1.09	2.46	75%	3.26	3.20	0%	0.00	0.00	5.65
0-056	358,489	8.23	25%	2.06	4.65	75%	6.17	6.05	0%	0.00	0.00	10.70
OP-001	1,301,975	29.89	15%	4.48	10.13	35%	10.46	10.25	50%	14.94	4.93	25.32
OP-002	865,824	19.88	5%	0.99	2.25	95%	18.88	18.51	0%	0.00	0.00	20.75

OUTFALL OR OBSERVATION POINT	STORM SEWERSHED AREA (SF)	STORM SEWERSHED AREA (AC)	IMPERVIOUS DEVELOPED AREA			PERVIOUS DEVELOPED AREA			UNDEVELOPED AREA (OUTSIDE MS4)			TP GROSS OVERALL (lbs/yr)
			% IMPERV DEV	IMPERV DEVELOPED (AC)	TP IMPERV DEV (lbs/yr)	% PERV-IOUS DEV	PERVIOUS DEVELOPED (AC)	TP PERV DEV (lbs/yr)	% UNDEV	UNDEV (AC)	TP UNDEV (lbs/yr)	
OP-003	918,501	21.09	20%	4.22	9.53	80%	16.87	16.53	0%	0.00	0.00	26.06
OP-004	200,545	4.60	25%	1.15	2.60	75%	3.45	3.38	0%	0.00	0.00	5.99
OP-005	818,595	18.79	10%	1.88	4.25	90%	16.91	16.57	0%	0.00	0.00	20.82
OP-006	281,500	6.46	25%	1.62	3.65	75%	4.85	4.75	0%	0.00	0.00	8.40
OP-007	581,625	13.35	10%	1.34	3.02	90%	12.02	11.78	0%	0.00	0.00	14.79
Willow Creek Riparian Area	1,484,094	34.07	See Table 4.d. for computation of existing gross loading.									13.25
	TOTALS:	1574.42			860.3			830.42			82.13	**1871.72**

TP LOADING RATES:		
	Impervious Developed Area:	2.26 lbs/acre/yr
	Pervious Developed Area:	0.98 lbs/acre/yr
	Undeveloped Area:	0.33 lbs/acre/yr

0-xxx: Outfall ID
OP-xxx: Observation Point ID

NOTE: Outfalls O-049, O-050 and O-051 are outside of the PRP planning area.

TABLE 2.
WILLOW CREEK PRP - MAIDENCREEK TOWNSHIP
MS4 OUTFALL STORM SEWERSHEDS - EXISTING POLLUTANT LOADING (NET AFTER EXISTING BMPS)
APRIL 2019

OUTFALL	TP GROSS OVERALL (lbs/yr)	EX BMP TYPE	% STORM SEWERSHED TO BMP	TP GROSS TO BMP (lbs/yr)	BMP EFFECTIVE TREATMENT %	TP AFTER BMP TREATMENT (lbs/yr)	TP NOT TO ANY BMP (lbs/yr)	TP NET OVERALL (lbs/yr)
0-001	64.38	VOC-B	95.0%	61.16	45%	33.64	3.22	36.86
0-002	4.48	n/a	0.0%	0.00	0%	0.00	4.48	4.48
0-003	317.80	DED	65.0%	206.57	20%	165.25	111.23	276.48
0-004	1.81	VOC-B	50.0%	0.90	45%	0.50	0.90	1.40
0-005	29.40	n/a	0.0%	0.00	0%	0.00	29.40	29.40
0-006	15.56	n/a	0.0%	0.00	0%	0.00	15.56	15.56
0-007	19.84	n/a	0.0%	0.00	0%	0.00	19.84	19.84
0-008	48.13	n/a	0.0%	0.00	0%	0.00	48.13	48.13
0-009	18.09	n/a	0.0%	0.00	0%	0.00	18.09	18.09
0-010	2.41	n/a	0.0%	0.00	0%	0.00	2.41	2.41
0-011	25.37	n/a	0.0%	0.00	0%	0.00	25.37	25.37
0-012	14.53	n/a	0.0%	0.00	0%	0.00	14.53	14.53
0-013	3.21	DED	90.0%	2.89	20%	2.31	0.32	2.63
0-014	7.77	n/a	0.0%	0.00	0%	0.00	7.77	7.77
0-015	85.66	n/a	0.0%	0.00	0%	0.00	85.66	85.66
0-016	11.11	n/a	0.0%	0.00	0%	0.00	11.11	11.11
0-017	6.29	n/a	0.0%	0.00	0%	0.00	6.29	6.29
0-018	6.34	n/a	0.0%	0.00	0%	0.00	6.34	6.34
0-019	21.70	n/a	0.0%	0.00	0%	0.00	21.70	21.70
0-020	7.57	FB	100.0%	7.57	50%	3.78	0.00	3.78
0-021	136.92	DED	100.0%	136.92	20%	109.53	0.00	109.53
0-022	103.93	n/a	0.0%	0.00	0%	0.00	103.93	103.93
0-023	4.35	n/a	0.0%	0.00	0%	0.00	4.35	4.35
0-024	5.07	n/a	0.0%	0.00	0%	0.00	5.07	5.07
0-025	152.55	DED	90.0%	137.29	20%	109.83	15.25	125.09
0-026	0.50	n/a	0.0%	0.00	0%	0.00	0.50	0.50
0-027	25.97	FB	100.0%	25.97	50%	12.98	0.00	12.98
0-028	26.10	FB	100.0%	26.10	50%	13.05	0.00	13.05
0-029	8.24	FB	100.0%	8.24	50%	4.12	0.00	4.12
0-030	3.82	FB	100.0%	3.82	50%	1.91	0.00	1.91
0-031	6.12	FB	100.0%	6.12	50%	3.06	0.00	3.06
0-032	1.53	FB	100.0%	1.53	50%	0.77	0.00	0.77

OUTFALL	TP GROSS OVERALL (lbs/yr)	EX BMP TYPE	% STORM SEWERSHED TO BMP	TP GROSS TO BMP (lbs/yr)	BMP EFFECTIVE TREATMENT %	TP AFTER BMP TREATMENT (lbs/yr)	TP NOT TO ANY BMP (lbs/yr)	TP NET OVERALL (lbs/yr)
0-033	7.53	FB	100.0%	7.53	50%	3.76	0.00	3.76
0-034	2.04	FB	100.0%	2.04	50%	1.02	0.00	1.02
0-035	8.23	FB	100.0%	8.23	50%	4.12	0.00	4.12
0-036	23.87	DED	15.0%	3.58	20%	2.86	20.29	23.16
0-037	16.30	DED	100.0%	16.30	20%	13.04	0.00	13.04
0-038	6.57	n/a	0.0%	0.00	0%	0.00	6.57	6.57
0-039	0.63	n/a	0.0%	0.00	0%	0.00	0.63	0.63
0-040	9.33	n/a	0.0%	0.00	0%	0.00	9.33	9.33
0-041	3.18	DED	100.0%	3.18	20%	2.55	0.00	2.55
0-042	11.24	n/a	0.0%	0.00	0%	0.00	11.24	11.24
0-043	1.56	n/a	0.0%	0.00	0%	0.00	1.56	1.56
0-044	80.54	DED	80.0%	64.43	20%	51.55	16.11	67.65
0-045	18.54	n/a	0.0%	0.00	0%	0.00	18.54	18.54
0-046	20.93	DED	75.0%	15.70	20%	12.56	5.23	17.79
0-047	42.20	VOC-B	100.0%	42.20	45%	23.21	0.00	23.21
0-048	46.99	n/a	0.0%	0.00	0%	0.00	46.99	46.99
0-052	53.71	DED	75.0%	40.28	20%	32.23	13.43	45.65
0-053	156.87	n/a	0.0%	0.00	0%	0.00	156.87	156.87
0-054	23.17	n/a	0.0%	0.00	0%	0.00	23.17	23.17
0-055	5.65	n/a	0.0%	0.00	0%	0.00	5.65	5.65
0-056	10.70	n/a	0.0%	0.00	0%	0.00	10.70	10.70
OP-001	25.32	n/a	0.0%	0.00	0%	0.00	25.32	25.32
OP-002	20.75	n/a	0.0%	0.00	0%	0.00	20.75	20.75
OP-003	26.06	n/a	0.0%	0.00	0%	0.00	26.06	26.06
OP-004	5.99	n/a	0.0%	0.00	0%	0.00	5.99	5.99
OP-005	20.82	n/a	0.0%	0.00	0%	0.00	20.82	20.82
OP-006	8.40	n/a	0.0%	0.00	0%	0.00	8.40	8.40
OP-007	14.79	VOC-B	100.0%	14.79	45%	8.14	0.00	8.14
Willow Creek Riparian Area	13.25	n/a	0.0%	0.00	0%	0.00	13.25	13.25
	1871.72						**NET TP (lbs/yr) =**	**1644.15**

ABBREV.:
DED - Dry Extended Detention Basin
FB - Forest Buffer
VOC-B - Vegetated Open Channel - B Soils

TABLE 3.
WILLOW CREEK PRP - MAIDENCREEK TOWNSHIP
PROPOSED POLLUTANT LOADING (WITH PROPOSED BMPS)
APRIL 2019

OUTFALL	STORM SEWERSHED AREA (AC)	TP NET OVERALL (lbs/yr)	PROPOSED BMP TYPE	PROPOSED BMP EFFECTIVE-NESS	TP AFTER BMP REDUCTION (lbs/yr)
0-001	43.15	36.86	--	0%	36.86
0-002	2.47	4.48	--	0%	4.48
0-003	279.38	276.48	--	0%	276.48
0-004	5.18	1.40	FB[1]	0%	1.40
0-005	28.16	29.40	FB[1]	0%	29.40
0-006	14.91	15.56	FB[1]	0%	15.56
0-007	12.75	19.84	FB	50%	9.92
0-008	30.93	48.13	FB	50%	24.06
0-009	14.64	18.09	FB[1]	0%	18.09
0-010	1.95	2.41	FB	50%	1.20
0-011	29.92	25.37	FB[1]	0%	25.37
0-012	8.97	14.53	FB	50%	7.27
0-013	1.91	2.63	--	0%	2.63
0-014	5.21	7.77	FB[1]	0%	7.77
0-015	63.46	85.66	CONVERT[1] (see Table 4.c.)		58.82
0-016	7.45	11.11	FB	50%	5.56
0-017	4.22	6.29	FB[1]	0%	6.29
0-018	4.25	6.34	FB[1]	0%	6.34
0-019	14.55	21.70	FB[1]	0%	21.70
0-020	4.33	3.78	--	0%	3.78
0-021	102.83	109.53	--	0%	109.53
0-022	84.22	103.93	FB[1]	0%	103.93
0-023	2.58	4.35	FB	50%	2.18
0-024	3.01	5.07	FB	50%	2.54
0-025	102.24	125.09	--	0%	125.09
0-026	0.31	0.50	--	0%	0.50
0-027	16.69	12.98	--	0%	12.98
0-028	16.77	13.05	--	0%	13.05
0-029	7.03	4.12	--	0%	4.12
0-030	2.46	1.91	--	0%	1.91
0-031	3.93	3.06	--	0%	3.06
0-032	0.98	0.77	--	0%	0.77
0-033	4.84	3.76	--	0%	3.76
0-034	1.31	1.02	--	0%	1.02

0-035	5.76	4.12	--	0%	4.12
0-036	17.50	23.16	--	0%	23.16
0-037	10.92	13.04	--	0%	13.04
0-038	4.22	6.57	--	0%	6.57
0-039	0.39	0.63	--	0%	0.63
0-040	18.98	9.33	--	0%	9.33
0-041	2.58	2.55	--	0%	2.55
0-042	9.59	11.24	--	0%	11.24
0-043	2.98	1.56	--	0%	1.56
0-044	61.95	67.65	--	0%	67.65
0-045	12.43	18.54	--	0%	18.54
0-046	30.53	17.79	--	0%	17.79
0-047	35.10	23.21	--	0%	23.21
0-048	48.10	46.99	--	0%	46.99
0-052	47.13	45.65	--	0%	45.65
0-053	160.73	156.87	--	0%	156.87
0-054	17.83	23.17	--	0%	23.17
0-055	4.35	5.65	--	0%	5.65
0-056	8.23	10.70	--	0%	10.70
OP-001	29.89	25.32	--	0%	25.32
OP-002	19.88	20.75	--	0%	20.75
OP-003	21.09	26.06	--	0%	26.06
OP-004	4.60	5.99	--	0%	5.99
OP-005	18.79	20.82	--	0%	20.82
OP-006	6.46	8.40	--	0%	8.40
OP-007	13.35	8.14	--	0%	8.14
Willow Creek Riparian Area	34.07	13.25	CONVERT[2] (see Table 4.e.)		2.81
		1644.15			1554.14

Table Summary:

Net Overall TP:	1644.15 lbs/yr
TP Reduction Required (5%):	82.21 lbs/yr
TP After BMP Reduction:	1554.14 lbs/yr
TP Reduction Actual:	90.00 lbs/yr
% TP Reduction Actual:	**5.47%**

Notes/Abbreviations:

CONVERT[1]	Ag Field Retirement/Conversion from Ag to Meadow (See Tables 4.a., 4.d., and 4.e.)
CONVERT[2]	Riparian Forest Buffer/Conversion from Meadow to Forest (See Tables 4.a., 4.d., and 4.e.)
FB	Forest Buffer - sewersheds counted for 50% reduction (approx. 68 acres - see note below)
FB[1]	Forest Buffer - sewershed is tributary to FB but no reduction applied (see note below)
Note:	Chesapeake Bay guidelines limit the credited area tributary to a riparian forest buffer to two times the buffer area when considering phosphorus reductions. Proposed riparian buffer area is 34 acres; therefore, 68 acres is the limit for tributary sewershed treatment credit. The sewersheds with "FB" denoted above total 68 acres; the sewersheds with "FB[1]" denoted are not credited.

TABLE 4.
WILLOW CREEK PRP - MAIDENCREEK TOWNSHIP
"CONVERT" BMP REDUCTION - STORMSHEDS O-015 & WILLOW CREEK RIPARIAN BUFFER
DECEMBER 2018

Table 4.a. Use Lake Ontelaunee TMDL Source Allocation to Estimate TP Loading Rate

Source[1]	TMDL Area ha	TMDL Ex. TP Load t/yr	TP Load Rate t/yr/ha	TP Load Rate lb/yr/ac
Hay/Pasture	9,061	3.95	0.00044	0.39
Cropland	19,994	46.93	0.00235	2.09
Deciduous Forest	14,481	1.34	0.00009	0.08
High Intensity	242	0.35	0.00145	1.29
Low Intensity	646	0.07	0.00011	0.10
MS4	54	0.13	0.00241	2.15

Notes:

1. Sources taken from the Lake Ontelaunee TMDL, Table ES-2. and are those that are in common with sources in O-015 and the Willow Creek Riparian Buffer (see below).
2. Loading Rates are computed to apply to specific O-015 sources in Table 4.b.
3. Loading Rates are computed to apply to specific Willow Creek Riparian Buffer sources in Table 4.d.
4. "t" is metric ton.

