

**NOTICE OF INTENT
MS4 INDIVIDUAL PERMIT (IP)**

for

**East Fallowfield Township
Chester County, PA**

Submitted by:

East Fallowfield Township
December 30, 2015

Prepared by:

Herbert E. MacCombie, Jr., P.E.,
Consulting Engineers and Surveyors, Inc.



**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
 INDIVIDUAL PERMIT (IP)
 FOR STORMWATER DISCHARGES FROM
 SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s)**

APPLICATION CHECKLIST

You must complete the following list to confirm that all required information has been included. Place a checkmark in the column provided for each item listed. Attach this checklist to the application that you submit.

Failure to provide all of the requested information will delay the processing of the application and may result in the application being placed ON HOLD or NO ACTION, or will be considered withdrawn and the file closed.

	Item	Check if Included	DEP USE
Application			
1.	a. Multi-Municipal Joint Application information, if applicable.	<input type="checkbox"/>	<input type="checkbox"/>
	b. MS4 operator(s) information and contact person(s).	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	c. Name(s) of Urbanized Area(s)(UAs) and area number(s)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	d. Name(s) of Receiving Water(s) and Watershed(s), designated and existing use(s) as described in 25 Pa. Code Chapter 93, 303(d) designation, if applicable, and (TMDL) parameter(s), if applicable.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	e. Stormwater Management Program (SWMP), including contact information for responsible person(s), and including a checkmark in the appropriate box in E(4)-(5).	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	f. Determine whether an MS4 TMDL Plan for Discharges to Impaired Waters with an approved TMDL is required.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	g. Information regarding whether or not any part of your regulated small MS4 is located in or discharging to any receiving watersheds that drain to the Chesapeake Bay?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	h. Information on regulated small MS4 outfalls that discharge to impaired waters without an approved TMDL.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	i. Stormwater Management Ordinance Information.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	j. Compliance History Review.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	k. Certification with signature of official or individual authorized by governing body. If applicable, include a copy of the written authorization to sign the application.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Attachments to application			
2.	Application filing fee. Check must be dated within ten (10) days of application submittal date in the amount of \$2,500.00 for application to reissue (renew) your permit, or \$5,000.00 to apply for a new permit	<input type="checkbox"/>	<input type="checkbox"/>
3.	Map: USGS topographical quadrangle showing the municipal boundaries for all permittees, the location of regulated MS4 outfalls, and all named Waters of the Commonwealth which receive discharge from each regulated MS4 outfall.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4.	MS4 Stormwater Management Ordinance Checklist, if applicable.	<input type="checkbox"/>	<input type="checkbox"/>
5.	A written MS4 TMDL Plan or written MS4 TMDL Strategy, if applicable, signed and sealed by a Professional Engineer (PE) holding a valid license in good standing from the Pennsylvania Department of State (DOS).	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6.	Written MS4 TMDL Plan, if applicable, must show substantial measurable progress with physical pollutant control measures installed on-the-ground in time for their operation to be documented in the annual report or progress report submitted in the third year of coverage, plus additional progress in time to be reported with the application for permit renewal.	<input type="checkbox"/>	<input type="checkbox"/>



APPLICATION FOR NPDES MS4 INDIVIDUAL PERMIT (IP) FOR STORMWATER DISCHARGES FROM SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s)

- (1) Please read the attached instructions carefully before completing this application.
- (2) If any of your regulated small MS4s discharge into "special protection waters" you must use this Individual NPDES MS4 Permit application.
- (3) Check the appropriate box if you are submitting this application for a RENEWAL of your current permit, or if this application is for a NEW permit:

Renewal Permit (for renewal, please provide Permit Number) PAI-130512
 OR
New Permit

A. Multi-Municipal Joint Application									
1.	Is this application being made jointly with other municipalities? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If "Yes", please complete the information below								
2.	Attach a completed and signed "Applicant Information for a Joint NPDES MS4 Authorization" for each joint permittee. Enter the total number of joint permittees: _____ A completed "Applicant Information for a Joint NPDES MS4 Authorization" is attached for each joint permittee. <input type="checkbox"/> Yes <input type="checkbox"/> No								
3.	Attach to this application a map (or maps) to show the locations of the regulated small MS4s, the urbanized area boundaries, and the municipal boundaries of each of the joint permittees. Are the required maps attached to this application? <input type="checkbox"/> Yes <input type="checkbox"/> No								
B. MS4 Operator Information									
1.	Name of MS4 Operator: East Fallowfield Township								
2.	Contact Person: Lisa Valaitis								
3.	Title/Role: Township Secretary								
4.	Division: _____ Department: _____								
5.	Phone Number: 610-384-7144 Fax: 610-384-7143								
6.	E-mail: lvalaitis@eastfallowfield.org								
7.	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; padding: 5px;">Mailing Address:</td> <td style="padding: 5px;">Address Line 1: 2264 Strasburg Road</td> </tr> <tr> <td style="padding: 5px;"></td> <td style="padding: 5px;">Address Line 2:</td> </tr> <tr> <td style="padding: 5px;"></td> <td style="padding: 5px;">City: East Fallowfield, PA</td> </tr> <tr> <td style="padding: 5px;"></td> <td style="padding: 5px;">Zip Code: 19320</td> </tr> </table>	Mailing Address:	Address Line 1: 2264 Strasburg Road		Address Line 2:		City: East Fallowfield, PA		Zip Code: 19320
Mailing Address:	Address Line 1: 2264 Strasburg Road								
	Address Line 2:								
	City: East Fallowfield, PA								
	Zip Code: 19320								
8.	<input checked="" type="checkbox"/> Place a check mark in the box to indicate that all of the following map requirements are met: USGS Topographical, or equivalent, maps that show municipal boundaries for all permittees listed in Sections A or B above are enclosed; and the maps marked to show the location of regulated MS4 outfalls; and the maps are marked to show and identify all named Waters of the Commonwealth that receive discharges from each regulated MS4 outfalls.								

C. Urbanized Area (UA) Information	
Urbanized Area Name(s):	UA #(s):
Philadelphia, PA-DE-NJ-MD	13
Northwest Portion	

D. Description of Receiving Waters (refer to the Instructions for more information).

List water bodies into which the regulated small MS4(s) discharge, their classification(s), uses, impairments, TMDL status, and location of the most downstream outfall.

1. Name of Waterbody	2.i. Designated Uses	2.ii. Existing Uses	3. 303(d) or 305(b) Listed? (Y/N)	4. TMDL ? (Y/N)	5. TMDL Parameter(s) List the Wasteload Allocation (WLA) and Load Allocation (LA) if applicable.	6. ID of most Downstream Outfall - 3-digit number.	7. Latitude (°, ' , ")	8. Longitude (°, ' , ")
a. Sucker Run B05	WWF-MF	Same	Yes	Yes	TN-9.80 kg/day; TP-1,849 kg/day; TSS-62.30 t/yr	B05-1	39°58'07.03"N	75°50'58.25"W
b. West Branch Brandywine Creek B06	CWF-MF	Same	Yes	Yes	TN-65.94 kg/day; TP-13,499 kg/day; TSS-194.12 t/day	B06-1	39°57'02.50"N	75°46'05.07"W
c. Dennis Run	WWF-MF	Same	No	No	See WBBC B06 (Item b above)	See b. above	See b. above	See b. above
d. East Branch Brandywine Creek B30	CWF	Same	Yes	No	N.A.	B30-1	39°59'03.19"N	75°46'06.00"W
e. Buck Run B20	TSF-MF	Same	Yes	Yes	TSS (only)-170.00 t/day	B20-1	39°56'06.74"N	75°51'05.83"W
f. Unnamed Tributary to West Branch Brandywine Creek	EV-MF	Same	No	No	See WBBC B06 (Item b above)	See b. above	See b. above	See b. above
g.								
h.								
i.								