Table 4.b. Apply Loading Rate from Table 4.a. to Areas of Actual Existing Sources in O-015

Source	TP Load Rate lb/yr/ac	O-015 Area sf	O-015 Area ac	O-015 Ex. TP Load lb/yr	
Hay/Pasture	0.39	288,932	6.63	2.58	
Cropland[1]	2.09	685,697	15.74	32.96	
High Intensity	1.29	1,100,000	25.25	32.58	
Low Intensity	0.10	350,000	8.03	0.78	
MS4	2.15	339,823	7.80	16.76	
	Totals	2,764,452	63.46	85.66	*See this value in Tables 1 & 2*

Table 4.c. Compute Proposed Loading with All Cropland as Hay/Pasture in O-015

Source	TP Load Rate lb/yr/ac	O-015 Area sf	O-015 Area ac	O-015 Prop. TP Load lb/yr	
Hay/Pasture	0.39	974,629	22.37	8.70	
Cropland[1]	2.09	-	-	0.00	
High Intensity	1.29	1,100,000	25.25	32.58	
Low Intensity	0.10	350,000	8.03	0.78	
MS4	2.15	339,823	7.80	16.76	
	Totals	2,764,452	63.46	58.82	*See this value in Table 3*

Notes:

1. Cropland area is "zeroed out" and added to Hay/Pasture to simulate cropland conversion to meadow.

Table 4.d. Apply Loading Rate from Table 4.a. to Areas of Actual Existing Sources in the Willow Creek Riparian Buffer

Source	TP Load Rate lb/yr/ac	Riparian Buffer Area sf	Riparian Buffer Area ac	Rip. Buffer Ex. TP Load lb/yr	
Hay/Pasture	0.39	1,484,094	34.07	13.25	
Deciduous Forest	0.08	-	-	0.00	
	Totals	1,484,094	34.07	13.25	*See this value in Tables 1 & 2*

Table 4.e. Compute Proposed Loading with All Deciduous Forest in the Willow Creek Riparian Buffer

Source	TP Load Rate lb/yr/ac	Riparian Buffer Area sf	Riparian Buffer Area ac	Rip. Buffer Ex. TP Load lb/yr	
Hay/Pasture[1]	0.39	-	-	0.00	
Deciduous Forest	0.08	1,484,094	34.07	2.81	
	Totals	1,484,094	34.07	2.81	*See this value in Table 3*

Notes:

1. Hay/Pasture area is "zeroed out" and added to Deciduous Forest to simulate Hay/Pasture conversion to the riparian buffer.

Table ES-1. Lake Ontelaunee Phosphorus TMDL Table (metric tons per year) (from EPA TMDL Lake Ontelaunee, Berks and Lehigh Counties, PA)

Source	Area (ha)	Existing Load (t/yr)	% of Total Existing Load	Existing UAL (t/yr*ha)	Allocated Load (t/yr)	% of Total Allocated Load	Allocated UAL (t/yr*ha)	Percent reduction (%)
Hay/Pasture	9,061	3.95	4.8	0.00044	1.00	9.9	0.00011	75
Cropland	19,994	46.93	57.0	0.00235	2.35	23.2	0.00012	95
Coniferous	1,135	0.02	0.0	0.00002	0.02	0.2	0.00002	0
Mixed Forest	948	0.09	0.1	0.00009	0.09	0.9	0.00010	0
Deciduous Forest	14,481	1.34	1.6	0.00009	1.34	13.2	0.00009	0
Unpaved Roads	44	0.37	0.4	0.00841	0.02	0.2	0.00042	95
Quarry	16	0.06	0.1	0.00375	0.00	0.0	0.00022	93
Transitional	1,490	16.27	19.8	0.01092	0.81	8.0	0.00054	95
Low Intensity	646	0.07	0.1	0.00011	0.07	0.7	0.00011	0
High Intensity	242	0.35	0.4	0.00145	0.05	0.5	0.00022	85
MS4	54	0.13	0.2	0.00232	0.01	0.1	0.00015	94
Point Source	--	3.65	4.4	--	2.76	27.2	--	24
Groundwater	--	6.06	7.4	--	1.52	15.0	--	75
Septic Systems	--	3.03	3.7	--	0.09	0.9	--	97
Total	48,111	82.31	100.0	0.00171	10.13	100.0	0.00021	88

TABLE 5.
WILLOW CREEK PRP - MAIDENCREEK TOWNSHIP
EXISTING BMP DATA
DECEMBER 2018

OUTFALL SHED AREA	EX BMP TYPE	LAT	LONG	PERMIT #	DATE INSTALLED	O&M REQUIREMENTS (T=TWP.; P=PRIVATE)
0-001	VOC-B	40-26-53.91	-75-51-41.11	None	1991	Mow, clean, repair as needed (T)
0-003	DED(1)	40-26-45.76	-75-52-10.68	PA-R-10-C449	2007	Maintain amended soils; manage vegetation (P)
0-003	DED(2)	40-26-38.01	-75-52-06.43	PA-R-10-C449	2007	Mow, clean, repair as needed (P)
0-003	DED(3)	40-26-30.93	-75-52-01.68	None	1985	"
0-003	DED(4)	40-26-42.21	-75-51-47.41	None	1992	Clean, repair as needed, manage vegetation (P)
0-004	VOC-B	40-27-07.72	-75-52-43.62	PA-S-10-C051	2003	Mow, clean, repair as needed (P)
0-013	DED	40-26-54.07	-75-53-55.23	None	2000	"
0-015	DED	40-26-35.27	-75-53-25.64	None	1991	"
0-020	FB	40-26-51.99	-75-53-05.43	None	1990	Manage woodland (T)
0-021	DED	40-27-08.39	-75-52-37.79	PA-S-10-C051	2003	Mow, clean, repair as needed (P)
0-025	DED(1)	40-26-49.10	-75-52-40.29	None	2000	Mow, clean, repair as needed (T)
0-025	DED(2)	40-27-01.35	-75-52-38.48	None	1998	Mow, clean, repair as needed (P)
0-025	DED(3)	40-26-41.63	-75-52-23.66	PAG2000607022	2004	Maintain amended soils; manage vegetation (P)
0-027	FB	40-26-48.90	-75-53-03.74	None	1995	Manage woodland (T)
0-028	FB	40-26-39.28	-75-52-55.40	None	1995	"
0-029	FB	40-26-48.08	-75-53-04.85	None	1995	"
0-030	FB	40-26-47.30	-75-53-03.31	None	1995	"
0-031	FB	40-26-45.08	-75-53-02.19	None	1995	"
0-032	FB	40-26-43.05	-75-53-00.76	None	1995	"
0-033	FB	40-26-40.10	-75-52-58.40	None	1995	"
0-034	FB	40-26-37.95	-75-52-57.18	None	1995	"
0-035	FB	40-26-35.02	-75-52-55.71	None	1995	"
0-036	DED	40-26-31.68	-75-52-38.19	None	1990	Mow, clean, repair as needed (P)
0-037	DED	40-26-30.19	-75-53-01.24	None	1988	"
0-041	DED	40-26-22.61	-75-52-43.47	None	1992	"
0-044	DED	40-26-17.06	-75-52-24.66	None	1994	Clean, repair as needed, manage vegetation (P)
0-046	DED(1)	40-26-45.28	-75-51-12.62	None	1999	Mow, clean, repair as needed (P)
0-046	DED(2)	40-26-45.77	-75-51-06.46	None	1995	"
0-047	VOC-B	40-27-01.49	-75-52-22.28	None	1990	Clean, repair as needed, manage vegetation (P)
0-052	DED	40-26-24.62	-75-51-41.26	PA-R-10-C309R	2003	Mow, clean, repair as needed (P)
OP-007	VOC-B	40-26-50.49	-75-51-38.50	None	2007	Mow, clean, repair as needed (T)

ABBREV.: DED - Dry Extended Detention Basin
FB - Forest Buffer
VOC-B - Vegetated Open Channel - B Soils

NOTE: All BMPs used for existing credit are functioning as designed.

APPENDIX B

DEP DOCUMENTATION

MS4 Name	NPDES ID	Individual Permit Required?	Reason	Impaired Downstream Waters or Applicable TMDL Name	Requirement(s)	Other Cause(s) of Impairment
Berks County						
HEREFORD TWP		Yes	SP	Swabia Creek	Appendix B-Pathogens (5), Appendix E-Siltation (5)	Other Habitat Alterations (4c)
				Perkiomen Creek	Appendix E-Nutrients, Siltation (5)	Thermal Modifications (5)
				Green Lane Reservoir	Appendix E-Organic Enrichment/Low D.O. (4a)	
				Little Lehigh Creek	Appendix E-Siltation (5)	
KENHORST BORO	PAG133515	No		Schuylkill River	Appendix C-PCB (4a)	
				Schuylkill River PCB TMDL	Appendix C-PCB (4a)	
LAURELDALE BORO	PAG133518	No		Laurel Run	Appendix E-Siltation (5)	Other Habitat Alterations (4c)
				Schuylkill River	Appendix C-PCB (4a)	
				Schuylkill River PCB TMDL	Appendix C-PCB (4a)	
				Bernhart Creek TMDL	Appendix A-Metals (4a)	TDS (4a)
LEESPORT BORO	PAG133527	No		Schuylkill River	Appendix C-PCB (4a)	
				Unnamed Tributaries to Schuylkill River		Water/Flow Variability (4c)
				Schuylkill River PCB TMDL	Appendix C-PCB (4a)	
LONGSWAMP TWP	PAI133512*	Yes	SP, WI	Little Lehigh Creek	Appendix B-Pathogens (5), Appendix E-Siltation (5)	
				Unnamed Tributaries to Little Lehigh Creek	Appendix E-Organic Enrichment/Low D.O. (5)	Cause Unknown (5), Other Habitat Alterations, Water/Flow Variability (4c)
				Swabia Creek	Appendix B-Pathogens (5), Appendix E-Siltation (5)	Other Habitat Alterations (4c)
LOWER ALSACE TWP	PAG133519	No		Antietam Creek	Appendix B-Pathogens (5)	
				Schuylkill River PCB TMDL	Appendix C-PCB (4a)	
				Unnamed Tributaries to Schuylkill River		Other Habitat Alterations (4c)
				Schuylkill River	Appendix C-PCB (4a)	
LOWER HEIDELBERG TWP	PAG133520	No		Blue Marsh Lake	Appendix B-Pathogens (5), Appendix E-Nutrients, Organic Enrichment/Low D.O. (5)	
				Manor Creek	Appendix E-Nutrients, Siltation (4a)	
				Schuylkill River	Appendix C-PCB (4a)	
				Spring Creek	Appendix E-Nutrients, Siltation (5)	
				Tulpehocken Creek	Appendix E-Nutrients (5)	
				Cacoosing Creek	Appendix B-Pathogens (5), Appendix E-Nutrients, Siltation (5)	
				Little Cacoosing Creek	Appendix E-Nutrients, Siltation (4a)	
MAIDENCREEK TWP	PAG133521	No		Willow Creek	Appendix B-Pathogens (5), Appendix E-Nutrients (5)	Flow Alterations (4c)
				Lake Ontelaunee TMDL	TMDL Plan-Nutrients, Suspended Solids (4a)	
				Maiden Creek	Appendix B-Pathogens (5)	Other Habitat Alterations (4c)
				Schuylkill River	Appendix C-PCB (4a)	
				Unnamed Tributaries to Willow Creek	Appendix B-Pathogens (5)	

ATTACHMENT B

DEVELOPED LAND LOADING RATES FOR PA COUNTIES[1,2,3]

County	Category	Acres	TN lbs/acre/yr	TP lbs/acre/yr	TSS (Sediment) lbs/acre/yr
Adams	impervious developed	10,373.2	33.43	2.1	1,398.77
	pervious developed	44,028.6	22.99	0.8	207.67
Bedford	impervious developed	9,815.2	19.42	1.9	2,034.34
	pervious developed	19,425	17.97	0.68	301.22
Berks	impervious developed	1,292.4	36.81	2.26	1,925.79
	pervious developed	5,178.8	34.02	0.98	264.29
Blair	impervious developed	3,587.9	20.88	1.73	1,813.55
	pervious developed	9,177.5	18.9	0.62	267.34
Bradford	impervious developed	10,423	14.82	2.37	1,880.87
	pervious developed	23,709.7	13.05	0.85	272.25

For land area outside of the urbanized area, undeveloped land loading rates may be used where appropriate. When using the simplified method, DEP recommends the following loading rates (for any county) for undeveloped land:

- TN – 10 lbs/acre/yr
- TP – 0.33 lbs/acre/yr
- TSS (Sediment) – 234.6 lbs/acre/yr

These values were derived by using the existing loads for each pollutant, according to the 2014 Chesapeake Bay Progress Run, and dividing by the number of acres for the unregulated stormwater subsector.

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 C

RIPARIAN BUFFER – HABITAT RESTORATION REPORT

WILLOW CREEK HABITAT RESTORATION PROJECT

Sponsor: Fish & Wilflife Service Office: Northeast Fisheries Center

Project Partners: Pennsylvania Fish & Boat Commission, Eastern Brook Trout Joint Venture, Berks Conservancy, Fleetwood High School Outdoor Club, Fleetwood Middle School, Maidencreek Township Parks and Recreation Board, Maidencreek Watershed Association, Reading Area Community College, Reading Area Water Authority, Schuylkill River National and State Heritage Area, Trout Unlimited (Tulpehocken Chapter), Maidencreek Township Authority, Boy Scouts of America Troop 183

Project Costs:

Total Cost - $121,800 - projected $161,246.36 - actual
Non Federal Amount - $71,800 – projected
$74,031.70 – in kind service and actual paid by Twp.
$37,214.66 – additional expenses covered by other grants
Federal Amount - $0

Funding Sources:

Partner	Activity	Cash Match	In Kind	Totals
PA Fish Commission	Materials for fish habitat, project oversight & design	7,214.66 (CHIP Grant)	32,500.95	39,715.61
Maidencreek Township	Materials, labor, equipment	16,919.38	12,703.17	29,622.55
Schuylkill River Heritage	Equipment Rental, riparian planting, materials	30,000.00 (SRGA Grant)		30,000.00
PA EBTJV	Equipment Rental, riparian planting, materials, signs	50,000.00		50,000.00
Berks County Conservancy	Riparian Planting		982.56	982.56

	design & oversight, trees and shrubs			
Maidencreek Watershed Association/Kutztown University	Volunteer hours for buffer planting	0	427.20	427.20
Trout Unlimited	Volunteer hours for buffer planting	0	1,110.72	1,110.72
Fleetwood High School/Outdoor Club	Volunteer hours for buffer planting	0	4,902.12	4,902.12
Fleetwood Middle School	Volunteer hours for buffer planting	0	2,221.44	2,221.44
Reading Area Community College	Volunteer hours for buffer planting	0	875.76	875.76
Reading Area Water Authority	Volunteer hours for invasive species removal	0	1,388.40	1,388.40
		104,134.04	57,112.32	161,246.36

Action Strategy Implemented In the Project:

Improve fish habitat and stabilize stream bank to narrow and deepen the channel which will encourage macroinvertebrate habitation and reproduction.

Plant a riparian buffer to provide shade so temperatures stay at trout suitable levels all year. Promote diversity and overall abundance of flora and fauna.

Educate and inform the public of the project

Provide angling opportunities.