9. Do any of the waterbodies that receive discharges from your regulated small MS4 qualify as either "High Quality" or "Exceptional Value" under 25 Pa. Code Chapter 93 of DEP's regulations? Yes No

E. Stormwater Management Program (SWMP)		
<p>MS4 operators must implement a written SWMP with BMPs to meet six (6) Minimum Control Measures (MCMs), including measurable goals and a schedule, as part of the application. The SWMP in Appendix A of the Authorization to Discharge meets this requirement.</p>		
<p>Check the boxes next to each Minimum Control Measure in the following table to confirm that the Stormwater Management Program contained in Appendix A will be followed. For any MCM in which the Program in DEP's version of Appendix A will not be followed, you must revise Appendix A to provide an alternative program that achieves equal or better protection of water quality. In the right-hand column, provide the names of the person(s) responsible for implementing the program for each Minimum Control Measure.</p>		
Minimum Control Measures	Check to indicate that the MS4 Permittee will implement the MCM as provided in DEP's <i>SWMP (i.e. DEP's Version of Appendix A)</i>	Name and telephone number of the principal person responsible for implementation.
<p>The permittee will implement the SWMP in Appendix A of the Authorization to Discharge. You must check the box in the center column, and provide the information in the right-hand column.</p>	<input checked="" type="checkbox"/>	LISA VALAITIS, TOWNSHIP SECRETARY 610-384-7144
(1) Public Education and Outreach	<input checked="" type="checkbox"/>	SAME
(2) Public Participation and Involvement	<input checked="" type="checkbox"/>	SAME
(3) Illicit Discharge Detection and Elimination	<input checked="" type="checkbox"/>	SAME
<p>(4) Construction Site Stormwater Runoff Control, and (5) BMPs #1, #2, and #3 of the MCM for Post-Construction Stormwater Management in New Development and Redevelopment</p> <p>You must check one (1) of the two (2) boxes in the column to the right and fill-in the blanks as indicated.</p> <p>Check the following box if you will implement these MCMs as provided in DEP's <i>SWMP (i.e. DEP's Version of Appendix A)</i> <input checked="" type="checkbox"/></p>	<input checked="" type="checkbox"/>	<p>MCM #4.A: The permittee will rely on DEP's statewide program for issuing National Pollutant Discharge Elimination System (NPDES) Permits for Stormwater Discharges Associated with Construction Activities to satisfy all requirements under this MCM #4 and all requirements described under BMPs #1 through #3 of MCM #5 in DEP's version of Appendix A. In this case, the permittee is not required as a condition of this permit to implement any of the BMPs listed under MCM #4 nor any of the requirements described in first three (3) BMPs listed under MCM #5 in DEP's version of Appendix A of the Authorization to Discharge.</p> <p>Note: The permittee may not issue any final approvals for development or redevelopment projects that require NPDES permits for discharges of stormwater from construction sites until after DEP or a delegated County Conservation District issues the NPDES Permit for Stormwater Discharges Associated with Construction Activities.</p>

	<input type="checkbox"/> MCM #4.B: The permittee is not relying on DEP's program for issuing NPDES Permits for Stormwater Discharges Associated with Construction Activities; therefore, the permittee must satisfy all of the requirements described in all of the BMPs listed under MCM #4 and all of the requirements in the BMPs #1, #2, and #3 under MCM #5 in DEP's version of Appendix A of the Authorization to Discharge.	
	Name of person responsible: _____	
	Telephone number: _____	

(5) BMPs #4, #5, and #6 of the MDM for Post Construction Stormwater Management in New Development and Redevelopment	<input checked="" type="checkbox"/>	LISA VALAITIS, TOWNSHIP SECRETARY 610-384-7144
(6) Pollution Prevention and Good Housekeeping for Municipal Operations and Maintenance	<input checked="" type="checkbox"/>	BARRY (TAG) GATHERCOLE 610-384-7144

F. MS4 TMDL Plan for Discharges to Impaired Waters with a TMDL

Additional Requirement to have a written MS4 TMDL Plan for Impaired Waters with a TMDL: If any outfalls of your regulated small MS4 discharges stormwater into any portion of a receiving water with applicable wasteload allocations in an approved TMDL, you must develop, submit to DEP for approval, and ensure implementation of a written MS4 TMDL Plan that achieves pollutant reductions consistent with the assumptions and requirements of the wasteload allocations in applicable TMDLs. Refer to Section 2, Part C, of the Authorization to Discharge for the list of ten (10) components that shall be addressed in the MS4 TMDL Strategy component of the MS4 TMDL Plan, **which shall be submitted as a written attachment to this application.**

Is any of your regulated small MS4 discharging stormwater to any portion of receiving waters with applicable WLAs in an approved TMDL? Yes No

If you answered yes above, then you must complete the remainder of this section.

Name and telephone number of the principal person responsible for preparation and implementation of the MS4 TMDL Plan.

Name:	Phone:
<u>James W. MacCombie, P.E., P.L.S. (Preparation)</u>	<u>610-356-9550</u>
<u>Lisa Valaitis, Township Secretary (Implementation)</u>	<u>610-384-7144</u>

Check one (1) of the following boxes to indicate how your MS4 TMDL Plan was developed:

- Your MS4 TMDL Plan implements and enforces the TMDL control measures from a watershed or regional TMDL Plan; or
- You will develop, submit to DEP for approval, and ensure implementation of your own TMDL control measures for your MS4 TMDL Plan according to the guidance in Section II.F of the Instructions.

Signature and Seal by Professional Engineer (PE) for MS4 TMDL Plans

If an MS4 TMDL Plan is required, do the components submitted with this application include the signature and seal of a professional engineer with a valid license in good standing from the Pennsylvania Department of State as required? Yes No

G. Discharges to the Chesapeake Bay

Are any of your regulated small MS4s located in or discharging to any receiving watersheds that drain to the Chesapeake Bay? Yes No

If you answered yes above, then within twelve (12) months of the effective date of your Approval of Individual Permit Coverage, you must develop and submit to DEP for approval a Chesapeake Bay Pollutant Reduction Plan;

Your Chesapeake Bay Pollutant Reduction Plan may incorporate portions of MS4 TMDL Plans that address applicable waste load allocations (WLAs) for sediment, nitrogen, or phosphorus associated with existing stormwater discharges to watersheds that drain to the Chesapeake Bay as described in Part C(1) of the Authorization to Discharge. Will your Chesapeake Bay Pollutant Reduction Plan incorporate portions of any MS4 TMDL Plans? Yes No

Signature and Seal by Professional Engineer (PE) for Chesapeake Bay Pollutant Reduction Plan

Indicate by checking the following box that your Chesapeake Bay Pollutant Reduction Plan will include the signature and seal of a professional engineer with a valid license in good standing from the Pennsylvania Department of State as required? Yes

H. Discharges to Impaired Waters without a TMDL

For each regulated small MS4 that discharges stormwater into any portion of a receiving water that is impaired, but does not have an approved TMDL, permittees shall ensure that new discharges from the permittee's regulated small MS4s do not cause or contribute to exceedances of water quality standards. Permittees must:

- a. identify outfalls that discharge to impaired waters;
- b. identify additional or modified BMPs in the SWMP to ensure that discharges do not cause or contribute to the impairment; and
- c. implement such BMPs and report on the status of each.

For each outfall that discharges to impaired waters, list the outfall, the impairment, and the BMPs that will be added or modified to the SWMP to ensure that new discharges from your regulated small MS4 will not cause or contribute to the identified impairments. For outfalls that discharge stormwater that reasonably cannot be a cause or contributor to the impairment of the receiving water, provide an explanation.

I. Stormwater Management Ordinance

Indicate by checking one (1) of the boxes below whether you have an existing ordinance from an Act 167 Plan approved by DEP in 2005 or later; or you plan to adopt an MS4 Stormwater Management Ordinance that corresponds to the checked box in E(4)-(5); or you have completed and attached an MS4 Stormwater Management Ordinance Checklist that corresponds to the checked box in E(4)-(5).

The applicant will satisfy one (1) of the following (Check one and fill-in blanks where indicated.):

<p>F.1.</p> <p><input type="checkbox"/> By the end of the first year of coverage under this permit, you will enact and implement either: a) the MS4 Stormwater Management Ordinance corresponding to the checked box in E(4)-(5); or, b) an ordinance from an Act 167 Plan approved in 2005 or later; or, c) an ordinance that satisfies all applicable requirements on a completed and signed MS4 Stormwater Management Ordinance Checklist corresponding to the checked box in E(4)-(5).</p>	<p>OR</p>	<p>F.2.</p> <p><input checked="" type="checkbox"/> Already have enacted and implemented an Act 167 Stormwater Management Ordinance from an Act 167 Plan approved in 2005 or later. Provide the enactment date and number of your stormwater management ordinance.</p> <p>Number: <u>2014-02</u></p> <p>Date: <u>9/23/14</u></p>	<p>OR</p>	<p>F.3.</p> <p><input type="checkbox"/> In relation to the box checked in E(4)-(5), the corresponding MS4 Stormwater Management Ordinance Checklist is completed, signed, and attached, and all applicable requirements are satisfied. If your ordinance already is enacted, provide the enactment date and number of your stormwater management ordinance.</p> <p>Number: _____</p> <p>Date: _____</p>
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Fill in the Name and Telephone number of the principal person responsible.

Chris Della Penna, P.E. (Implementation)
 Name

610-857-0045
 Telephone number

J. Compliance History Review

Has the applicant been in violation during the past five (5) years of any permits issued by DEP, or any orders, regulations, or schedules of compliance?

Yes No

If yes, list each permit, order, regulation, or schedule that is/was in violation and provide compliance status of the permitted activity (use additional sheets to provide information on all permits).

Brief Description of Non-Compliance:

MS4 Program deficiencies in Years 4 and 5.

Steps Taken to Return to Compliance and Dates Compliance Achieved:

Deficiencies corrected. Program in compliance Years 6 to 12.

K. Certification:

"I certify under penalty of law that this document and all attachments were 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 knowledge of violations."

Name and official title: (Please Print or Type name and title. Use corporate or professional seal as appropriate)

Joe Pomorski, Chairman East Fallowfield Township Board of Supervisors

Signature: _____ Date Signed: _____

East Fallowfield Township
Christina Basin MS4 TMDL Plan
Part 1 – MS4 TMDL Strategy

Submitted By: East Fallowfield Township

Date: December 30, 2015 (*Submission to PA DEP*)

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C-TIP MS4 TMDL STRATEGY OUTLINE

Section A- Introduction

Section B - Key Definitions

- I. Definitions from PAG-13 (3/2012), “Authorization to Discharge”**
- II. Definitions Used in this MS4 TMDL Strategy**

Section C - Required Information (as required in the NOI instructions)

- I. Title of TMDL(s) that affect East Fallowfield Township**
- II. Watershed Name(s) and Hydrologic Unit Code (HUC)**
 - **Figure 1.** Christina Basin and its TMDL Watersheds, TMDL Subbasins and Municipalities
- III. List of Pollutants and Waste Load Allocations (WLAs) Assigned to Each MS4 Covered by the NOI**
 - a. Pollutants Assigned
 - **Table 1.** Brandywine-Christina Watershed (HUC # 02040205) EPA TMDL MS4 Baseline Pollutant Loadings, MS4 Allocations, and Reductions
 - b. Pollutants Not Applicable
- IV. List of Municipalities Subject to the Same TMDL Pollutants (within HUC Watershed 02040205)**
- V. List of Counties Subject to the TMDL (within HUC Watershed 02040205)**
- VI. Allocated Pollutant Loadings Established in Each Applicable TMDL**
- VII. Reduction in Pollutant Loads Necessary to Meet Each Applicable TMDL or WLA**
 - a. EPA Pollutant Load Reductions
 - i. Sediment Reductions:
 - ii. Nitrogen and Phosphorus Reductions:
 - b. Adjusted MS4 Allocations and Required Load Reductions
 - i. Justification for Adjusting MS4 Baseline, MS4 Allocations, and Reductions
 - ii. Adjustment Approach
 1. Adjustment Process
 2. Delineation of TMDL Storm Sewershed
 - iii. Recalculation of Required Load Reduction (Adjustment Equations)
 - iv. New Municipal Load Allocation (LA)
 - **Table 2.** Adjusted MS4 Baselines, MS4 Allocations Required Load Reductions and New LA for East Fallowfield Township

VIII. Control Measures and BMPs Implemented to Meet the TMDL(s)

- a. MS4 TMDL Implementation Area
- b. Priorities for Implementation
- c. Inventory of Previously Installed Pollutant Reduction Control Measures (March 10, 2003– December 31, 2015)
 - **Table 3.** Previously Installed BMPs/Control Measures and Pollutant Reductions
 - **Figure 2.** Locations of Previously Installed and Candidate BMPs/Control Measures
- d. Municipal Stormwater Ordinance Control Measure
- e. Proposed Control Measures to be Implemented
 - **Table 4.** List of Candidate Control Measures (BMPs)

IX. Analysis of Consistency of this Implementation Plan with WLAs and TMDLs

- a. Analysis of Consistency
- b. Timeline and Milestones
 - **Table 5.** Timeline and Milestones for attaining TMDL Pollutant Load Reductions
- c. Implementation Tracking
 - **Table 6.** TMDL Implementation and Attainment Log
- d. Process for Evaluating and Updating MS4 TMDL Plan
- e. BMP/Control measures Performance Evaluation and Reporting

X. Additional Information: (See Appendices)

Section D - References

Appendix A - List of Municipalities in C-TIP Partnership

Appendix B – PADEP letter dated March 21, 2012

Appendix C - Worksheets for adjusting TMDL MS4 Allocations

Appendix D - BMP/control measure documentation and calculations

SECTION A - INTRODUCTION

This MS4 TMDL Strategy is Part 1 of East Fallowfield Township's MS4 TMDL Plan. This MS4 TMDL Strategy is submitted in accordance with the requirements of the *Individual Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s)*. This MS4 TMDL Strategy has been prepared and will be implemented as part of the Christina Basin TMDL Implementation Plan (C-TIP), and addresses all requirements of the Christina Basin stormwater TMDLs (as listed in Subsection C.I), applicable to East Fallowfield Township. East Fallowfield Township is a participating member of the C-TIP Partnership as indicated in Appendix A.

This MS4 TMDL Strategy (Part I) for East Fallowfield Township is based on, and consistent with all applicable Christina Basin TMDLs. This MS4 TMDL Strategy is organized to follow and respond to the instructions presented in the *Individual Permit* instruction packages. Part II, MS4 TMDL Design Details, will be developed by East Fallowfield Township, and will be submitted to DEP within one year of the date of the approval of coverage under the Municipality's new MS4 permit.

This MS4 TMDL Strategy has been developed after significant coordination with both EPA and PADEP over more than a three year period. A letter from PADEP, included for reference as Appendix B, provides support for the approach taken in this MS4 TMDL Strategy, and more specifically, offers concurrence with the general concept for revising the Christina Basin TMDL MS4 Allocations. This MS4 TMDL Strategy is based on several analyses of the data and results published in the Christina Basin stormwater TMDL Reports and current conditions that have been previously reviewed by PADEP.

This MS4 TMDL Strategy includes the following:

Section AIntroduction

Section BKey Definitions

Section C.....Required Information (as required in the NOI instructions)

Section DReferences

Appendix AList of Municipalities in C-TIP partnership

Appendix BPADEP letter dated March 21, 2012

Appendix CWorksheets for adjusting TMDL MS4 Allocations

Appendix DBMP/control measure documentation and calculations

SECTION B - KEY DEFINITIONS

I. Definitions from PAG-13 (3/2012), “Authorization to Discharge” (pages 6, 7, 8):

Municipal Separate Storm Sewer: A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains), which is all of the following:

- Owned or operated by a state, city, town, borough, township, county, district, association or other public body (created under state law) having jurisdiction over disposal of sewage, industrial wastes, stormwater or other wastes,
- Designed or used for collecting or conveying stormwater,
- Not a combined sewer, and
- Not part of a Publicly Owned Treatment Works as defined at 40 CFR § 122.2.

Outfall: A “Point Source” as defined by 40 CFR § 122.2 is the point where an MS4 discharges stormwater to other surface waters of this Commonwealth. This does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels or other conveyances which connect segments of the same stream and are used to convey waters of the Commonwealth (40 CFR § 122.26(b)(9)).

Regulated Small MS4: Any small MS4 that is covered by the federal Phase II stormwater program, either through automatic nationwide designation under 40 CFR § 122.32(a)(1) (via the Urbanized Area criteria) or by designation on a case-by-case basis by DEP pursuant to 40 CFR § 122.32(a)(2). “Regulated small MS4s” are a subset of “small MS4s”.

Storm Sewershed: The catchment area that drains into the storm sewer system based on the surface topography in the area served by the storm sewer.

Urbanized Area (UA): Land area comprising one or more places (central place(s)) and the adjacent densely settled surrounding area (urban fringe) that together have a residential population of at least 50,000 and an overall population density of at least 1,000 people per square mile, as defined by the United States Bureau of the Census and as determined by the latest available decennial census. The UA outlines the extent of automatically regulated areas.

II. Definitions Used in this MS4 TMDL Strategy:

(The terms listed below are capitalized throughout the text.)

Adjusted TMDL Allocations: MS4 Baseline Loads, MS4 Allocations (Waste Load Allocations), or Load Reductions that have been recalculated to more accurately represent the pollutant loads received and discharged by the regulated MS4, and covered by the MS4 permit, as recommended in the TMDL Reports. Adjustment methods are described in Subsection C.VII.b.

Load Reduction: The required pollutant load reduction; difference between the TMDL MS4 Baseline Load and the MS4 Allocation (Waste Load Allocation).

MS4 Allocation: Used herein to refer to EPA's "MS4 Allocation, EPA's "MS4 Load Allocation", as used in the TMDL Reports, and which appear to be used by EPA as synonyms for "Waste Load Allocation" (WLA).

MS4 TMDL Implementation Area: All areas that are within the Municipality's boundaries and within a TMDL Watershed that are:

- a. Located where the target pollutant load reductions are quantifiable at the impaired stream segment that receives stormwater discharges from the Municipality's regulated small MS4; and
- b. Within the Urbanized Area; or
- c. Outside the Urbanized Area and in accordance with PADEP's forthcoming credit, trading, and offset policies.

This is the maximum geographic area within which the MS4 Municipality can install new TMDL control measures or can identify previously installed control measures (2003-2012) that can be counted toward achieving the Municipality's required pollutant Load Reduction.

Regulated Storm Sewershed: All land area that drains to the Regulated Small MS4 that is both within the Urbanized Area and within the Municipal boundary.