Priority Score of the Sub-Watershed: Gray

State Wildlife Action Plan Listed Habitat Conservation Goal Supported by the Project: The restoration actions will help restore the Willow Creek, a high priority lotic and riparian habitat and improve water quality in the Schuylkill River Watershed.

Methods Used: Used volunteers and Maidencreek Township Road Crew to re-vegetate the riparian buffer and install fish habitats. PA Fish Commission provided project oversite for the habitat installation and Berks Conservancy provided project oversite for the riparian buffer design and installation. Educated the public through mailings, newspaper articles and informational kiosks in the project area.

Project Outcomes: Fish habitat and stream bank stabilization were addressed by Maidencreek Township Road Crew and the PA Fish Commission installing 16 mud sills, 100 random boulders and 65 deflectors along 1.2 miles of the Willow Creek. These devices will help narrow and deepen the channel which will encourage macroinvertebrate habitation and reproduction.

A riparian buffer (native trees and shrubs) was planted in six acres by Maidencreek Township Road Crew, the Berks Conservancy and volunteers. Vegetation was allowed to grow without cutting and invasive species were removed from plantings by volunteers. Once mature, the trees will provide shade so temperatures stay at trout suitable levels all year. Grass was cut to provide a twelve foot wide trail for access to the stream for fishing.

Pamphlets were distributed to everyone along the stream corridor via mail and several articles were published in the Township newsletters as well as local newspapers. This spurred additional interest in the project and two members of Boy Scout Troop 183 installed three bat boxes and fifteen birdhouses within the project area.

Informational signs were installed throughout the project area to commemorate the effort and educate trail users on the project.

PA Fish Commission will continue to monitor the site after completion. An Open Space Management Plan was created and adopted so future generations have a manual to follow.

Brook Trout Population Response to the Project Outcome: Sampling was taken in July 2014 and there has been no significant increase in trout population to date. However, stream bank erosion has stabilized and the riparian buffer is growing at a steady pace.

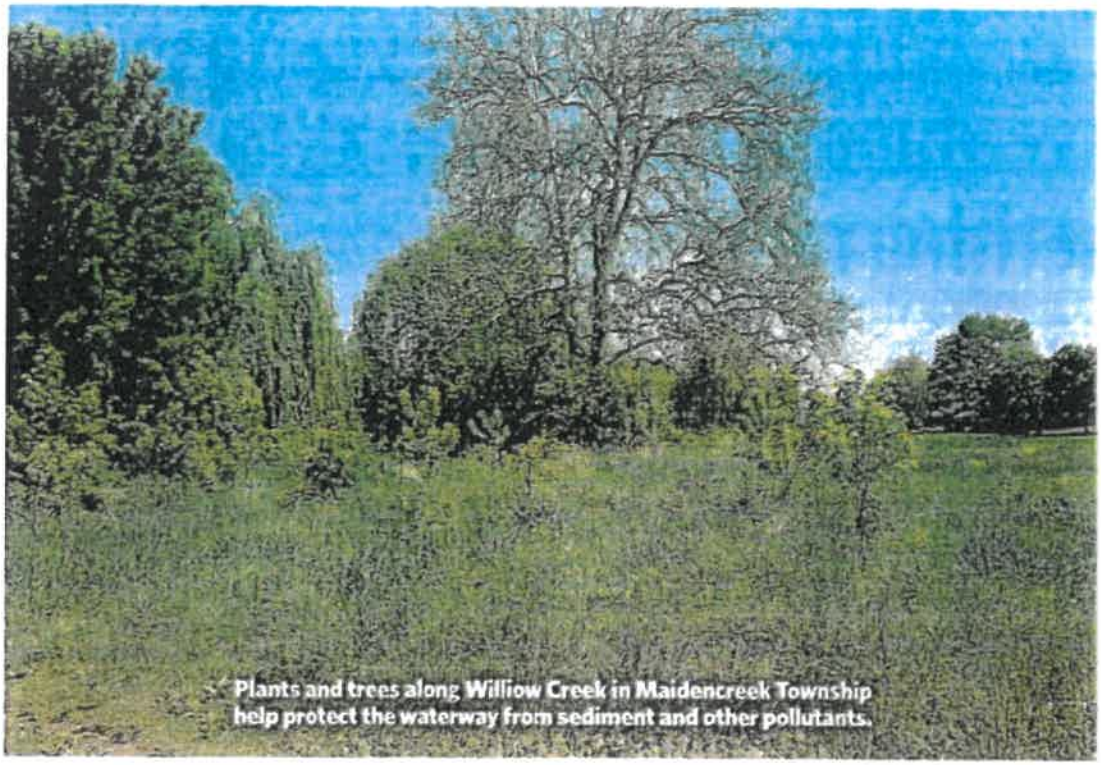
Number of Stream Miles: 1.2 miles

List of Accomplishments

- Larry Lloyd of the Berks Conservancy treated noxious weeds on June 10, September 12, 13, and 14, 2011 between Schaeffer Road to 150ft further downstream from the tributary at the playground on the South side of the creek. Weeds treated included poison hemlock, Canada thistle, crown vetch, mile a minute, teasel, bindweed, tree of heaven and Japanese knotweed. The Township Road Crew mowed along areas of the stream to prevent thistle from going to seed in untreated areas.
- A pamphlet was created by John Buzzar of PA Fish and Boat. The pamphlet titled, "Willow Creek Habitat Restoration Project – Improving Your Water Resources" and mailed by the Township staff to the ninety property owners along the stream corridor on June 22, 2011. It has also been posted on the Township website and put at the municipal building for residents and visitors to take.
- Fish habitats and stream bank stabilization were installed in the area from Schaeffer Road to the Cornerstone Drive Playground by PA Fish and Boat and Township Road Crew June 20 to June 29, 2011.
- John Buzzar of PA Fish and Boat attended the July 14, 2011 Maidencreek Township Board of Supervisors meeting to answer questions from the public.
- A riparian buffer was designed by Larry Lloyd of the Berks Conservancy.
- The Township ordered 450 trees and shrubs for the riparian buffer. The Township Road Crew dug holes and volunteers installed the plants on October 15, 2011 on the Cornerstone Drive side of the stream from Schaeffer Road to the Cornerstone Playground. Volunteer hours totaled 253.5 hours. Volunteers from the Fleetwood High School and Middle School (185.5 hours), Kutztown University (20 hours), and Trout Unlimited (48 hours) participated and were overseen by the Berks Conservancy and PA Fish and Boat.
- May 25, 2012 a walking trail was marked out by Keith Shuman of the Maidencreek Township Road Crew and Larry Lloyd and was mowed by the Township Road Crew.

- Larry Lloyd of the Berks Conservancy treated noxious weeds on June 8, and September 11-13, 2012. The June treatment was to remove vegetation that was growing around the plantings between Schaeffer Road to 150ft further downstream from the tributary at the playground on the South side of the creek, some of which was done chemically and some pulling by hand. The September treatment occurred between the playground at Cornerstone Drive and Route 73. Weeds treated included poison hemlock, Canada thistle, crown vetch, mile a minute, teasel, bindweed, tree of heaven and Japanese knotweed. This treatment was in preparation for fall planting of 600 trees and shrubs.
- The pamphlet created by John Buzzar of PA Fish and Boat titled, "Willow Creek Habitat Restoration Project – Improving Your Water Resources" is posted on the Township website and put at the municipal building for residents and visitors to take. All new homeowners receive this information upon moving into the Township and pamphlets were also distributed at Community Day.
- June 26 to 29, 2012 the Township Road Crew mowed the meadow along the stream.
- July 1 to 6, 2012 the Township Road Crew staged all materials in meadow for the fish habitat structures.
- Fish habitats and stream bank stabilization were installed in the area from the Cornerstone Drive Playground to Route 73 by PA Fish and Boat and Township Road Crew between July 9 and July 12, 2012.
- July 11 and 12, 2012 the stream bank was planted with a 50/50 mix of annual rye grass and stream bank rye grass under the direction of Larry Lloyd.
- The Township Road Crew dug the holes on October 1 to 4, 2012 and volunteers installed 600 trees and plants on October 13 and 20, 2012 on the Cornerstone Drive side of the stream from Cornerstone Drive Playground to Route 73.
- The Township Road Crew set boulders in the stream in February 2013. This completed the installation of all trout habitat structures.
- This project has drawn the attention of local Boy Scout Troops and in March, one leader, Geoffrey Price, constructed and installed three bat boxes in the project limits. The Township paid for all materials.

- From March 21, 2013 through April 13, 2013, the Township purchased and planted another 600 trees in the riparian buffer area with the help of volunteers from Reading Area Community College.
- The Road Crew mowed and maintained the grass trail through the project in May, June and August of 2013.
- In June and September of 2013 Larry Lloyd of Berks Conservancy pulled invasive species from along the Willow Creek.
- The Township purchased 29 trees, each 12 feet in height, in September 2013 and were planted by the Township Road Crew in October 2013 along the stream.
- A local Boy Scout, Brandon Beshore, proposed an Eagle Scout Project to build 15 bird houses along the Willow Creek from Cornerstone Drive to Schaeffer Road. The Township Park and Recreation Board approved the project and Brandon Beshore completed the project in October 2013, with all materials purchased by the Township.
- The Road Crew mowed and maintained the grass trail through the project in May, June and August of 2014.
- In June and September of 2014 Larry Lloyd of Berks Conservancy, along with interns from Albright College and volunteers from the Reading Area Water Authority pulled invasive species from along the Willow Creek.
- September 15 and 16, 2014 Township Road Crew installed informative signs along the walking trail of the Willow Creek.
- Larry Lloyd of the Berks Conservancy will complete the riparian planting of 56 native trees in October 2014 to replace those lost to animal activity.



Plants and trees along Willow Creek in Maidencreek Township help protect the waterway from sediment and other pollutants.

COURTESY OF BERKS COUNTY CONSERVANCY

It takes a community to clean a stream

Larry Lloyd *is a senior ecologist with the Berks County Conservancy.*

BY LARRY LLOYD

IT IS puzzling how water, our most precious and essential natural resource, is at the same time our most taken-for-granted gift. With the human body composed of greater than 95 percent water and with all aspects of health and life on planet Earth dependent on water, it would stand to reason that clean, sustainable drinking water would be a top priority. Do you know where your drinking water comes from and how it got there?

Today, there are many stressors to water quality, and our lack of attention and lack of action to protect our water quality is negatively impacting the availability of clean water.

Water is a community value, because it takes respect and action by all members of our communities to ensure quality drinking water. What we drink is the result of positive and negative human behaviors on the land, and everyone is downstream from someone.

There are some local communities in Berks County that are taking their link in the chain of protecting our water seriously. Among those forward-thinking communities using best management practices to enhance drinking water quality, Maidencreek Township is a shining and instructive example.

The Willow Creek runs through Ruscombmanor Township, Fleetwood, and Maidencreek and Ontelaunee townships on its way to join the Maiden Creek near its confluence with the Schuylkill River. The Willow Creek has stream segments that support breeding native brook trout. Native, as opposed to stocked, trout are bio-indicators of good water quality. Their presence in a stream means the process of cleaning water is functioning. The Willow Creek, like many streams, is an impaired waterway, primarily because of storm runoff from residential, commercial, industrial and agricultural impervious surfaces.

Instead of feeling daunted by these many challenges, Maidencreek officials and the state Fish and Boat Commission procured grant funding to help improve the water quality of the Willow Creek by installing aquatic habitat structures to reduce erosion and the accumulation of sediment, and by planting native trees along the stream to shade and cool the water, stabilize soil and serve as a riparian buffer from surrounding residences.

The Berks Conservancy helped the Fish and Boat Commission and the township develop a plan to manage Maidencreek's milelong, 44 acre riparian buffer along the creek. Between fall 2011 and spring 2013, more than 1,900 5-foot-tall native trees were planted.

Participating in the tree planting were the Fish and Boat Commission; Maidencreek Township supervisors and management staff; the township Parks and Recreation Board; Conservancy staff and members; the Maiden Creek Watershed Association; students from Kutztown University, Albright College, Reading Area Community College and Exeter High School; Tulpehocken Trout Unlimited; and students from the Fleetwood School District's elementary school, middle school and high school, who participated in all four plantings from start to finish.

This extraordinary participation proved contagious and was the impetus for other positive actions for water quality to be undertaken in the watershed. An upstream dairy farmer installed agricultural best management practices to keep animal manures from mixing with storm water runoff and entering the stream, reducing the nutrient load in the stream.

Downstream, the Maidencreek Township Authority and its staff planted more than 85 native trees, averaging 12 feet tall, creating a riparian buffer on their portion of the creek. In addition, Giorgio Foods plans to plant native trees in the fall along its portion of the creek.

Congratulations to all the partners for participation in this Willow Creek water quality project and for demonstrating the importance of talking individual and collective responsibility for the water quality in their watershed. Everyone can play a part in and add value to the sustainability of clean drinking water. Catch the wave.

We welcome letters and commentary. Letters should be brief (about 200 words) and should respond to a news item published in *Berks Country* or address a specific topic of interest to the rural community. For verification purposes, include your full name, the municipality in which you reside, and phone number (day and evening). **Online:** Go to berkscountry.readingeagle.com, click on the "Submit News" tab, select "Letters to the Editor," email: country@readingeagle.com

APPENDIX D

WILLOW CREEK PROJECT MANAGEMENT PLAN

MAIDENCREEK TOWNSHIP OWNED PROPERTIES

WILLOW CREEK PROJECT MANAGEMENT PLAN

I. Background, overview

A. Project and Property Summary - open space in multiple residential subdivisions- Blandon Meadows, Willow Gardens, Creekside Manor, Maiden Creek Estates, Georgetown Village

B. Donor wishes - open space in Maidencreek Township

II. Property Description

A. Location - Road Map

B. Size – 44.19 acres with ~ 5,250 linear feet of the main stem Willow Creek and ~ 2,500 linear feet of an unnamed tributary of the Willow Creek. ; see also, aerial map , tax parcel map , topo map, approved Subdivision Plan map

C. Watershed – Primary watershed – Schuylkill River; Secondary watershed - Maiden Creek ; Local watershed – Willow Creek, a Cold Water Fishery (CWF) ; see also the Maiden Creek Watershed map with the Willow Creek Project location

D. Historic Land use – Farm pasture

E. Current Land Use – open space in residential subdivisions

F. Species of concern - breeding brook trout

G. Site Specific Studies – Pennsylvania Fish and Boat Commission as basis for grant award to Maidencreek Township for Expanding Brook Trout within Willow Creek as per the NFHAP and PA ABTJV State Conservation Strategy

III Management Goals and Objectives

A. Real Estate Aspects

1. Agreements – 20 year Operations and Maintenance Agreement within grant award which is applicable to the main stem of the Willow Creek; see also the grant award agreement
2. Easements - Buckeye Pipeline and UGI; see also the Subdivision Plan map
3. Storm water outfalls – see MS4 Stormwater Management Plan
4. Liability/Structures - playground and court and floodplain
5. Neighbor Relations- No Homeowners Association. This Management Plan is being developed in part to present to all Township residents the Township's intended uses for this Township owned property
6. School District - Fleetwood

7. Property Taxes – N/A
8. Municipality- Maidencreek Township
9. Municipal Zoning- High Density Residential
10. Title Report - clear
11. Environmental Assessment, Phase I- not required
12. Insurance- Township coverage (PIRMA for Liability and EMC for Property)