TMDL Storm Sewershed: All Regulated Storm Sewershed areas and portions of the Regulated Small MS4 that are within a TMDL Subbasin. This represents the land area that generates the pollutant load received and discharged by the Regulated Small MS4 and which can be used to "adjust" EPA's MS4 Baseline Loads, MS4 Allocations, and required pollutant Load Reductions.

TMDL Subbasin: Any "subbasin" delineated in either EPA Christina Basin TMDL Report and for which either TMDL Report lists WLAs for TSS, TN and/or TP.

TMDL Watershed: The watershed in which the TMDL Subbasin is located; Either Brandywine Creek, Red Clay Creek, or White Clay Creek watershed.

SECTION C - REQUIRED INFORMATION

I. Title of TMDL(s) that affect East Fallowfield Township:

The following TMDLs have been established for various portions of the watersheds in the Christina Basin, PA. Those that are and are not applicable to East Fallowfield Township are indicated below:









- a. *Total Maximum Daily Loads for Bacteria and Sediment in the Christina River Basin, Pennsylvania, Delaware, and Maryland.* September 2006. U.S. Environmental Protection Agency, Philadelphia, PA (herein referred to as Bacteria/Sediment TMDL Report). This TMDL Report presents TMDLs for sediment and bacteria.
- Applicable, East Fallowfield Township is listed with a WLA in the above Report
 - Not Applicable, East Fallowfield Township is **NOT** listed with a WLA in the above Report.
- b. *Revisions to Total Maximum Daily Loads for Nutrient and Low Dissolved Oxygen Under High-Flow Conditions, Christina River Basin, Pennsylvania, Delaware, and Maryland.* September 2006. U.S. Environmental Protection Agency, Philadelphia, PA (herein referred to as the Nutrient/Low DO TMDL Report). This TMDL Report presents TMDLs for Total Nitrogen and Total Phosphorus.
- Applicable, East Fallowfield Township is listed with a WLA in the above Report
 - Not Applicable, East Fallowfield Township is **NOT** listed with a WLA in the above Report.
- c. *Total Maximum Daily Loads, Polychlorinated Biphenyls (PCBs) and Chlordane, West Branch Brandywine Creek, Chester County, Pennsylvania.* March 9, 2001. Pennsylvania Department of Environmental Protection, Harrisburg, PA (herein referred to as the Brandywine Creek PCB/Chlordane TMDL Report). This TMDL Report presents a TMDL only for PCB.
- Not Applicable, East Fallowfield Township is **NOT** listed with a WLA in the above Report.
- d. *Total Maximum Daily Load for the Red Clay Creek Basin Chester County, Pennsylvania.* April 7, 2007. U.S. Environmental Protection Agency, Philadelphia, PA (herein referred to as the Red Clay Creek PCB TMDL Report). This TMDL Report presents TMDLs for PCB.
- Not Applicable, East Fallowfield Township is **NOT** listed with a WLA in the above Report.

Further details about the applicability of the above TMDLs are provided in Subsection C.III.

Figure 1. Christina Basin and its TMDL Watersheds, TMDL Subbasins and Municipalities

Figure 1. Christina Basin and its TMDL Watersheds, TMDL Subbasins and Municipalities

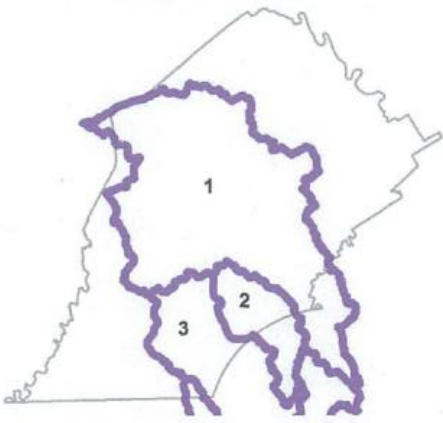
September 26, 2012 (Revised)
Chester County Water Resources Authority

	Christina Basin Watersheds		Chester County Boundary
	Christina Basin HSPF Subbasins (As presented in the Christina Basin EPA TMDL Reports)		Municipalities
	TMDL Subbasins (Listed with at least 1 WLA)		Water Bodies
	Urbanized Area (Christina Basin)- 2000 Census		Streams

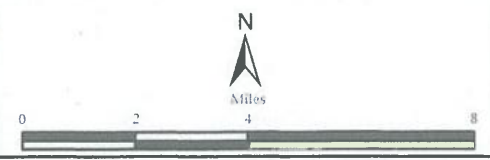
Map Location and Major Drainages



Christina Basin TMDL Watersheds



1. Brandywine Creek watershed
2. Red Clay Creek watershed
3. White Clay Creek watershed

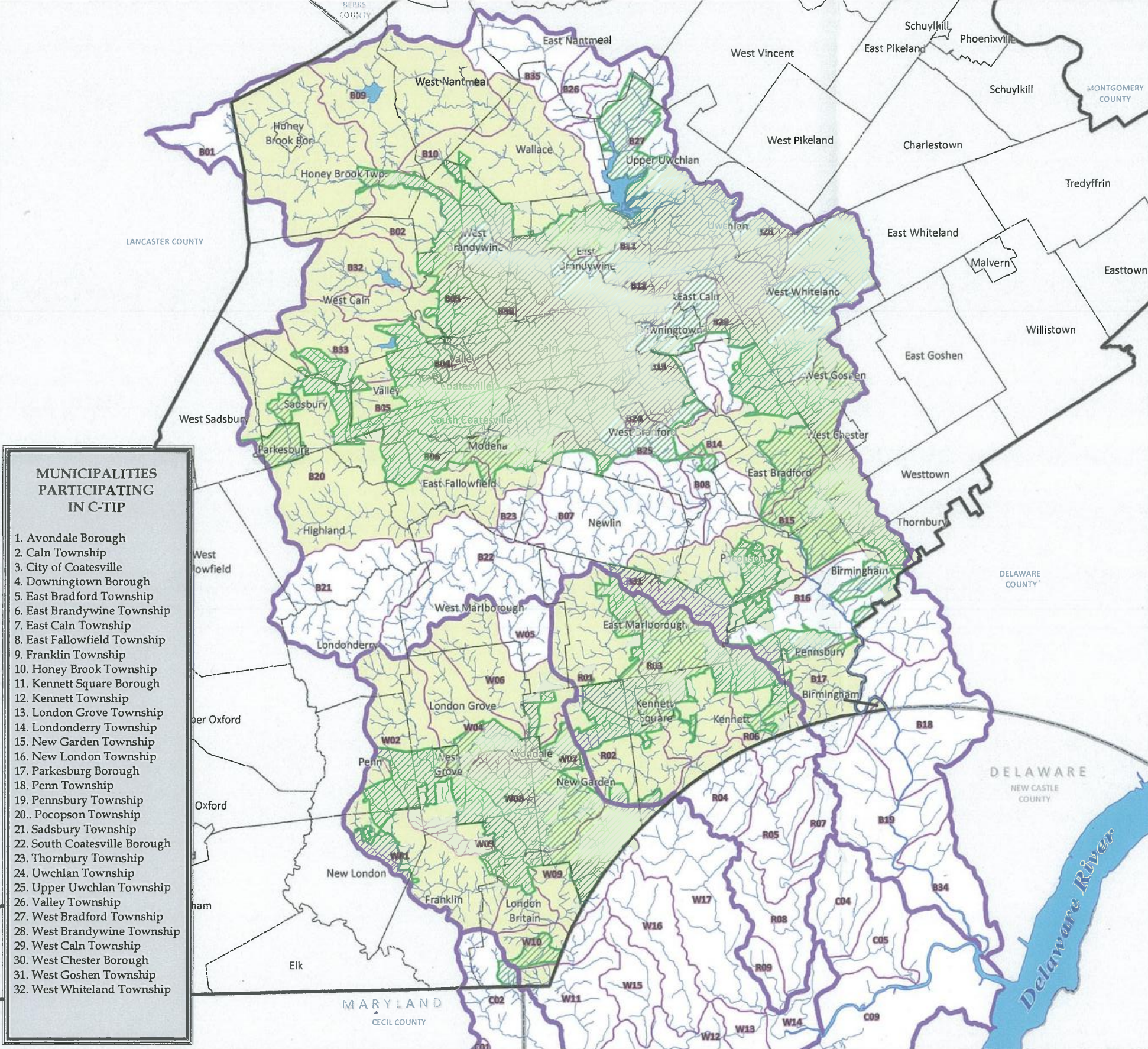


DATA SOURCES:
Administrative Boundaries Watersheds, Streams - Chester County
Census 2000 Urbanized Areas (UA) subset of "Urban Areas 2000" - U.S. Department of Commerce; Bureau of the Census; Geography Division.
HSPF Subbasin Delineation - GIS files provided by USGS Exton, PA Office - June, 2009.

DISCLAIMER:
This map was generated using the best information available at the time of publication. This map should not be relied upon as the sole basis of determination of regulatory requirements or responsibilities. The relevant PADEP reports and other documents should be consulted for official designations and associated regulatory information. Should any conflicts exist between this map and the PADEP reports and regulations, the latter supersede this map.