B. Ecological Aspects

Zone 1 - Riparian area/buffer of unnamed tributary of the Willow Creek , between Cornerstone Drive and Park Rd. ; 6.91 acres

1. Resource Management objectives - manage as wooded riparian buffer with no public access
2. Resource Management considerations –
   a. Encroachment by neighboring residences; e.g. dumping of yard waste and failure to respect property boundaries
   b. Stormwater runoff from neighboring residences
3. Resource Management actions-
   a. Identify and mark property line boundaries
   b. Contact neighboring residences by mail to inform neighbors of the Township's desires for the Township property and include educational materials - " Caring for your streamside property" and " When it rains , it drains"

Zone 2 – playground and court area , north of Cornerstone Drive; 1.2 acres

1. Resource Management objectives- manage for playground activities and active recreation
2. Resource Management considerations - provide a safe environment with vegetation management suited to playground activities
3. Resource Management actions-
   a. Perform regular maintenance
   b. Marking of property boundaries
   c. Posting of Regulations

Zone 3 - ~ 10 foot wide mowed access trail; 3.34 acres

1. Resource Management objectives – manage as public access corridor/trail in vicinity of the property line boundary; in addition, establish a few trail spurs from the main corridor/trail to the stream to provide stream access

2. Resource Management considerations – encroachment by neighboring residences ; e.g. dumping of yard waste and failure to respect property boundaries
3. Resource Management actions
   a. Identify and mark property line boundaries
   b. Contact neighboring residences by mail to inform neighbors of Township's desires for the Township property and include educational materials – " Caring for your streamside property", " When it rains , it drains", "Willow Creek Habitat Restoration Project"
   c. Identify and mark mowing limits

Zone 4 – Riparian area/buffer of Willow Creek, mainstem between Schaeffer Rd and Main St.; 32.74 acres

1. Resource Management objectives - manage as riparian buffer, as per 20 year O&M Agreement through grant award. Provide a few trail spurs from the main public access corridor/trail to the stream to provide for stream access
2. Resource Management considerations
   a. In cooperation with Pa. Fish and Boat Commission, monitoring and maintenance of installed practices as part of Grant Agreement
   b. Establishment of riparian buffer with special attention to installed trees and shrubs and also invasive species which may negatively effect riparian buffer function
   c. Provide access to stream
3. Resource Management actions –
   a. Identify and mark mowing limits for trail spurs
   b. Monitor and maintain installed stream and streambank practices
   c. Monitor and maintain riparian buffer; develop program for dealing with alien invasive species and Pa. Noxious weeds.
   d. Monitor effects of increased usage and develop program for dealing with emerging issues. E.g. increased trash ; durability of trail surfaces

Zone 5 – Parking locations for access to project area (note , to date, no parking areas have been chosen ; TBD)

1. Resource Management objectives- manage for parking to provide public access
2. Resource Management considerations - floodplain proximity and stormwater runoff from impervious surfaces

3. Resource management actions - identify possible locations and analyze relative to floodplain ; consider pervious surfaces and stormwater retention for any parking lot

C. Programmatic Aspects
   1. Public access - open to all residents in Zones 2,3,4,5
   2. Permitted uses - fishing with valid Pa, Fish and Boat fishing license in Zone 4; no hunting and trapping throughout
   3. Authorized users – pipeline maintenance
   4. Signage - to be determined; make a note on sketch plan and with photo and photo map entry
   5. Rules posting and site maps – playground regulations and Willow Creek riparian buffer regulations(to be determined) , make note on Sketch map and with photo and photo map entry
   6. Education – participation in Willow Creek Project by the Fleetwood School District; project area could be made available for field trips by Fleetwood School District
   7. Research - ongoing by Pa. Fish and Boat Commission
   8. Surveillance /Security – none currently; any future installation should be noted on Sketch Map and with photo and photo map entry

IV Operations and Maintenance

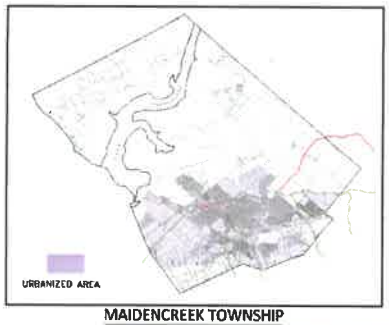
1. Work Plan, 3-5 year
2. Management Fund and/or Annual Stipend- Park and Rec Board has annual budget
3. Work Plan Project budgets
4. Staff and Board(s) responsibilities

V. Reporting

1. internal annual report form - playground form
   a. photo stations with photos annually; see also Photo stations map
2. owned property reports files

APPENDIX E

PRP MAPS – EXISTING & PROPOSED CONDITIONS



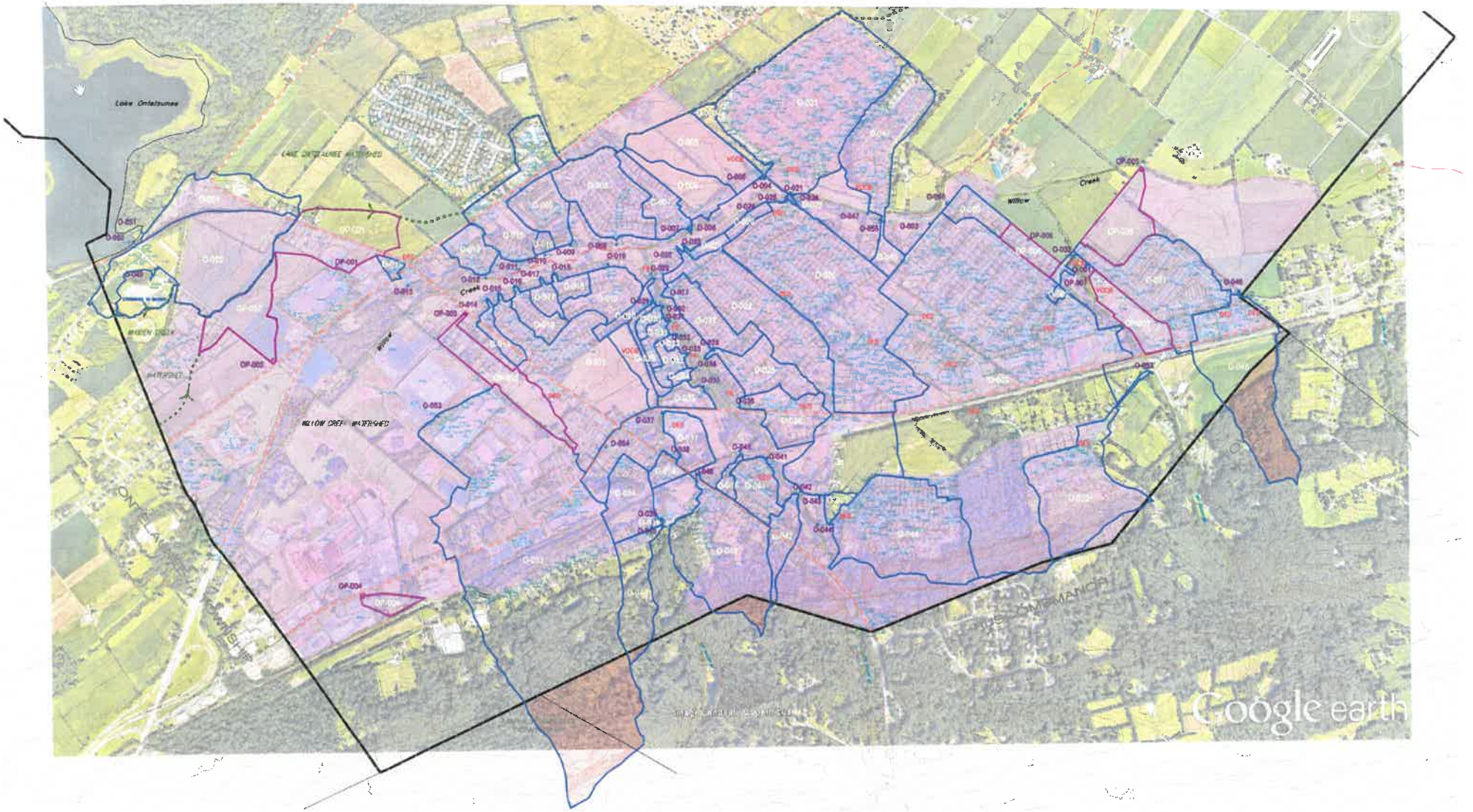
MAIDENCREEK TOWNSHIP

LEGEND

- MS4 OUTFALL & ID #
- MS4 OBSERVATION POINT & ID #
- EXISTING STORMWATER COLLECTION SYSTEM
- EXISTING STORM PIPE AND FLOW DIRECTION
- EXISTING CHANNEL
- EXISTING STREAM (IMPAIRED-NUTRIENTS)
- EXISTING STREAM (IMPAIRED-PATHOGENS)
- TOWNSHIP ROAD
- STATE ROAD
- ACT 167 WATERSHED BOUNDARY
- STORM SEWERSHED (OUTFALL)
- STORM SEWERSHED (OBSERVATION POINT)
- STORM SEWERSHED ID
- STORM SEWERSHED OUTSIDE OF PLANNING AREA
- MUNICIPAL BOUNDARY
- "READING" URBANIZED AREA
- DED — EXISTING DRY EXTENDED DETENTION BASIN
- VOCB — VEGETATED OPEN CHANNEL – "B" SOILS
- FB — FOREST BUFFER

MS4 REQUIREMENTS TABLE

IMPAIRED DOWNSTREAM WATERS OR APPLICABLE TMDL NAME	REQUIREMENTS	OTHER CAUSE(S) OF IMPAIRMENT
UNNAMED TRIBUTARIES TO WILLOW CREEK	APPENDIX B-PATHOGENS (5)	NONE LISTED
SCHUYLKILL RIVER	APPENDIX C-PCB (4a)	NONE LISTED
MAIDEN CREEK	APPENDIX B-PATHOGENS (5)	OTHER HABITAT ALTERATIONS (4c)
LAKE ONTELAUNEE TMDL	TMDL PLAN-NUTRIENTS, SUSPENDED SOLIDS (4d)	OTHER HABITAT ALTERATIONS (4c)
WILLOW CREEK	APPENDIX B-PATHOGENS(5), APPENDIX C-NUTRIENTS (5)	FLOW ALTERATIONS (4c)



SYSTEMS DESIGN ENGINEERING INC

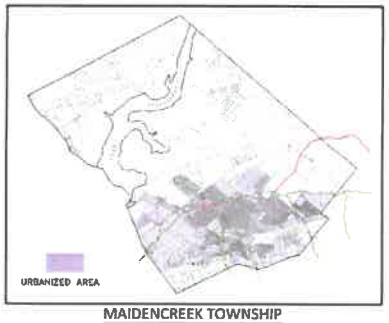
SDE Project No.: 17-0019-0191

1" = 500'

PRP MAP - EXISTING CONDITIONS

MAIDENCREEK TOWNSHIP
BERKS CO., PA.

UPDATED 04/01/2019
06/25/2017



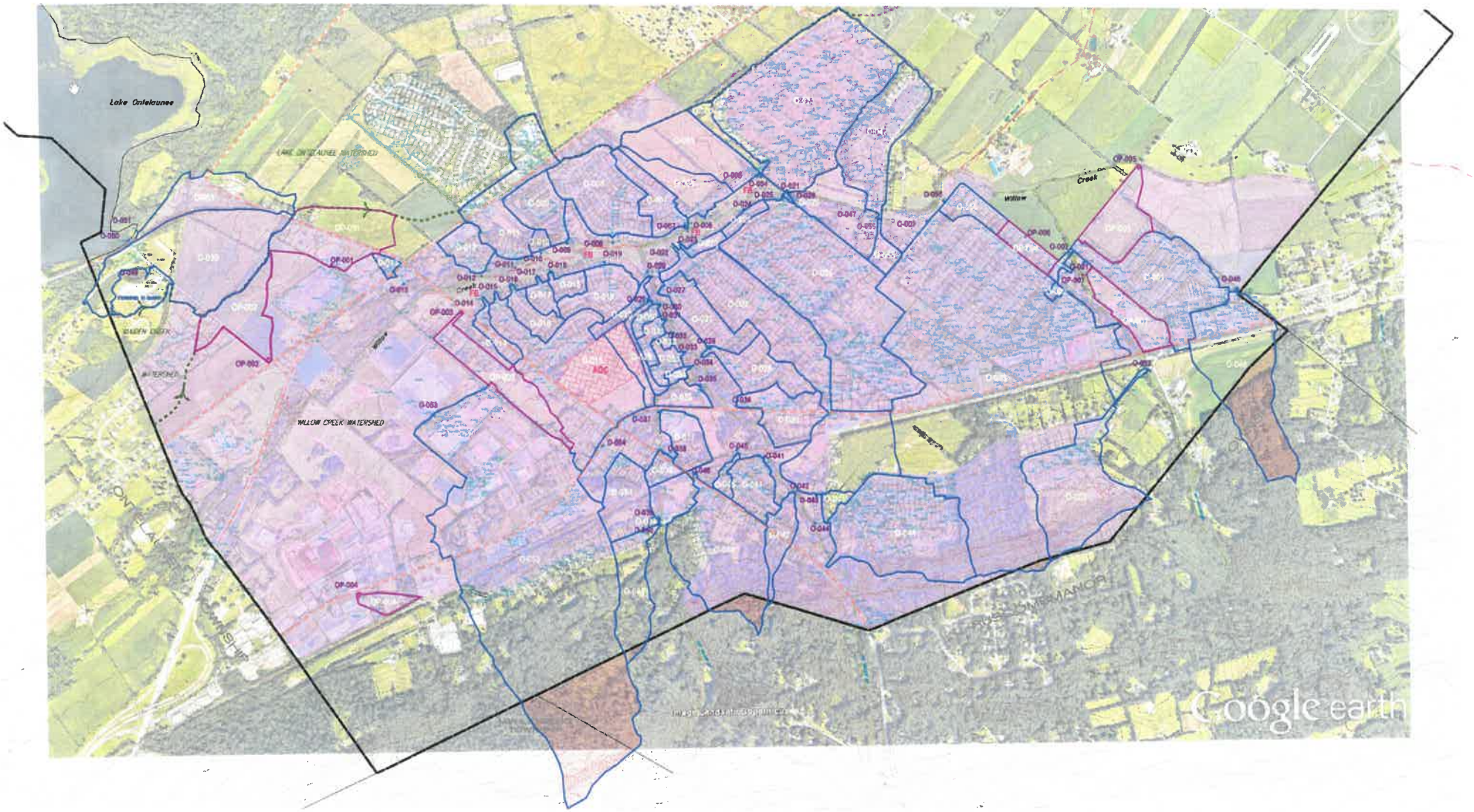
MAIDENCREEK TOWNSHIP

LEGEND

- O-001 MS4 OUTFALL & ID #
- OP-001 MS4 OBSERVATION POINT & ID #
- EXISTING STORMWATER COLLECTION SYSTEM
- EXISTING STORM PIPE AND FLOW DIRECTION
- EXISTING CHANNEL
- EXISTING STREAM (IMPAIRED-NUTRIENTS)
- EXISTING STREAM (IMPAIRED-PATHOGENS)
- TOWNSHIP ROAD
- STATE ROAD
- ACT 167 WATERSHED BOUNDARY
- STORM SEWERSHED (OUTFALL)
- STORM SEWERSHED (OBSERVATION POINT)
- STORM SEWERSHED ID
- STORM SEWERSHED OUTSIDE OF PLANNING AREA
- MUNICIPAL BOUNDARY
- "READING" URBANIZED AREA
- FB FOREST BUFFER
- AGC AGRICULTURAL CONVERSION BMP

MS4 REQUIREMENTS TABLE

IMPAIRED DOWNSTREAM WATERS OR APPLICABLE TMDL NAME	REQUIREMENTS	OTHER CAUSE(S) OF IMPAIRMENT
UNNAMED TRIBUTARIES TO WILLOW CREEK	APPENDIX B-PATHOGENS (B)	NONE LISTED
SCHUYLKILL RIVER	APPENDIX C-PCB (4a)	NONE LISTED
MANCH CREEK	APPENDIX B-PATHOGENS (B)	OTHER HABITAT ALTERATIONS (4a)
LAKE ONTELAUNEE TMDL	TMDL PLAN-NUTRIENTS, SUSPENDED SOLIDS (4a)	OTHER HABITAT ALTERATIONS (4a)
WILLOW CREEK	APPENDIX B-PATHOGENS(B), APPENDIX E-NUTRIENTS (B)	FLOW ALTERATIONS (4c)



SYSTEMS DESIGN ENGINEERING, INC

SDE Project No.: 17-0019-0191

1" = 800'

PRP MAP - PROPOSED CONDITIONS

MAIDENCREEK TOWNSHIP
BERKS CO., PA.

UPDATED 04/01/2019
08/25/2017

APPENDIX R

MCM #6 – POLLUTION PREVENTION / GOOD HOUSKEEPING

MS4 TMDL PLAN

Maidencreek Township, Berks County
MS4 TMDL Plan
Lake Ontelaunee TMDL

Prepared for

MAIDENCREEK TOWNSHIP
BOARD OF SUPERVISORS

1 Quarry Road
Blandon, PA 19510
Maidencreek Township, Berks County, PA

June 29, 2017

SDE SYSTEMS DESIGN ENGINEERING, INC

Project 17-0019-0191
"A Passion for Engineering Excellence"
sdei.net

Maidencreek Township, Berks County
MS4 TMDL Plan
Lake Ontelaunee Watershed

1.0 Introduction

This MS4 TMDL Plan has been prepared by Systems Design Engineering, Inc. (SDE), for Maidencreek Township, Berks County, Pennsylvania (the Township), as part of the Township's obligations under its NPDES PAG-13 MS4 permit (Permit Number PAG-13-3521). Maidencreek Township has been operating under a permit since 2003 and the Notice of Intent (NOI) for the 2018 permit is due in September 2017.

This TMDL Plan is a component of Maidencreek Township's NOI, and is required due to a small portion of the Township's MS4 system being located within the watershed of Lake Ontelaunee, which has a TMDL specified for nutrients and suspended solids. The MS4 contributing to Lake Ontelaunee in Maidencreek Township consists of three (3) outfalls.

This plan will provide background wasteloads and propose a strategy for implementation of best management practice (BMP) control measures, with the intention of demonstrating a reduction in applicable pollutant loads as specified in the Lake Ontelaunee TMDL document.

2.0 TMDL Summary

A Total Maximum Daily Load (TMDL) report was prepared by Tetra Tech, Inc., for the U.S. Environmental Protection Agency (EPA) for the Lake Ontelaunee watershed, Berks and Lehigh Counties, Pennsylvania, on August 9, 2004. The report, referred herein as "TMDL report" is entitled "*Total Maximum Daily Load For Nutrients and Suspended Sediment Lake Ontelaunee, Berks and Lehigh County, Pennsylvania*".

The TMDL report indicates that the lake is impaired due to nutrients and suspended solids. Contributing to the impairment are agriculture, municipal point sources, on-site wastewater treatment systems, and urban runoff. Table 1-1 is reprinted from the TMDL report:

Table 1-1. 303(d) Listing for Lake Ontelaunee

Assessment ID	Causes	Listing Date	TMDL Date	Size	Use Assessed
Lake Ontelaunee 19910001-0004-LAK	Agriculture/Nutrients Agriculture/Suspended Solids Municipal Point Source/Nutrients Municipal Point Source/Suspended Solids On site Wastewater/Nutrients On site Wastewater/Suspended Solids Urban Runoff/Storm Sewers/Nutrients Urban Runoff/Storm Sewers/Suspended Solids	1996	2005	1080 acres	Aquatic Life

2.1 Nutrient Impairments

Nutrient impairments in water bodies tend to lead to excessive algal biomass which in turn reduces content of dissolved oxygen, potentially causing death of aquatic organisms. The TMDL report indicates that phosphorus is the limiting nutrient for algae control. The two largest nonpoint sources of the phosphorus nutrient are croplands and transitional areas, with point sources accounting for around 4.5 percent of Total Phosphorus. Nitrate is another nutrient that is often present with phosphorus contamination, and is of particular concern in this case, since Lake Ontelaunee is a public water supply. However, the report indicates that water quality data do not indicate nitrate concentrations in excess of EPA established maximum contaminant levels, leading to a determination that a nitrate TMDL was not necessary.

2.2 Sediment Loading

Sediment loading is a concern as it reduces storage capacity in the lake and impairs fish food sources and spawning areas. Excess sediment in drinking water supplies can lead to odor and taste issues, and can interfere with proper water treatment facilities. The TMDL report indicates that, as with nutrients, croplands and transitional areas are the largest sources of sediment. Pasturelands and unpaved roads are also significant sediment contributors. Point sources are responsible for less than one percent of the sediment load.

2.3 Affected Municipalities

Table 2 lists municipalities and counties subject to the TMDL within the same Hydrologic Unit Code (HUC) 02040203.

Table 1. Municipalities Subject to the Lake Ontelaunee TMDL for HUC 02040203

Municipality	County	Municipality	County
Albany Township	Berks	Maxatawny Township	Berks
Greenwich Township	Berks	Perry Township	Berks
Kutztown Borough	Berks	Richmond Township	Berks
Lenhartsville Borough	Berks	Rockland Township	Berks
Lynn Township	Lehigh	Windsor Township	Berks
Lyons Borough	Berks	Weisenberg Township	Lehigh
Maidencreek Township	Berks		

3.0 Watershed Characteristics

According to the TMDL report, the Lake Ontelaunee watershed consists of approximately 123,104 acres of land in Berks and Lehigh Counties. The lake itself has a surface area of approximately 1,100 acres. The watershed is within the Schuylkill River basin, Hydrologic Unit Code (HUC) 02040203. All discharges to the lake from the Maidencreek Township MS4 are from within this HUC area. Figure 1 is a graphical depiction of the watershed, from the TMDL report.

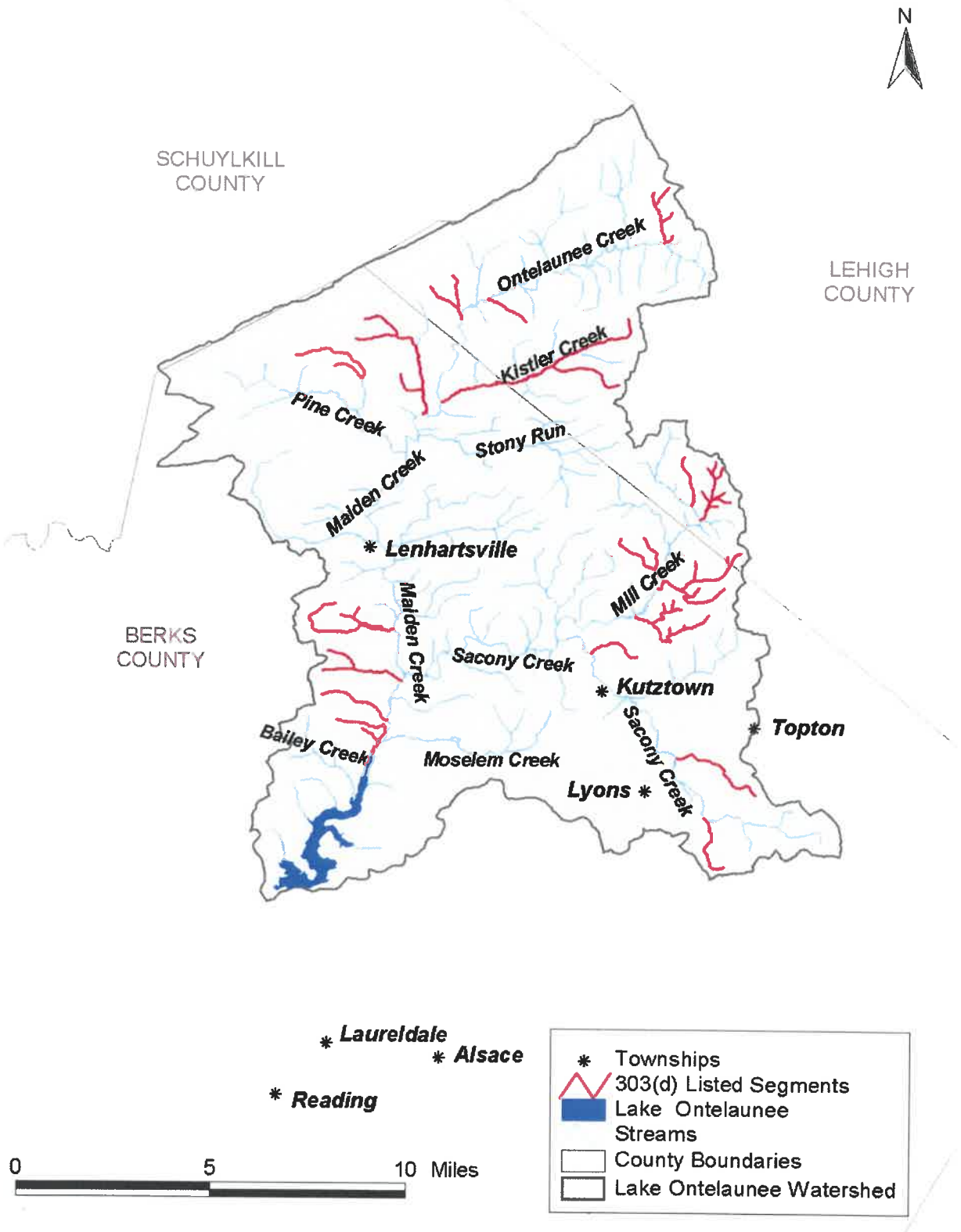


Figure 1. Lake Ontelaunee Watershed (*from USEPA Total Maximum Daily Load For Nutrients and Suspended Sediment Lake Ontelaunee Berks and Lehigh County, Pennsylvania, 8/9/04)*

Lake Ontelaunee supplies drinking water for the City of Reading and several surrounding municipalities. Fishing and hunting are primary recreational uses on and around the lake. The majority of the watershed is rural, dominated by agriculture.

The Maidencreek Township MS4 storm sewersheds within the Lake Ontelaunee watershed are depicted in Figure 2. Of the 123,104-acre watershed to the lake, a total of approximately 98 acres, or 0.08 percent, contribute from the storm sewersheds, and only about 57 acres (0.05 percent) contribute from the Urbanized Area within Maidencreek Township. Figure 3 depicts the areal breakdown to the three outfalls, and areas to the outfalls are tabulated in Table 2.

Table 2. Storm Sewersheds Tributary to Lake Ontelaunee from Maidencreek Township UA

Stormshed/Outfall	Area, Ac.
O-049	11.1
O-059	62.9
O-051	23.6
Total	**97.6**

Figure 4 superimposes Figure 2 onto Figure 1, to depict a relative comparison of drainage area size. The intent is to demonstrate the relative insignificance of Maidencreek Township's MS4 contribution to the lake's watershed.