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- MUNICIPALITIES PARTICIPATING IN C-TIP**
1. Avondale Borough
 2. Caln Township
 3. City of Coatesville
 4. Downingtown Borough
 5. East Bradford Township
 6. East Brandywine Township
 7. East Caln Township
 8. East Fallowfield Township
 9. Franklin Township
 10. Honey Brook Township
 11. Kennett Square Borough
 12. Kennett Township
 13. London Grove Township
 14. Londonderry Township
 15. New Garden Township
 16. New London Township
 17. Parkesburg Borough
 18. Penn Township
 19. Pennsbury Township
 20. Pocopson Township
 21. Sadsbury Township
 22. South Coatesville Borough
 23. Thornbury Township
 24. Uwchlan Township
 25. Upper Uwchlan Township
 26. Valley Township
 27. West Bradford Township
 28. West Brandywine Township
 29. West Caln Township
 30. West Chester Borough
 31. West Goshen Township
 32. West Whiteland Township

III. List of Pollutants and Waste Load Allocations (WLAs) Assigned to Each MS4 Covered by the NOI:

This NOI is for East Fallowfield Township.

a. Pollutants Assigned:

The following TMDL pollutants (as presented in the applicable TMDL Reports listed in Subsection C.I.) **are** applicable to East Fallowfield Township because a Waste Load Allocation has been listed for East Fallowfield Township, and their implementation is addressed in this East Fallowfield Township MS4 TMDL Strategy:

- Total Suspended Solids (Sediment)
- Total Nitrogen
- Total Phosphorus

Table 1 lists the pollutants (total suspended solids, total nitrogen and total phosphorous) and WLAs presented in the Bacteria/Sediment TMDL Report and the Nutrient/Low DO TMDL Report for East Fallowfield Township and for all other municipalities listed in the TMDL Report(s). The TMDL Report(s) present these WLAs as “MS4 Load Allocation” (for Total Suspended Solids (TSS) referred to in the TMDL Report and herein as sediment), and “MS4 Allocation” (for total nitrogen (TN), and total phosphorus (TP), referred to herein as nitrogen and phosphorus, respectively), and these terms and numbers are presented in Table 1 exactly as presented in the TMDL Reports.

**Table 1. Brandywine-Christina Watershed (HUC # 02040205)
EPA TMDL MS4 Baseline Pollutant Loadings, MS4 Allocations, and Reductions**

Table 1. Brandywine-Christina Watershed (HUC # 02040205)
EPA TMDL MS4 Baseline Pollutant Loadings, MS4 Allocations, and Reductions

Municipalities Listed in TMDL Reports Brandywine Creek Watershed	Baseline MS4 Load ^b		Sediment (tons/year) MS4 Load Allocation ^b		MS4 Load Reduction ^{1a}		% Reduction ^{1b}		MS4 Baseline Load ^{2a}		Total Nitrogen (kg/day) MS4 Load Allocation ^{2a}		% Reduction ^{2m}		MS4 Baseline Load ²ⁱ		Total Phosphorus (kg/day) MS4 Load Allocation ²ⁱ		% Reduction ^{2m}	
	MS4 Load	Reduction	MS4 Load	Reduction	MS4 Load	Reduction	% Reduction	MS4 Load	Reduction	MS4 Load	Reduction	MS4 Load	Reduction	% Reduction	MS4 Load	Reduction	MS4 Load	Reduction	% Reduction	MS4 Load
BIRMINGHAM TWP	310.81	180.35	130.35	180.46	58.06%	16.08	10.86	5.22	32.48%	3,015	2,031	0.984	32.64%	2,031	0.984	0.984	32.64%	2,031	0.984	32.64%
COATESVILLE CITY	231.29	79.76	151.53	65.52%	60.58%	54.19	44.44	9.75	17.99%	0.828	0.677	0.149	18.04%	0.677	0.149	0.149	18.04%	0.677	0.149	18.04%
EAST BRADFORD TWP	1185.00	467.17	717.83	60.58%	46.91%	110.54	75.74	34.80	31.48%	22,365	15,348	7,017	31.37%	15,348	7,017	7,017	31.37%	15,348	7,017	31.37%
EAST BRANDYWINE TWP	803.23	426.42	376.81	46.91%	61.98%	384.80	238.86	145.94	37.93%	9.61	5.76	3.85	40.08%	5.76	3.85	0.074	40.22%	5.76	3.85	40.22%
EAST FALLOWFIELD TWP	366.70	139.44	227.26	61.98%	31.34%	20.58	13.23	7.35	35.70%	421.64	279.02	142.62	33.83%	279.02	142.62	2,643	34.78%	279.02	142.62	34.78%
EAST MARLBOROUGH TWP	384.80	238.86	145.94	37.93%	55.43%	27.96	12.46	15.50	55.43%	2.38	2.22	0.16	6.72%	2.22	0.16	0.015	7.04%	2.22	0.16	7.04%
HIGHLAND TWP	20.58	13.23	7.35	35.70%	58.67%	144.18	59.59	84.59	58.67%	6.53	4.57	1.96	30.02%	4.57	1.96	0.401	29.99%	4.57	1.96	29.99%
HONEY BROOK TWP	813.84	558.76	255.08	31.34%	37.93%	52.11	32.35	19.76	37.93%	47.00	43.71	3.29	7.00%	43.71	3.29	0.285	7.01%	43.71	3.29	7.01%
KENNETT TWP	27.96	12.46	15.50	55.43%	66.06%	485.14	184.64	320.50	66.06%	10.92	8.96	1.96	17.95%	8.96	1.96	0.029	17.47%	8.96	1.96	17.47%
MODENA BORO	144.18	59.59	84.59	58.67%	19.92%	283.22	121.6	181.62	57.07%	57.57	43.75	13.82	24.01%	43.75	13.82	2,215	31.81%	43.75	13.82	31.81%
NEWLIN TWP	52.11	32.35	19.76	37.93%	51.74%	126.53	103.76	22.77	19.00%	1,929	1,562	0.347	17.99%	1,562	0.347	0.347	17.99%	1,562	0.347	17.99%
PARKESBURG BORO	113.98	43.48	70.50	61.85%	57.07%	17.25	12.08	5.17	29.87%	3,532	2,473	1,059	29.88%	2,473	1,059	1,059	29.88%	2,473	1,059	29.88%
PENNSBURG TWP	821.21	320.79	500.42	60.94%	36.92%	138.01	104.78	31.23	22.96%	9.63	8.344	1.285	13.35%	8.344	1.285	1.285	13.35%	8.344	1.285	13.35%
POCOPSON TWP	288.73	172.13	117.60	40.59%	60.87%	183.72	149.28	34.46	18.78%	0.329	0.205	0.124	37.68%	0.205	0.124	0.124	37.68%	0.205	0.124	37.68%
SADSBURY TWP	82.17	34.46	47.71	58.06%	0.00%	4.32	4.32	0.00	0.00%	4.32	4.32	0.00	0.00%	4.32	0.00	0.00	0.00%	4.32	0.00	0.00%
THORNBURY TWP	82.17	34.46	47.71	58.06%	0.00%	68.28	43.07	25.21	36.92%	4.32	4.32	0.00	0.00%	4.32	0.00	0.00	0.00%	4.32	0.00	0.00%
UPPER UMCHLAN TWP	485.14	184.64	320.50	66.06%	60.87%	461.32	180.51	280.81	60.87%	4.32	4.32	0.00	0.00%	4.32	0.00	0.00	0.00%	4.32	0.00	0.00%
VALLEY TWP	174.41	67.41	107.00	61.64%	0.00%	8.96	8.96	0.00	0.00%	8.96	8.96	0.00	0.00%	8.96	0.00	0.00	0.00%	8.96	0.00	0.00%
WALLACE TWP	283.22	121.6	181.62	57.07%	0.00%	68.28	43.07	25.21	36.92%	4.32	4.32	0.00	0.00%	4.32	0.00	0.00	0.00%	4.32	0.00	0.00%
WEST BRADFORD TWP	821.21	320.79	500.42	60.94%	0.00%	68.28	43.07	25.21	36.92%	4.32	4.32	0.00	0.00%	4.32	0.00	0.00	0.00%	4.32	0.00	0.00%
WEST BRANDYWINE TWP	821.21	320.79	500.42	60.94%	0.00%	68.28	43.07	25.21	36.92%	4.32	4.32	0.00	0.00%	4.32	0.00	0.00	0.00%	4.32	0.00	0.00%
WEST CALN TWP	821.21	320.79	500.42	60.94%	0.00%	68.28	43.07	25.21	36.92%	4.32	4.32	0.00	0.00%	4.32	0.00	0.00	0.00%	4.32	0.00	0.00%
WEST GOSHEN TWP	821.21	320.79	500.42	60.94%	0.00%	68.28	43.07	25.21	36.92%	4.32	4.32	0.00	0.00%	4.32	0.00	0.00	0.00%	4.32	0.00	0.00%

(1) U.S. EPA Region III, 8 April 2005. Total Maximum Daily Loads for Bacteria and Sediment in the Christina River Basin Watershed Pennsylvania, Delaware, and Maryland. Philadelphia, PA.

(2) U.S. EPA Region III, 28 September 2006. Revisions to Total Maximum Daily Loads for Nutrient and Low Dissolved Oxygen under High-Flow Conditions. Christina River Basin Watershed, Pennsylvania, Delaware, and Maryland. Philadelphia, PA.

a. Appendix C - Table C-7a. Total nitrogen MS4 allocations for Brandywine Creek watershed (kg/day) p. C-9

b. Appendix C - Table C-7b. Total nitrogen MS4 allocations for Red Clay Creek watershed (kg/day) p. C-9

c. Appendix C - Table C-7c. Total nitrogen MS4 allocations for White Clay Creek watershed (kg/day) p. C-11

d. Appendix C - Table C-7d. Total nitrogen MS4 allocations for Brandywine Creek watershed (kg/day) p. C-8

e. Appendix C - Table C-7e. Total phosphorus MS4 allocations for Brandywine Creek watershed (kg/day) p. C-10

f. Appendix C - Table C-7f. Total phosphorus MS4 allocations for Red Clay Creek watershed (kg/day) p. C-10

g. Appendix C - Table C-7g. Total phosphorus MS4 allocations for White Clay Creek watershed (kg/day) p. C-13

h. Appendix C - Table C-7h. Total nitrogen MS4 baseline loads for Brandywine Creek watershed (kg/day) p. C-9

i. Appendix C - Table C-7i. Total nitrogen MS4 baseline loads for Red Clay Creek watershed (kg/day) p. C-9

j. Appendix C - Table C-7j. Total nitrogen MS4 baseline loads for White Clay Creek watershed (kg/day) p. C-10

k. Appendix C - Table C-7k. Total phosphorus MS4 baseline loads for Brandywine Creek watershed (kg/day) p. C-9

l. Appendix C - Table C-7l. Total phosphorus MS4 baseline loads for Red Clay Creek watershed (kg/day) p. C-9

m. Calculated by COWRA using Tables listed in 1a-1d. Based above MS4 Reduction = (Baseline MS4 Load) - (MS4 Load Allocation)

n. Calculated by COWRA using Tables listed in 2a-2i. Based above MS4 Reduction = (MS4 Baseline Load) - (MS4 Allocation)

o. Municipality that are not currently regulated under the NPDES MS4 program, and thus not required to implement TMDLs

b. Pollutants Not Applicable:

The following TMDL pollutants (as listed in the TMDL Reports listed in Subsection C.I.) are **NOT** applicable to East Fallowfield Township, as indicated and explained below:

- Sediment (Total Suspended Solids)** – There is NO WLA listed for East Fallowfield Township. Therefore, implementation of the Sediment TMDL is not addressed in this East Fallowfield Township MS4 TMDL Strategy.
- Total Nitrogen** - There is NO WLA listed for East Fallowfield Township. Therefore, implementation of the Total Nitrogen TMDL is not addressed in this East Fallowfield Township MS4 TMDL Strategy.
- Total Phosphorus** - There is NO WLA listed for East Fallowfield Township. Therefore, implementation of the Total Phosphorus TMDL is not addressed in this East Fallowfield Township MS4 TMDL Strategy.
- Bacteria** – East Fallowfield Township is:
 - a)** not listed with a WLA for bacteria. Therefore, implementation of the Bacteria TMDL is not addressed in this East Fallowfield Township MS4 TMDL Strategy.
 - b)** is listed with a WLA for bacteria, however, based on the PADEP letter dated March 21, 2012 (Appendix B) and best information available¹ at the time of preparation of this MS4 TMDL Strategy there are no streams designated as impaired by bacteria attributed to stormwater runoff located within or downstream of East Fallowfield Township, or within the Christina Basin, PA. Therefore, implementation of the Bacteria TMDL is not addressed in this East Fallowfield Township MS4 TMDL Strategy.
- PCB/Chlordane (Brandywine Creek)**
 - a)** There are no Municipal WLAs listed in the Brandywine Creek PCB/Chlordane TMDL Report. This TMDL applies only to 5.6 miles of the West Branch Brandywine Creek in East Fallowfield, West Bradford, and Newlin Townships, the City of Coatesville, and Modena Borough. As quoted in the TMDL Report: “*Pennsylvania found no permitted point sources contributing to the load of either chlordane or PCBs to the West Branch Brandywine Creek*” and “*...the WLA was assigned a value of 0*”. Therefore, implementation of the Brandywine Creek PCB/Chlordane TMDL is not addressed in this East Fallowfield Township MS4 TMDL Strategy.
 - b)** East Fallowfield Township has no land area in the Brandywine Creek Watershed. Therefore, implementation of the Brandywine Creek

¹ 2010 Pennsylvania Integrated Water Quality Monitoring and Assessment Report. “Undated, Pennsylvania Department of Environmental Protection. Office of Water Management, Bureau of Water Supply & Wastewater Management, Water Quality Assessment and Standards Division.

PCB/Chlordane TMDL is not addressed in this East Fallowfield Township MS4 TMDL Strategy.

PCB (Red Clay Creek)

a) There are no Municipal WLAs listed in the Red Clay Creek PCB TMDL Report. As quoted in the TMDL Report: “*According to PADEP, there are no known point sources of PCB to Red Clay and the East and West Branches of Red Clay Creek at this time*” and “*...the WLA was set to zero.*” Therefore, implementation of the Red Clay Creek PCB TMDL is not addressed in this East Fallowfield Township MS4 TMDL Strategy.

b) East Fallowfield Township has no land area in the Red Clay Creek Watershed. Therefore, implementation of the Red Clay Creek PCB TMDL is not addressed in this East Fallowfield Township MS4 TMDL Strategy.

IV. List of Municipalities Subject to the Same TMDL Pollutants (within HUC Watershed 02040205):

Table 1, presented in Subsection C.III, lists all Pennsylvania municipalities in the HUC 02040205 that are subject to the sediment, nitrogen and phosphorus TMDLs.

V. List of Counties Subject to the TMDL (within HUC Watershed 02040205):

There are no counties listed or referenced in any of the above referenced TMDL Reports and therefore there are no counties subject to any of the Christina TMDLs.

VI. Allocated Pollutant Loadings Established in Each Applicable TMDL:

Table 1, as presented in Subsection C.III, lists the EPA allocated pollutant loadings for East Fallowfield Township for each applicable TMDL pollutant addressed by the Christina Basin Bacteria/Sediment and Low DO/Nutrient TMDL Reports. The allocated pollutant loadings are presented within these TMDL Reports as “MS4 Load Allocation” or “MS4 Allocation”, and Table 1 presents the pollutant loadings and terminology exactly as presented in the TMDL Reports.

VII. Reduction in Pollutant Loads Necessary to Meet Each Applicable TMDL or WLA:

a. EPA Pollutant Load Reductions:

Table 1, as presented in Section C.III, lists the applicable pollutant Load Reductions required by the TMDL Reports. East Fallowfield Township is located within B05 (West Branch Brandywine Creek; Unnamed Tributary to Sucker Run) and B06 (West Branch Brandywine Creek) watersheds. Table 1 indicates that pollutant Load Reductions are required by East Fallowfield Township for Sediment, Nitrogen, and Phosphorus.

- i. **Sediment Reductions:** The pollutant Load Reductions for sediment (TSS) are presented within the Bacteria/Sediment TMDL Report as “Percent Reduction” and are presented in Table 1 exactly as presented in the Bacteria/Sediment TMDL Report. Table 1 also includes Municipal sediment “MS4 Load Reductions” in tons per year, which were calculated for the C-TIP based on the following equation:

$$(MS4\ Load\ Reduction) = (Baseline\ MS4\ Load) - (MS4\ Load\ Allocation)$$

where “Baseline MS4 Load” and “MS4 Load Allocation” are taken from tables presented in the Sediment TMDL Report.

- ii. **Nitrogen and Phosphorus Reductions:** The Nutrient/Low DO TMDL Report does not present pollutant Load Reductions by Municipality; they are presented only by Subbasin and only by “percent”. Table 1 presents TN (nitrogen) and TP (phosphorus) Load Reductions by Municipality and percent reductions that were calculated using the following equations:

$$(MS4\ Load\ Reduction) = (MS4\ Baseline\ Load) - (MS4\ Allocation)$$

$$(Percent\ Reduction) = (MS4\ Load\ Reduction) / (MS4\ Baseline\ Load)$$

where “MS4 Baseline Load” and “MS4 Load Allocation” are taken from tables presented in the Nutrient/Low DO TMDL Report.

b. Adjusted MS4 Allocations and Required Load Reductions:

East Fallowfield Township

- has adjusted their MS4 Allocation(s) and Load Reduction(s). See below.
 has NOT adjusted their MS4 Allocation(s) and Load Reduction(s) at this time and will adhere to Table 1 Load Reductions (Skip below and go to Part VIII).

i. Justification for Adjusting MS4 Baseline, MS4 Allocations, and Reductions:

The TMDL Reports explain that the EPA MS4 Allocation and required Load Reductions were calculated assuming the entire land area within the TMDL Subbasin in the Municipality drains to the MS4. However because the Urbanized Area boundary bisects many municipalities in the Christina Basin, and because most Regulated MS4s cover only a portion of the Municipality, EPA acknowledges that the municipal allocations should be recalculated when MS4 mapping is available. This involves recalculating MS4 Baselines, MS4 Allocations, and pollutant Load Reductions.