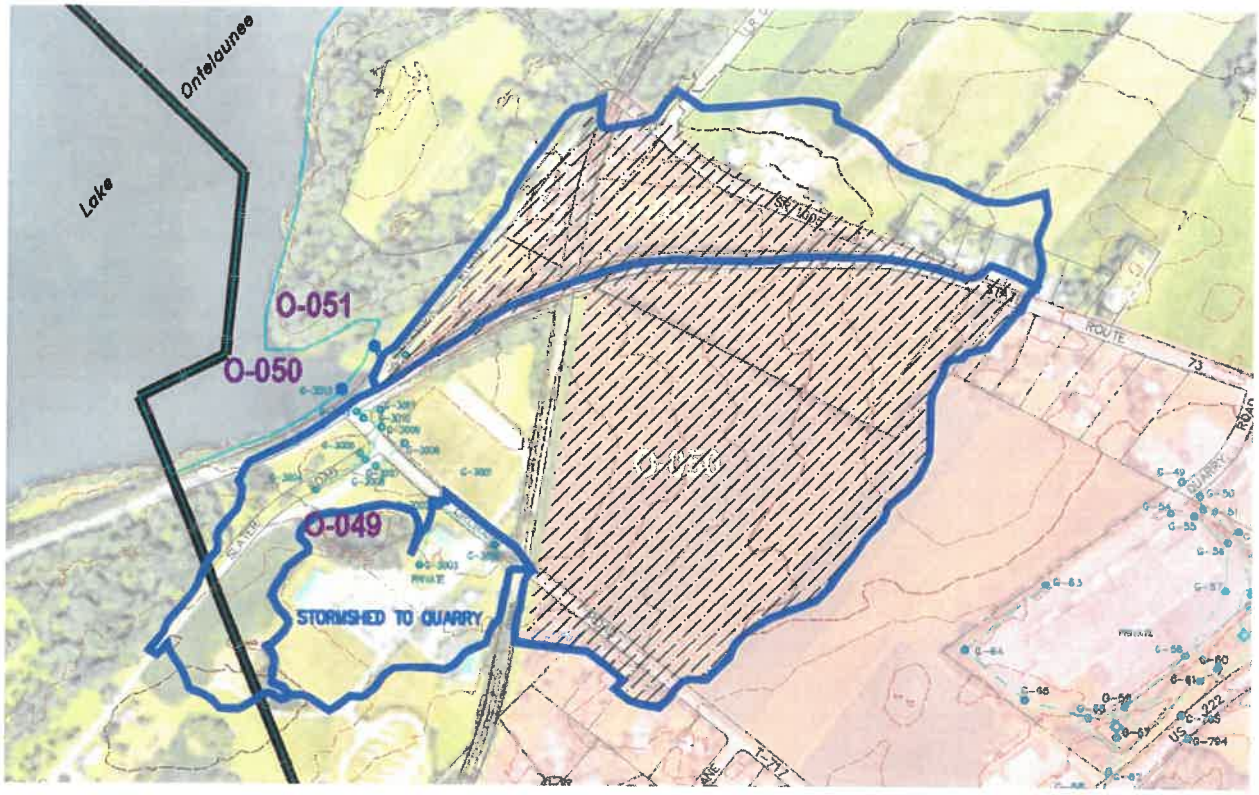


Figure 2. Maidencreek Township MS4 Area within Lake Ontelaunee Watershed

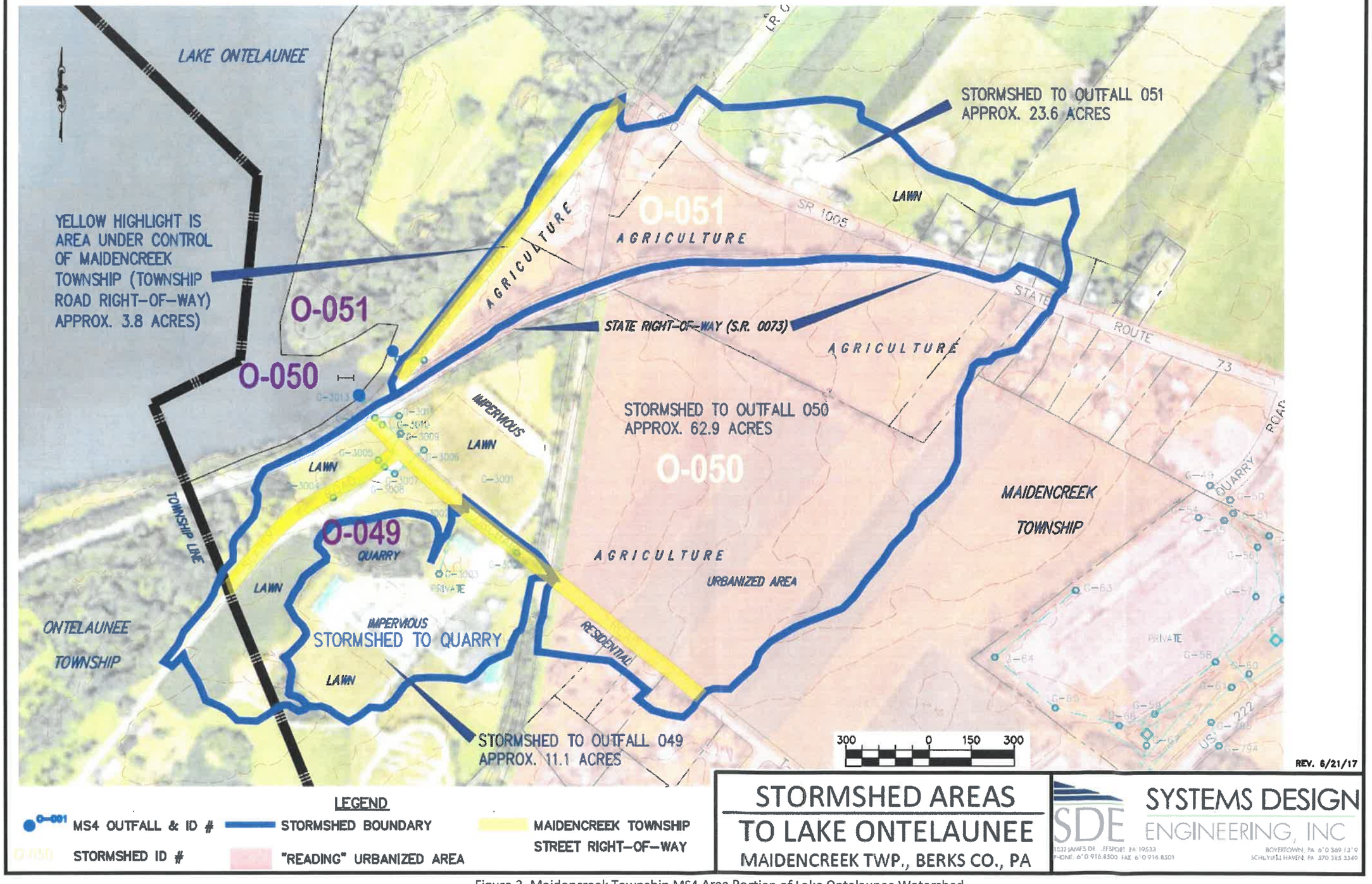


Figure 3. Maidencreek Township MS4 Area Portion of Lake Ontelaunee Watershed

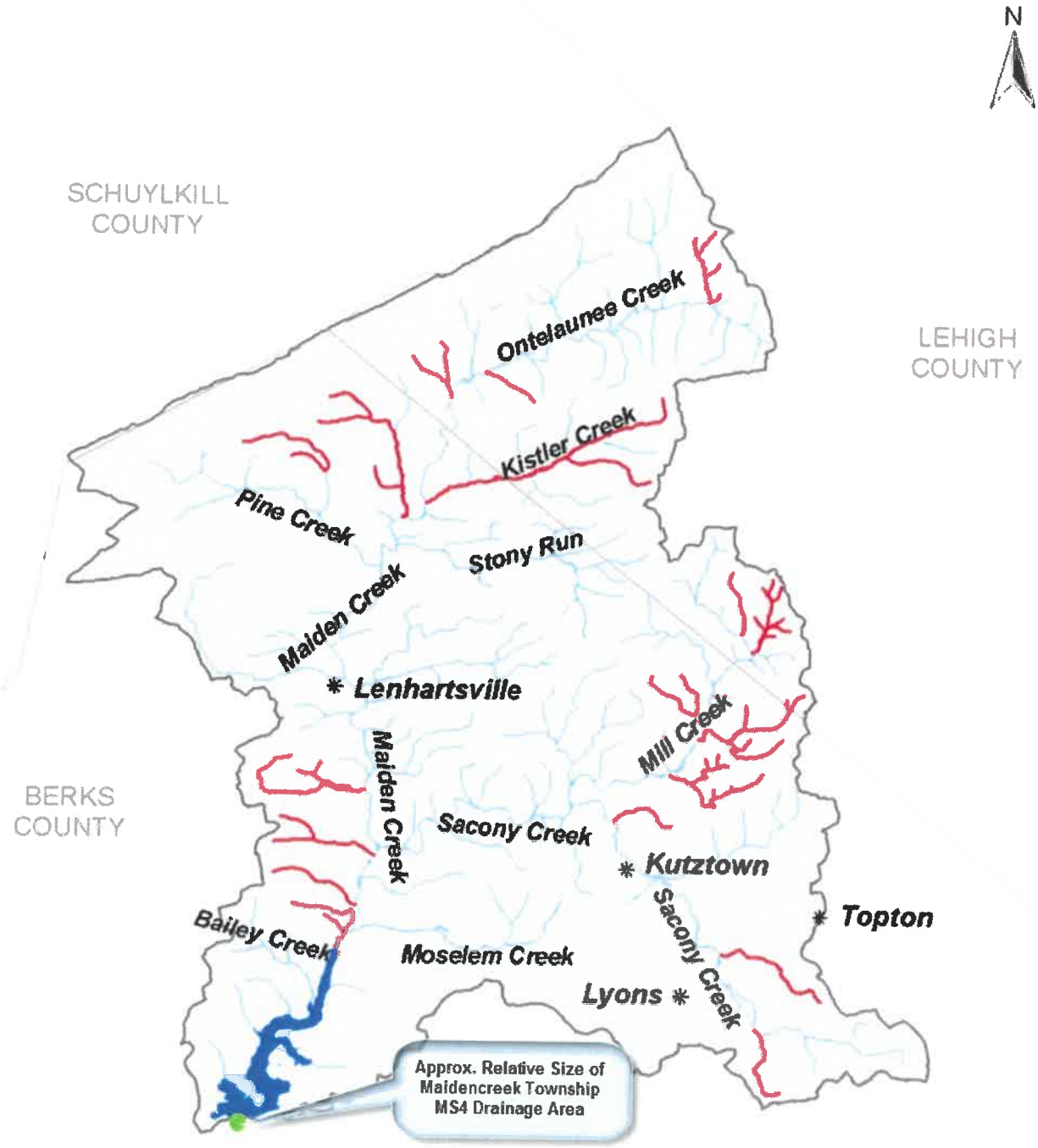


Figure 4. Maidencreek Township MS4 Area Relative to Lake Ontelaunee Watershed

4.0 Waste Load Allocations

The following tables are reprinted from the Lake Ontelaunee TMDL report, and depict various load and waste load allocations by pollutant. Recall that phosphorus was determined as the controlling nutrient in the nutrient loading component of the TMDL – nitrates were determined to be within acceptable levels.

Table ES-1. Lake Ontelaunee Phosphorus TMDL Table (metric tons per year)

TMDL (t/yr)	LA (t/yr)	WLA (t/yr)	MOS (t/yr)
10.65	7.36	2.77	0.52

Table ES-2. Lake Ontelaunee Phosphorus TMDL, Source Allocation Summary (metric tons/year)

Source	Area (ha)	Existing Load (t/yr)	% of Total Existing Load	Existing UAL (t/yr*ha)	Allocated Load (t/yr)	% of Total Allocated Load	Allocated UAL (t/yr*ha)	Percent reduction (%)
Hay/Pasture	9,061	3.95	4.8	0.00044	1.00	9.9	0.00011	75
Cropland	19,994	46.93	57.0	0.00235	2.35	23.2	0.00012	95
Coniferous	1,135	0.02	0.0	0.00002	0.02	0.2	0.00002	0
Mixed Forest	948	0.09	0.1	0.00009	0.09	0.9	0.00010	0
Deciduous Forest	14,481	1.34	1.6	0.00009	1.34	13.2	0.00009	0
Unpaved Roads	44	0.37	0.4	0.00841	0.02	0.2	0.00042	95
Quarry	16	0.06	0.1	0.00375	0.00	0.0	0.00022	93
Transitional	1,490	16.27	19.8	0.01092	0.81	8.0	0.00054	95
Low Intensity	646	0.07	0.1	0.00011	0.07	0.7	0.00011	0
High Intensity	242	0.35	0.4	0.00145	0.05	0.5	0.00022	85
MS4	54	0.13	0.2	0.00232	0.01	0.1	0.00015	94
Point Source	--	3.65	4.4	--	2.76	27.2	--	24
Groundwater	--	6.06	7.4	--	1.52	15.0	--	75
Septic Systems	--	3.03	3.7	--	0.09	0.9	--	97
Total	48,111	82.31	100.0	0.00171	10.13	100.0	0.00021	88

Table ES-3. WLA for Total Phosphorus, MS4s

Township	Permit ID	WLA, TP kg/yr	% Reduction
Maiden Creek	PAG133521	5.98	94
Ontelaunee	PAG133512	1.96	93

Table ES-6. Lake Ontelaunee Sediment Loading Characteristics, Existing and TMDL Conditions

	Existing Conditions	TMDL Conditions
Years until 30 percent full	43	92
Sedimentation Rate (cm/yr)	0.91	0.44
Annual Load (kg/m3)	10,772	5,149

Table ES-7. Lake Ontelaunee Sediment TMDL Table (metric tons)

TMDL tons/yr	LA tons/yr	WLA tons/yr
19,587	19,444	143

Table ES-8. Lake Ontelaunee Sediment TMDL, Source Allocation Summary

Source	Area (ha)	Existing Load (t/yr)	Existing UAL (t/ha-yr)	% of Existing Load	Allocated Load (t/yr)	Reduced UAL (t/yr-ha)	% of Allocated Load	% Reduction
Hay/Pasture	9,061	2,146.8	0.24	3.13	1,629.7	0.18	8.32	24
Cropland	19,994	44,973.1	2.25	65.53	11,243.3	0.56	57.40	75
Coniferous	1,135	24.2	0.02	0.04	24.2	0.02	0.12	0
Mixed Forest	948	104.6	0.11	0.15	104.6	0.11	0.53	0
Deciduous Forest	14,481	1,467.3	0.10	2.14	1,467.3	0.10	7.49	0
Unpaved Roads	44	416.7	9.47	0.61	104.2	2.37	0.53	75
Quarry	16	56.7	3.55	0.08	22.6	1.41	0.12	60
Transitional	1,490	19,244.2	12.92	28.04	4,811.0	3.23	24.56	75
Low Intensity Developed	646	19.8	0.03	0.03	19.8	0.03	0.10	0
High Intensity Developed	242	17.1	0.07	0.02	17.1	0.07	0.09	0
MS4	54	127.8632	2.37	0.19	33.494118	0.62	0.17	74
Point Sources	--	36.0	--	0.05	109.6	--	0.56	0
Total Existing Load (t/yr)				68,634				
Total Allocated Load (t/yr)				19,587				
Total % Reduction				71				
Existing Channel Deposition (t/yr)				53,071				
Reduced Channel Deposition (t/yr)				12,782				

Table ES-9. WLA for TSS, MS4s (metric tons)

Township	Permit ID	WLA, TSS t/yr	% Reduction
Maiden Creek	PAG133521	26.6	74
Ontelaunee	PAG133512	6.9	73

5.0 MS4 TMDL Strategy

5.1 MS4 Drainage Area

Lake Ontelaunee's watershed area is approximately 123,104 acres. Maidencreek Township's MS4 storm sewershed area to the lake is about 98 acres, or 0.08 percent. The 98 acres drain to a three outfalls (#s O-049, O-050 and O-051). See Figures 2, 3, and 4 for a graphical depiction of the MS4 drainage area.

The MS4 watershed consists predominantly of agricultural lands. The next largest land user is the Rajah Temple property, which consists of large areas of open grass (athletic fields and parking areas), as well as some significant paved areas for parking and access. Much of this area is tributary to a quarry on the Rajah property, which does not have an overland outlet, but is included in the contributing storm sewershed area nonetheless. Several detached residential homesites and roadways occupy the remaining portion of the watershed.

Figure 3 also depicts the extent of Township-owned land within the MS4 drainage area to the lake; approximately 3.8 acres, comprised solely of streets and adjoining rights-of-way – strips of land less than 50 feet wide. This severely limits the type and number of BMPs that can be implemented and directly controlled by the Township.

5.2 Prior TMDL Plans for Maidencreek Township's MS4

SDE, Inc. developed an initial TMDL Plan for the Maidencreek Township MS4 tributary to Lake Ontelaunee in September 2012. The strategy employed in that plan relied heavily on street sweeping as a means to reduce nutrient and sediment loading to the lake, because this was the only reasonable physical BMP that the Township had at its disposal on the limited areas of the MS4 under their ownership.

DEP subsequently deemed the street sweeping approach to be insufficient, and in December 2015, Great Valley Consultants (GVC) developed a supplement to the original plan. The supplement relies more on public education and outreach than on physical BMPs, and seeks voluntary cooperation with the implementation of conservation practices from private property owners, to achieve nutrient and sediment reductions. The GVC strategy is paraphrased in the following sections.

5.3 Waste Load Allocations and Sources

The Lake Ontelaunee TMDL waste load allocation (WLA) for sediment is 26.6 metric tons/year (58,643 pounds per year) and the WLA for phosphorous is 5.98 kg/year (13.19 pounds/year). The TMDL requires reductions in sediment and phosphorus loading of 74% and 94%, respectively. These reductions are applied MS4-wide; however, it should be abundantly clear that the 3.8 acres of Township-owned streets and rights-of-way are incapable of generating any significant quantities of sediment and nutrients.

Principal land uses within the MS4 storm sewersheds tributary to the lake include privately-owned agricultural facilities and lawn areas. These uses are significantly more likely to contribute to the waste loads identified in the TMDL report. See Table 3 for an approximate distribution of land uses throughout the MS4 storm sewersheds tributary to Lake Ontelaunee, from Maidencreek Township.