The Bacteria /Sediment TMDL Report States:

“5.0 REASONABLE ASSURANCE AND IMPLEMENTATION

For purposes of this TMDL, WLAs were developed for each municipality holding MS4 permits. Distribution of loads was estimated using land use data within municipal boundaries and application of unit area loadings (lbs/acre/year) determined for subbasins defined in the HSPF model and used for TMDL development. As additional data are collected by PADEP regarding drainage areas of each storm sewer system in the basin, these WLAs can be refined to more detailed representation of WLAs for each stormwater permit and LAs for areas not bound by such permits. To do this, the drainage area of each storm sewer should be delineated so that the area and distributions of land use can be determined. The land use areas within the stormwater drainage areas can be multiplied by the unit area loadings reported herein to determine the WLA for each MS4 permit and to calculate the load reduction necessary to meet the TMDL. The remaining load in each respective township can then be assigned to LAs. Until such storm water drainage area data are available, the WLAs and required load reductions reported herein are applicable.

(Excerpt from *Total Maximum Daily Loads for Bacteria and Sediment in the Christina River Basin Watershed Pennsylvania, Delaware, and Maryland. Philadelphia, PA. April, 2005 (pg. 5-2).*)

The Nutrient/Low DO TMDL Report States:

“5.0 REASONABLE ASSURANCE AND IMPLEMENTATION

For purposes of this TMDL, WLAs were developed for each municipality holding MS4 permits. Distribution of loads was estimated using land use data within municipal boundaries and application of unit area loadings (lbs/acre/year) determined for subbasins defined in the HSPF model and used for TMDL development. As additional data are collected by PADEP regarding drainage areas of each storm sewer system in the basin, these WLAs can be refined to more detailed representation of WLAs for each stormwater permit and LAs for areas not bound by such permits. To do this, the drainage area of each storm sewer should be delineated so that the area and distributions of land use can be determined. The remaining load in each respective township can then be assigned to LAs. Until such storm water drainage area data are available, the WLAs and required load reductions reported herein are applicable.

(Excerpt from *Revisions to Total Maximum Daily Loads for Nutrient and Low Dissolved Oxygen Under High-Flow Conditions: Christina River Basin Watershed, Pennsylvania, Delaware, and Maryland. Philadelphia, PA. September, 2006 (pg. 5-2).*)

After extensive coordination with PADEP and analyses of available TMDL and GIS data, an approach was selected for adjusting MS4 Baselines, MS4 Allocations, and required Load Reductions for the MS4 TMDL Strategy that reflects the actual extent of Regulated MS4s, and their contributing drainage areas, as described in the following section.

ii. Adjustment Approach:

1. Adjustment Process:

The MS4 Baselines, MS4 Allocations and Load Reductions were adjusted using the following approach:

- 1) The TMDL Storm Sewershed or Urbanized Area was delineated for each TMDL Subbasin based on mapping of the MS4 system and topography, excluding any portions that are discharging to streams that are not currently listed by PADEP for stormwater related impairments; and
- 2) The delineated TMDL Storm Sewershed or Urbanized Area land area was then used to pro-rate the MS4 Baselines, MS4 Allocations, and Load Reduction requirements.

Methods used for adjusting MS4 Baselines, MS4 Allocations and Load Reductions are described in the following subsection. The overall process included the following steps:

- A base map for East Fallowfield Township was prepared using best available geographic data to include: political boundaries, streams and surface water bodies, TMDL Subbasin boundaries, TMDL Watershed boundaries, and the Urbanized Area.
- The East Fallowfield Township Regulated Small MS4 (as defined in “Key Definitions”) was mapped.
- The Regulated Storm Sewershed (as defined in “Key Definitions”) was delineated using best available topographic data (2-foot LiDAR contours).
- The TMDL Storm Sewershed area (as defined in “Key Definitions”) was delineated for each TMDL subbasin that is applicable to East Fallowfield Township.
 - The portions of the TMDL Storm Sewershed that do not drain to a stream currently listed as impaired by PADEP for stormwater related causes are subtracted from the TMDL Storm Sewershed area for each TMDL subbasin.
 - The portions of the TMDL Watershed that drain to a stream currently listed as impaired by PADEP for stormwater related causes but drain directly to the stream and do not pass through the Regulated Small MS4 are subtracted from the TMDL Storm Sewershed area for each TMDL subbasin.
- The total land area within the Urbanized Area within each TMDL Subbasin was calculated and used in lieu of the TMDL Storm Sewershed area as a simplified method.
 - The portions of the Urbanized Area that do not drain to a stream currently listed as impaired by PADEP for stormwater related causes are subtracted from the Urbanized Area land area for each TMDL subbasin.
- Adjusted MS4 Baselines, MS4 Allocations, and Load Reductions for each applicable TMDL pollutant were calculated by TMDL Subbasin using the methods and equations as presented below.

2. Delineation of TMDL Storm Sewershed:

The following method was used by East Fallowfield Township to delineate the TMDL Storm Sewershed. This methodology is consistent with the recommended approach described by EPA in the TMDL Reports and has been conditionally approved by PADEP in its letter dated March 21, 2012 (Appendix B):

- Land Use Area Method** – Within each applicable TMDL subbasin, the TMDL Storm Sewershed area is delineated based on 2008 LiDAR topography (2-foot contours), and the individual land use areas are determined using 2010 land use data. The Adjustment Equations are then applied to each land use type to recalculate the MS4 Baselines, MS4 Allocations and required Load Reductions for each category of land use within each TMDL Subbasin, for each applicable pollutant. The individual land use Baselines, MS4 Allocations and required Load Reductions are then summed by TMDL Subbasin, and then by TMDL Watershed. The TMDL Watershed totals become the adjusted MS4 Baseline, Allocation and required Load Reductions for each applicable pollutant.
- Total Land Area Method** – Within each applicable TMDL subbasin, the TMDL Storm Sewershed area is delineated based on 2008 LiDAR topography (2-foot contours). The Adjustment Equations are then applied to the total TMDL Storm Sewershed area for each TMDL Subbasin to recalculate the MS4 Baselines, MS4 Allocations, and Load Reductions for each applicable pollutant. The TMDL Subbasin totals are then summed by TMDL Watershed. The TMDL Watershed totals become the adjusted MS4 Baseline, Allocation, and required Load Reductions for each applicable pollutant.

In Watershed B06 the West Branch Brandywine Creek, which is impaired, is within the Urbanized Area according to the 2000 Census. There are several tributaries to the West Branch Brandywine Creek within the B06 watershed. The Urbanized Area based on the 2000 Census within the B06 watershed in East Fallowfield consists of approximately 1972 acres. The majority of the watershed drains to unnamed tributaries to the West Branch Brandywine Creek, which do not have impairments, or do not drain through the Township's MS4 and, therefore, could be parsed out. The resulting TMDL stormsewer shed is approximately 129 acres. This stormsewer shed consists of a corridor along the West Branch Brandywine Creek along Mortonville Road north of the creek and a railroad south of the creek that both parallel the creek. The surrounding topography and ground cover consists largely of very steeply sloped mature woodlands. The MS4 in this area consists of drainage along Mortonville Road. Furthermore, according to the 2010 Census, the West Branch Brandywine Creek is no longer within the Urbanized Area. Therefore, East Fallowfield Township should not be held accountable for Load Reductions

for this area and the current Strategy proposes no water quality BMPs within this watershed. Refer also to Appendix D for further justification and supporting calculations.

Urbanized Area Method – Within each applicable TMDL subbasin, the total land area within the Urbanized Area is determined using the Urbanized Areas currently depicted on the PADEP Stormwater webpage (2000 Census). The Adjustment Equations are then applied to the total land area within the Urbanized Area for each TMDL Subbasin to recalculate the MS4 Baselines, MS4 Allocations, and Load Reductions for each applicable pollutant. The TMDL Subbasin totals are then summed by TMDL Watershed. The TMDL Watershed totals become the adjusted MS4 Baseline, MS4 Allocation and required Load Reductions for each applicable pollutant.