Table 3. Contributing Land Uses to Lake Ontelaunee from Maidencreek Township MS4 Storm Sewersheds

Land Use Type	Approx. Area, ac	% of Total Area
Agriculture	**57.2**	**58.6**
Maintained Lawn	**14.7**	**15.1**
Woods/Quarry	**8.5**	**8.7**
Street ROW (State)	**5.2**	**5.3**
Impervious (Private)	**4.3**	**4.4**
Residential	**3.9**	**4.0**
Street ROW (Municipal)	**3.8**	**3.9**
Total	**97.6**	**100.0**

5.4 TMDL Strategy

It has been established that political subdivision of Maidencreek Township has little, if any, impact to the wasteloads attributable to the Township in the Lake Ontelaunee TMDL. In addition, the Township has extremely limited ownership of property within the MS4 tributary to the lake, limited solely to the narrow strips of street rights-of-way depicted in Figure 3.

In consideration of these limitations, Maidencreek Township proposes public education and outreach as its principal BMP in the effort to reduce wasteloads to the lake. This approach will involve education of private landowners within the MS4 area about the effects of nutrient and sediment pollution on the lake, and encouragement of those landowners to voluntarily implement BMPs to reduce quantities of phosphorus and sediment in stormwater runoff from lands they control.

For agricultural lands, practices including contour cropping, no-till farming and fertilizer reductions contribute greatly to sediment and nutrient reductions. In residential and commercial areas, landscaping practices can be altered to reduce the amounts of fertilizers and pesticides applied to "green" areas, and better housekeeping techniques can be implemented, such as refraining from disposal of grass clippings in or near waterways and dry cleanup of oils and debris from paved surfaces.

Education and outreach can be accomplished through the assistance of conservation agencies that specialize in agricultural education, including Berks Nature and Berks County Conservation District. These agencies often offer or have connections to agencies that offer funding opportunities and support for these efforts. Additional avenues for outreach are available to the Township via its membership in the Berks County MS4 Steering Committee, which provides continuous updates and opportunities for public education throughout Berks County.

5.4.1 Plan Implementation

Maidencreek Township and/or its designee(s) will implement the TMDL Plan in the following manner ("Year x" designations refer to the end of the particular "Permit Year" by which foregoing activities will be completed):

effectiveness of applying several conservation measures to the agricultural lands. Results will help in the future discussions with the landowner(s).

The model was set up to cover the agricultural portion of the Maidencreek Township UA, an area of approximately 57.6 acres (233,277 sq. meters). Of this area, the model database characterized 9.9 acres (4.0 hectares) as "cropland." Based on Google Earth and other aerial imagery, the cropland acreage appears low, but the goal of the model runs are to gauge percentage loading reductions; therefore, the relative comparisons should be reflective of actual area.

The following scenarios were evaluated:

1. Current Condition
2. Add Cover Crop Only
3. Add Conservation Tillage Only
4. Add Nutrient Management Only
5. Add Cover Crop, Conservation Tillage and Nutrient Management ("All 3")
6. Add Cover Crop and Conservation Tillage
7. Add Cover Crop and Nutrient Management
8. Add Conservation Tillage and Nutrient Management

As would be expected, number 5 ("All 3" scenarios) achieved the highest wasteload reductions of 65% for sediment and 84% for phosphorus, which would meet the short term (permit term) reduction percentage requirements for sediment (10%) and phosphorus (5%). Long term reductions are those stipulated in the TMDL (74% for sediment and 94% for phosphorus). It is important to note that this evaluation assumes that none of the conservation measures are currently being used.

Table 4 summarizes the results of the model run for the different scenarios, and Appendix A contains the WikiWatershed screenshots with supporting documentation.

5.4.2 Plan Implementation

Maidencreek Township and/or its designee(s) will implement the TMDL Plan in the following manner ("Year x" designations refer to the end of the particular "Permit Year" by which foregoing activities will be completed):

Year 1 Collect and compile data regarding ownership and uses of properties within the storm sewersheds leading to Outfalls O-049, O-050 and O-051. Rank target audiences as to their pollutant potential, based on geographic locations within the sewersheds, and relative to public or private storm sewer systems.

Year 2 Model the agricultural portion of the planning area to gauge effectiveness of load reductions in response to various scenarios of conservation management measures and focus efforts on outreach accordingly. Contact local agricultural landowners to determine types and extents of conservation measures actually being utilized, as well as areal extent of application, and compare to model results. Contact local agencies including Berks County Conservation District and Berks Nature, and attend the quarterly meetings of the Berks County MS4 Steering Committee to gauge interest and ability for the agencies to reach out to and/or meet with

property owners, in conjunction with Maidencreek Township, in an order of timeliness based on severity of ranking in the Year 1 effort.

Year 3 Within the years leading up to and including Year 3, more detailed mapping of existing public and private stormwater conveyance and management facilities will be performed, to refine the concentration of private property owners to target with education and outreach, and seek voluntary cooperation with BMP implementation. BMP modeling will also be refined based on contact with landowners and evaluations of actual existing land use and/or conservation measures. Types of BMPs will be dictated by the type of property(ies) cooperating. Properties whose owners agree to participate in the plan will be mapped and a scheme will be devised to concentrate efforts based on topography and contributions of potential wasteloads to the outfalls. A baseline wasteload can then be computed for areas on and around the subject property(ies), to be used as a gauge to measure BMP effectiveness over time. The end of Year 3 will be the conclusion of efforts to solicit voluntary cooperation from private landowners.

Year 4 Properties whose owners do not wish to implement BMPs voluntarily will be mapped and any resulting "gaps" in potential BMP coverage will be evaluated. At this point, the Township will seek alternatives as needed for compliance with TMDL wasteload allocations. The Township will assess the "untreated" land uses and evaluate particular types of BMPs that could be effective in the given areas. Due to the need to establish an inventory of non-participating properties and a wasteload baseline in the preceding years, it will not be until this stage that the Township can begin the assessment of what actual BMPs will be effective in achieving the short term reductions of 10% sediment and 5% phosphorus, as well as the long term TMDL requirements of 74% reduction in sediment and a 94% reduction in phosphorous.

Year 5 By the end of Year 5, it is hoped that the Township will have succeeded in obtaining enough cooperation from private landowners that BMP implementation will have a positive effect on reducing sediment and phosphorus loadings to the short term goals of 10% and 5%, respectively. As needed and as available, the Township will also have established a BMP program to supplement reductions achieved by the private properties.

Long Term Beyond the permit term, the Township will continue to focus on any remaining pollutant sources and means to encourage private property cooperation to meet the TMDL waste load allocations.

5.4.3 Facilities Inventory

Several sources of data to refine the storm sewershed mapping are already available and include record plans for development of one of the larger private facilities. In addition, it is hoped that Agricultural Erosion and Sediment Control Plans and/or Conservation Plans are available at the Berks County Conservation District for the farms located within the sewersheds. Township and consultant staffs are also available for more detailed field investigations that will occur throughout the permit cycle.

5.4.4 Other MS4-Related Activities

The Township will also continue in its MS4 permit obligations, public education, outreach and participation, outfall inspections (IDD&E), erosion and sediment control and post-construction stormwater management inspections, and good housekeeping at all of its properties. Street-sweeping

of the two (2) Township roads within the delineated storm sewersheds will also be incorporated into the Township's sweeping program.

5.4.5 Ongoing Projects

A dredging project completed in 2017 removed approximately 50,000 cubic yards of sediment from Lake Ontelaunee. This equates to over 50,000 tons of dry sediment. Much of the sediment has been attributed to upstream farmland. This may have an impact on any future updates to the TMDL document.

5.4.6 Funding

Funding sources will be dependent upon the type and number of BMPs that will voluntarily be placed by private landowners on private property. Township-related efforts will be reimbursed via the general fund, unless any necessary alternative BMPs can be covered by grants.

6.0 Summary and Conclusions

The 2010 Census Urbanized Area (UA) within Maidencreek Township encompasses a small portion of the Lake Ontelaunee watershed; about 57 acres. The UA is part of three (3) MS4 storm sewersheds that include both UA and non-UA, totaling about 98 acres. The total Lake Ontelaunee watershed is approximately 123,104 acres, so it can be seen that Maidencreek Township's wasteload contribution is exceptionally slight. Couple this with the fact that the actual land owned by Maidencreek Township within the UA is less than 4 acres and it is evident that Maidencreek Township has very little opportunity to make an impact on wasteloads to the lake through traditional structural BMPs.

A strategy has been devised to adapt to this limitation and it involves public education and outreach to the approximately 96 percent of the tributary storm sewersheds that consist of private property. This audience will be targeted in hopes of obtaining voluntary cooperation and implementation of BMPs within their properties. Based on the results of the loading analyses, concentration will be focused on the agricultural landowners within the planning area. Short of succeeding in gaining cooperation and/or in conjunction with those properties who will participate, the Township will continue to investigate BMPs that it can implement, types and locations of which will be determined once it is know where and how many of the private landowners will participate.

In the interim, Maidencreek Township intends to continue to meet its Minimum Control Measure obligations under its current and anticipated renewed NPDES PAG-13 permit.

TABLE 4.
LAKE ONTELAUNEE TMDL STRATEGY- MAIDENCREEK TOWNSHIP
CROPLAND LOADING SCENARIOS
DECEMBER 2018

	CURRENT CROPLAND		ADD COVER CROP			ADD CONSERVATION TILLAGE			ADD NUTRIENT MANAGEMENT			ADD ALL (3) SCENARIOS		
POLLUTANT	ANNUAL LOAD (kg)	ANNUAL LOAD (lb)	ANNUAL LOAD (kg)	ANNUAL LOAD (lb)	PERCENT REDUCTION	ANNUAL LOAD (kg)	ANNUAL LOAD (lb)	PERCENT REDUCTION	ANNUAL LOAD (kg)	ANNUAL LOAD (lb)	PERCENT REDUCTION	ANNUAL LOAD (kg)	ANNUAL LOAD (lb)	PERCENT REDUCTION
SEDIMENT	13,197.0	29,094.4	8,580.8	18,917.4	**35.0%**	9,240.3	20,371.4	**30.0%**	13,197.0	29,094.4	0.0%	4,624.0	10,194.2	**65.0%**
PHOSPHORUS	34.7	76.5	17.4	38.4	**49.9%**	27.1	59.7	**21.9%**	19.4	42.8	**44.1%**	5.5	12.1	**84.1%**

	CURRENT CROPLAND		ADD COVER CROP & NUTRIENT MGMT.			ADD COVER CROP & CONSERVATION TILLAGE			ADD CONSERVATION TILLAGE & NUTRIENT MGMT.		
POLLUTANT	ANNUAL LOAD (kg)	ANNUAL LOAD (lb)	ANNUAL LOAD (kg)	ANNUAL LOAD (lb)	PERCENT REDUCTION	ANNUAL LOAD (kg)	ANNUAL LOAD (lb)	PERCENT REDUCTION	ANNUAL LOAD (kg)	ANNUAL LOAD (lb)	PERCENT REDUCTION
SEDIMENT	13,197.0	29,094.4	8,580.8	18,917.4	**35.0%**	4,624.0	10,194.2	**65.0%**	9,240.3	20,371.4	**30.0%**
PHOSPHORUS	34.7	76.5	9.7	21.4	**72.0%**	9.7	21.4	**72.0%**	15.2	33.5	**56.2%**

Notes:

1. **Bold** values indicate percent reductions meeting the short term (permit term) sediment and phosphorus reductions of 10% and 5%, respectively.
2. Lake Ontelaunee TMDL WLAs long term reductions are 74% for Sediment and 94% for Phosphorus.
3. Appendix A includes WikiWatershed screenshots supporting above data.

Sources

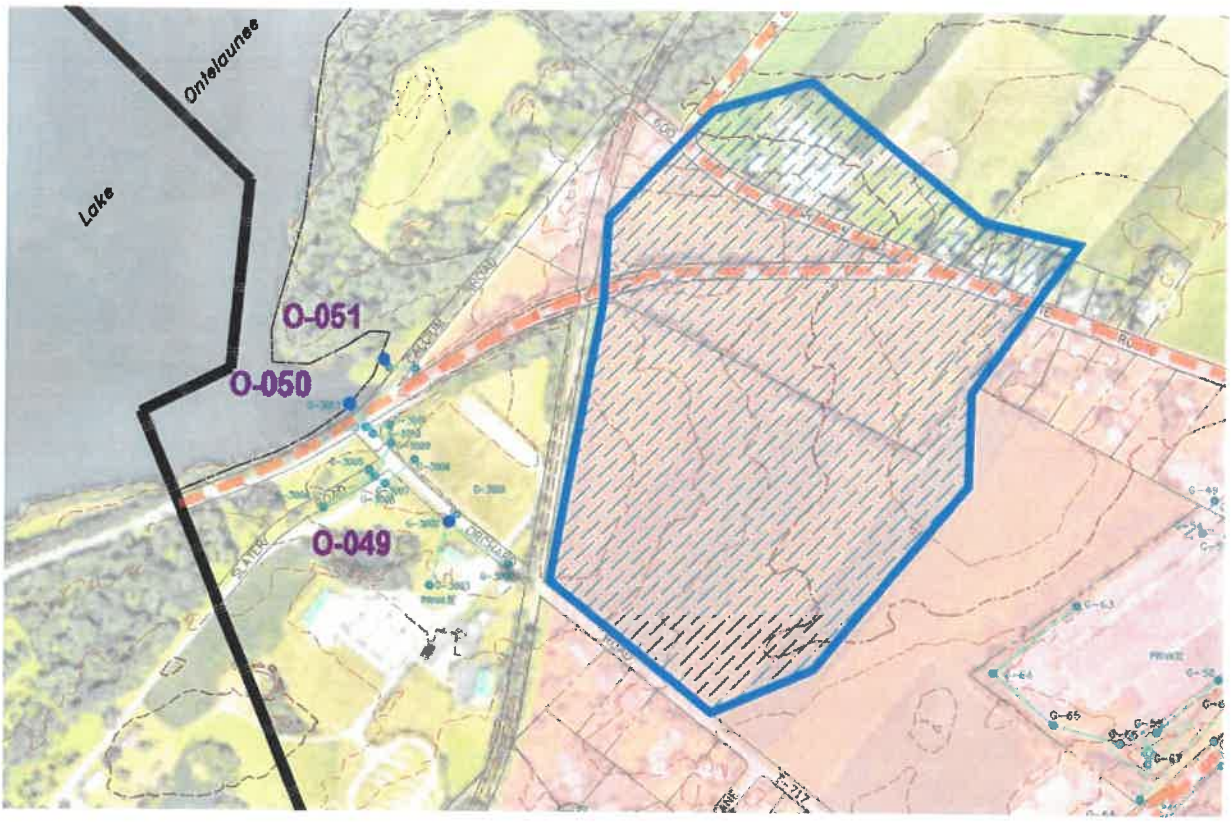
"Pennsylvania Stormwater Best Management Practices Manual", Pennsylvania Department of Environmental Protection, Bureau of Watershed Management, December 30, 2006.

"Total Maximum Daily Load For Nutrients and Suspended Sediment Lake Ontelaunee, Berks and Lehigh County, Pennsylvania", by Tetra Tech, Inc. for the U.S. Environmental Protection Agency, August 9, 2004.

"Model My Watershed," Version 1.23.1, WikiWatershed, by Stroud Water Research Center, https://wikiwatershed.org/model/

Appendix A

WikiWatershed Model My Watershed Documentation



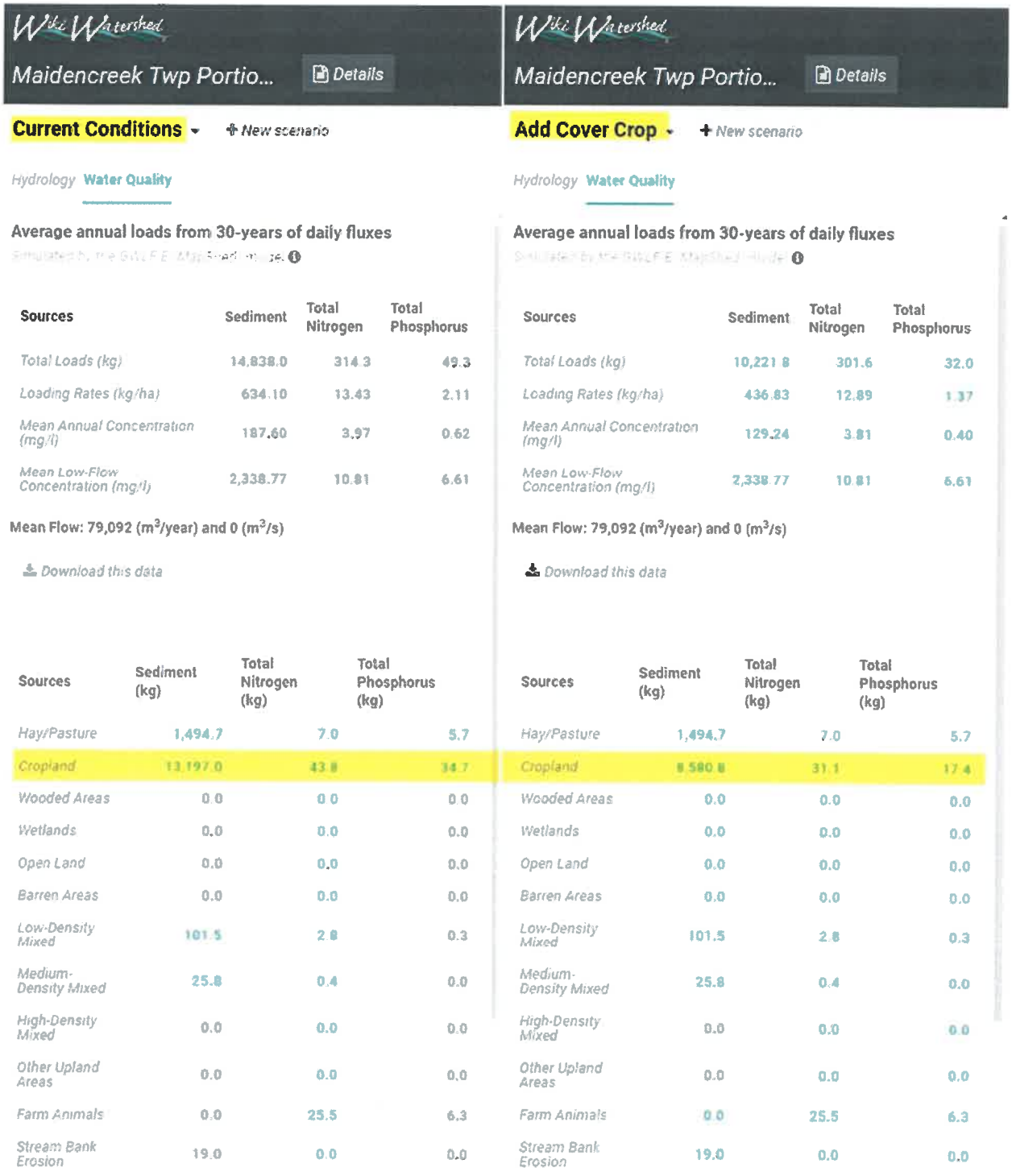
LEGEND

- EXISTING STORMWATER COLLECTION SYSTEM
- EXISTING STORM PIPE AND FLOW DIRECTION
- EXISTING STREAM/WATER'S EDGE
- MS4 OUTFALL & ID #
- "READING" URBANIZED AREA
- WIKIWATERSHED MODELING AREA

Figure A.1. WikiWatershed Modeling Area within Maidencreek Township's MS4 to Lake Ontelaunee

Figure A.2. WikiWatershed Model Area

Figure A.3. WikiWatershed Model Scenario Screenshots



WikiWatershed

Maidencreek Twp Portio... Details

Current Conditions + New scenario

Hydrology **Water Quality**

Average annual loads from 30-years of daily fluxes

Sources	Sediment	Total Nitrogen	Total Phosphorus
Total Loads (kg)	14,838.0	314.3	49.3
Loading Rates (kg/ha)	634.10	13.43	2.11
Mean Annual Concentration (mg/l)	187.60	3.97	0.62
Mean Low-Flow Concentration (mg/l)	2,338.77	10.81	6.61

Mean Flow: 79,092 (m^3/year) and 0 (m^3/s)

Download this data

Sources	Sediment (kg)	Total Nitrogen (kg)	Total Phosphorus (kg)
Hay/Pasture	1,494.7	7.0	5.7
Cropland	13,197.0	43.8	34.7
Wooded Areas	0.0	0.0	0.0
Wetlands	0.0	0.0	0.0
Open Land	0.0	0.0	0.0
Barren Areas	0.0	0.0	0.0
Low-Density Mixed	101.5	2.8	0.3
Medium-Density Mixed	25.8	0.4	0.0
High-Density Mixed	0.0	0.0	0.0
Other Upland Areas	0.0	0.0	0.0
Farm Animals	0.0	25.5	6.3
Stream Bank Erosion	19.0	0.0	0.0

WikiWatershed

Maidencreek Twp Portio... Details

Add Cover Crop + New scenario

Hydrology **Water Quality**

Average annual loads from 30-years of daily fluxes

Sources	Sediment	Total Nitrogen	Total Phosphorus
Total Loads (kg)	10,221.8	301.6	32.0
Loading Rates (kg/ha)	436.83	12.89	1.37
Mean Annual Concentration (mg/l)	129.24	3.81	0.40
Mean Low-Flow Concentration (mg/l)	2,338.77	10.81	6.61

Mean Flow: 79,092 (m^3/year) and 0 (m^3/s)

Download this data

Sources	Sediment (kg)	Total Nitrogen (kg)	Total Phosphorus (kg)
Hay/Pasture	1,494.7	7.0	5.7
Cropland	8,580.8	31.1	17.4
Wooded Areas	0.0	0.0	0.0
Wetlands	0.0	0.0	0.0
Open Land	0.0	0.0	0.0
Barren Areas	0.0	0.0	0.0
Low-Density Mixed	101.5	2.8	0.3
Medium-Density Mixed	25.8	0.4	0.0
High-Density Mixed	0.0	0.0	0.0
Other Upland Areas	0.0	0.0	0.0
Farm Animals	0.0	25.5	6.3
Stream Bank Erosion	19.0	0.0	0.0

Wiki Watershed

Maidencreek Twp Portio... Details

Add Conservation Tillage + New scenario

Hydrology **Water Quality**

Average annual loads from 30-years of daily fluxes

Simulated by the GWLF-E (MapShed) model

Sources	Sediment	Total Nitrogen	Total Phosphorus
Total Loads (kg)	10,881.3	310.8	41.7
Loading Rates (kg/ha)	465.01	13.28	1.78
Mean Annual Concentration (mg/l)	137.58	3.93	0.53
Mean Low-Flow Concentration (mg/l)	2,338.77	10.81	6.61

Mean Flow: 79,092 (m^3/year) and 0 (m^3/s)

Download this data

Sources	Sediment (kg)	Total Nitrogen (kg)	Total Phosphorus (kg)
Hay/Pasture	1,494.7	7.0	5.7
Cropland	9,240.3	40.3	27.1
Wooded Areas	0.0	0.0	0.0
Wetlands	0.0	0.0	0.0
Open Land	0.0	0.0	0.0
Barren Areas	0.0	0.0	0.0
Low-Density Mixed	101.5	2.8	0.3
Medium-Density Mixed	25.8	0.4	0.0
High-Density Mixed	0.0	0.0	0.0
Other Upland Areas	0.0	0.0	0.0
Farm Animals	0.0	25.5	6.3
Stream Bank Erosion	19.0	0.0	0.0

Wiki Watershed

Maidencreek Twp Portio... Details

Add Nutrient Mgmt + New scenario

Hydrology **Water Quality**

Average annual loads from 30-years of daily fluxes

Simulated by the GWLF-E (MapShed) model

Sources	Sediment	Total Nitrogen	Total Phosphorus
Total Loads (kg)	14,838.0	301.6	33.9
Loading Rates (kg/ha)	634.10	12.89	1.45
Mean Annual Concentration (mg/l)	187.60	3.81	0.43
Mean Low-Flow Concentration (mg/l)	2,338.77	10.81	6.61

Mean Flow: 79,092 (m^3/year) and 0 (m^3/s)

Download this data

Sources	Sediment (kg)	Total Nitrogen (kg)	Total Phosphorus (kg)
Hay/Pasture	1,494.7	7.0	5.7
Cropland	13,197.0	31.1	19.4
Wooded Areas	0.0	0.0	0.0
Wetlands	0.0	0.0	0.0
Open Land	0.0	0.0	0.0
Barren Areas	0.0	0.0	0.0
Low-Density Mixed	101.5	2.8	0.3
Medium-Density Mixed	25.8	0.4	0.0
High-Density Mixed	0.0	0.0	0.0
Other Upland Areas	0.0	0.0	0.0
Farm Animals	0.0	25.5	6.3
Stream Bank Erosion	19.0	0.0	0.0

Wiki Watershed

Maidencreek Twp Portio... Details

Add Cover Crop; Nutrient Mgt.; Conserv. Tillage

Hydrology **Water Quality**

Average annual loads from 30-years of daily fluxes

Sources	Sediment	Total Nitrogen	Total Phosphorus
Total Loads (kg)	6,265.0	290.1	19.9
Loading Rates (kg/ha)	267.74	12.40	0.85
Mean Annual Concentration (mg/l)	79.21	3.67	0.25
Mean Low-Flow Concentration (mg/l)	2,338.77	10.81	6.61

Mean Flow: 79,092 (m^3/year) and 0 (m^3/s)

Download this data

Sources	Sediment (kg)	Total Nitrogen (kg)	Total Phosphorus (kg)
Hay/Pasture	1,494.7	7.0	5.7
Cropland	4,624.0	19.6	5.5
Wooded Areas	0.0	0.0	0.0
Wetlands	0.0	0.0	0.0
Open Land	0.0	0.0	0.0
Barren Areas	0.0	0.0	0.0
Low-Density Mixed	101.5	2.8	0.3
Medium-Density Mixed	25.8	0.4	0.0
High-Density Mixed	0.0	0.0	0.0
Other Upland Areas	0.0	0.0	0.0
Farm Animals	0.0	25.5	6.3
Stream Bank	19.0	0.0	0.0

Wiki Watershed

Maidencreek Twp Portio... Details

Add Cover Crop & Nutrient Mgmt. + New scenario

Hydrology **Water Quality**

Average annual loads from 30-years of daily fluxes

Sources	Sediment	Total Nitrogen	Total Phosphorus
Total Loads (kg)	10,221.8	292.6	24.2
Loading Rates (kg/ha)	436.83	12.50	1.03
Mean Annual Concentration (mg/l)	129.24	3.70	0.31
Mean Low-Flow Concentration (mg/l)	2,338.77	10.81	6.61

Mean Flow: 79,092 (m^3/year) and 0 (m^3/s)

Download this data

Sources	Sediment (kg)	Total Nitrogen (kg)	Total Phosphorus (kg)
Hay/Pasture	1,494.7	7.0	5.7
Cropland	8,580.8	22.1	9.7
Wooded Areas	0.0	0.0	0.0
Wetlands	0.0	0.0	0.0
Open Land	0.0	0.0	0.0
Barren Areas	0.0	0.0	0.0
Low-Density Mixed	101.5	2.8	0.3
Medium-Density Mixed	25.8	0.4	0.0
High-Density Mixed	0.0	0.0	0.0
Other Upland Areas	0.0	0.0	0.0
Farm Animals	0.0	25.5	6.3
Stream Bank Erosion	19.0	0.0	0.0

Wiki Watershed

Maidencreek Twp Portio... Details

Add Cover Crop & Conserv Tillage + New scenario

Hydrology **Water Quality**

Average annual loads from 30-years of daily fluxes

Sources	Sediment	Total Nitrogen	Total Phosphorus
Total Loads (kg)	6,265.0	298.1	24.4
Loading Rates (kg/ha)	267.74	12.74	1.04
Mean Annual Concentration (mg/l)	79.21	3.77	0.31
Mean Low-Flow Concentration (mg/l)	2,338.77	10.81	6.61

Mean Flow: 79,092 (m^3/year) and 0 (m^3/s)

Download this data

Sources	Sediment (kg)	Total Nitrogen (kg)	Total Phosphorus (kg)
Hay/Pasture	1,494.7	7.0	5.7
Cropland	4,624.0	27.6	9.7
Wooded Areas	0.0	0.0	0.0
Wetlands	0.0	0.0	0.0
Open Land	0.0	0.0	0.0
Barren Areas	0.0	0.0	0.0
Low-Density Mixed	101.5	2.8	0.3
Medium-Density Mixed	25.8	0.4	0.0
High-Density Mixed	0.0	0.0	0.0
Other Upland Areas	0.0	0.0	0.0
Farm Animals	0.0	25.5	6.3
Stream Bank Erosion	19.0	0.0	0.0

Wiki Watershed

Maidencreek Twp Portio... Details

Add Conservation Tillage & Nutrient Mgmt. + New s

Hydrology **Water Quality**

Average annual loads from 30-years of daily fluxes

Sources	Sediment	Total Nitrogen	Total Phosphorus
Total Loads (kg)	10,881.3	299.1	29.6
Loading Rates (kg/ha)	465.01	12.78	1.27
Mean Annual Concentration (mg/l)	137.58	3.78	0.37
Mean Low-Flow Concentration (mg/l)	2,338.77	10.81	6.61

Mean Flow: 79,092 (m^3/year) and 0 (m^3/s)

Download this data

Sources	Sediment (kg)	Total Nitrogen (kg)	Total Phosphorus (kg)
Hay/Pasture	1,494.7	7.0	5.7
Cropland	9,240.3	28.6	15.2
Wooded Areas	0.0	0.0	0.0
Wetlands	0.0	0.0	0.0
Open Land	0.0	0.0	0.0
Barren Areas	0.0	0.0	0.0
Low-Density Mixed	101.5	2.8	0.3
Medium-Density Mixed	25.8	0.4	0.0
High-Density Mixed	0.0	0.0	0.0
Other Upland Areas	0.0	0.0	0.0
Farm Animals	0.0	25.5	6.3
Stream Bank Erosion	19.0	0.0	0.0