Other Method –

iii. Recalculation of Required Load Reduction (Adjustment Equations):

Each method above results in a delineation of the land area(s) to be used to calculate the Adjusted MS4 Baselines, MS4 Allocations, and required Load Reductions (See “Key Definitions”) using the following Adjustment Equations:

$$\text{Adjustment Ratio} = \frac{\left(\begin{array}{l} \text{Actual Contributing land area (acres)} \\ \text{as delineated by the Municipality} \end{array} \right)}{\left(\begin{array}{l} \text{Land area (acres) used by EPA to} \\ \text{calculate the EPA MS4 Allocation} \end{array} \right)}$$

$$\text{Adjusted MS4 Baseline} = \text{Adjustment Ratio} \times (\text{EPA MS4 Baseline})$$

$$\text{Adjusted MS4 Allocation} = \text{Adjustment Ratio} \times (\text{EPA MS4 Allocation})$$

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

The adjustment calculations are provided in Appendix C:

- Appendix C.2 – MS4 Worksheet for Calculating Adjusted MS4 Baseline Loads, MS4 Allocations, required Load Reductions and new Municipal LAs - Total Land Area method.

iv. New Municipal Load Allocation (LA):

The portion of the EPA MS4 Allocation that was removed by the adjustment is now assigned as the Load Allocation (LA) for East Fallowfield Township. The total TMDL Allocation for East Fallowfield Township remains unchanged by the adjusted MS4 Allocation, and becomes: MS4 Allocation (WLA) + Municipal LA +MOS.

Table 2 presents the Adjusted MS4 Baselines, MS4 Allocations and adjusted Load Reductions for East Fallowfield Township. The new LA for East Fallowfield Township is also shown for each TMDL Watershed.

Table 2. Adjusted MS4 Baselines, MS4 Allocations Required Load Reductions and New LA for East Fallowfield Township

Note: All values are calculated in this section from the Watershed Totals in Appendix C.2, column E		TMDL Watershed 1	TMDL Watershed 1
NITROGEN -	Applicable <input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/>	B05	B06**
Total Nitrogen MS4 baseline Load (kg/day):		16.34	94.20
Total Nitrogen MS4 Allocation (kg/day):		9.80	65.94
Nitrogen Reduction (kg/day):		6.54	28.26
TMDL Percent Reduction:		40.0%	30.0%
Adjusted Total Nitrogen MS4 baseline Load (kg/day):		0.73	3.08
Adjusted Total Nitrogen MS4 Allocation (kg/day):		0.44	2.16
Adjusted Nitrogen Reduction (kg/day)		0.29	0.93
Adjusted Nitrogen Percent Reduction		40.0%	30.0%
New Nitrogen Municipal Load Allocation (kg/day):*		9.36	63.78
PHOSPHORUS -	Applicable <input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/>		
Total Phosphorus MS4 baseline Load (kg/day):		3.08	19.28
Total Phosphorus MS4 Allocation (kg/day):		1.85	13.50
Phosphorus Reduction (kg/day):		1.23	5.79
TMDL Percent Reduction:		40.0%	30.0%
Adjusted Total Phosphorus MS4 baseline Load (kg/day):		0.14	0.63
Adjusted Total Phosphorus MS4 Allocation (kg/day):		0.08	0.44
Adjusted Phosphorus Reduction (kg/day):		0.05	0.19
Adjusted Phosphorus Percent Reduction:		40.0%	30.0%
New Phosphorus Municipal Load Allocation (kg/day):*		1.77	13.06
SEDIMENT -	Applicable <input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/>		
Total Sediment baseline MS4 Load (tons/year):		117.36	365.66
Total Sediment MS4 Allocation (tons/year):		62.30	194.12
Sediment Reduction (tons/year):		55.06	171.54
TMDL Percent Reduction:		46.9%	47%
Adjusted Total Sediment MS4 baseline Load (tons/year):		5.23	11.97
Adjusted Total Sediment MS4 Allocation (tons/year):		2.78	6.36
Adjusted Sediment Reduction (tons/year):		2.45	5.62
Adjusted Sediment Percent Reduction:		46.9%	46.9%
New Sediment Municipal Load Allocation (tons/year)*		59.52	187.76
* The new Municipal Load Allocations are not addressed by this MS4 TMDL Strategy			
** Refer to Appendix D			

c. *Inventory of Previously Installed Pollutant Reduction Control Measures (March 10, 2003– December 30, 2015):*

East Fallowfield Township:

- has previously installed pollutant reduction control measures to claim (2003-2015). See below.*
- has NO previously installed pollutant reduction control measures to claim at this time (2003-2015). (Skip below and go to Subsection VIII.d).*

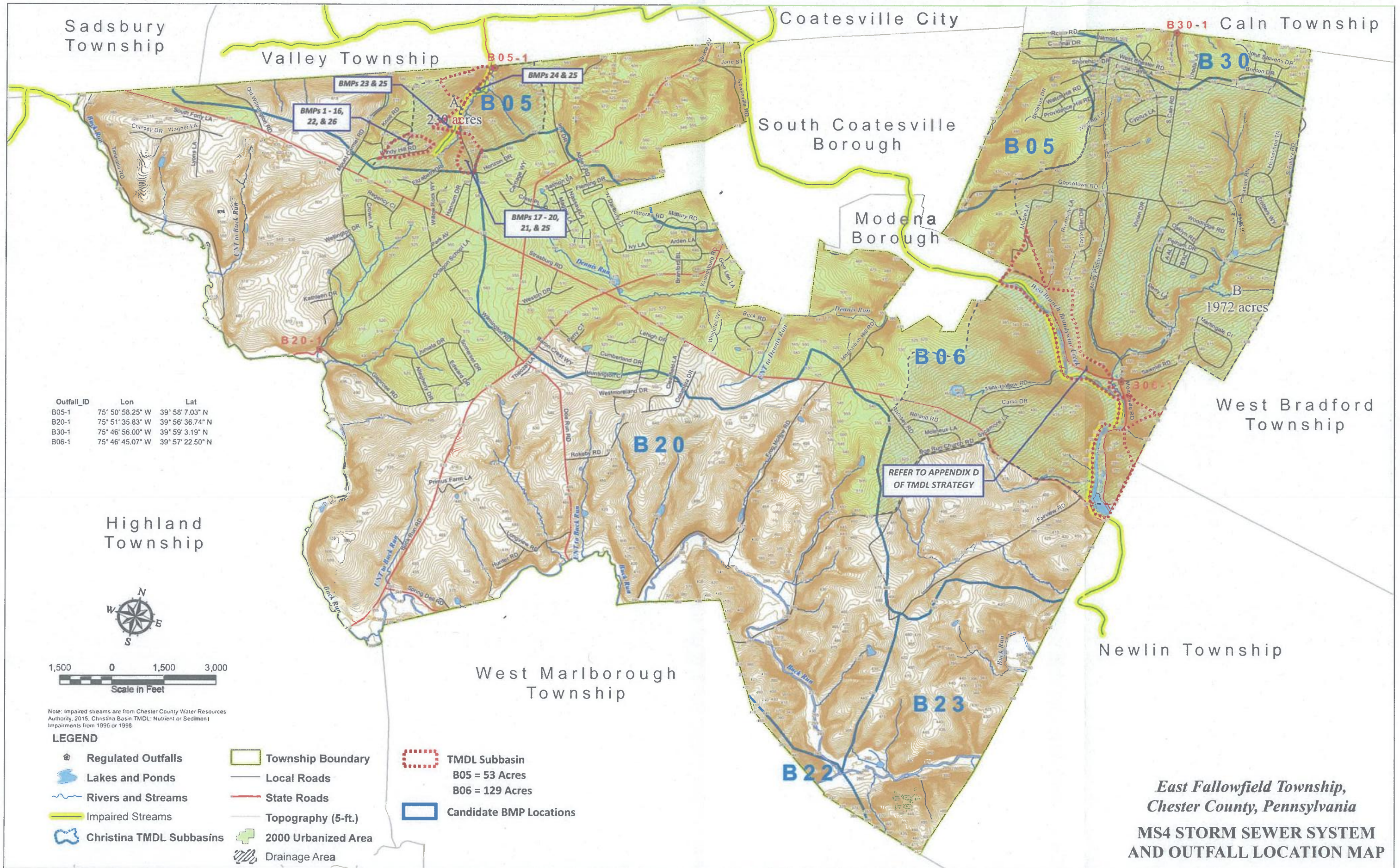
**Table 3. Previously Installed BMPs/Control Measures and Pollutant Reductions
For East Fallowfield Township in the Brandywine Creek Watershed**

BMP/ control measure #	Date Installed	Description	BMP Category *	TMDL Subbasin	In Urbanized Area?	Pollutant(s) Treated	Removal Efficiency (for each)**	Estimated Pollutant Load Reduction**	Date of Last Inspection	Condition/ Performance of BMP at inspection
1		Add a new record for each BMP	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3		<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Nitrogen <input type="checkbox"/> Phosphorus <input type="checkbox"/> Sediment	X% X% X%	N (kg/day) P (kg/day) S (tons/year)		
			1 and 2	Total Installed BMP/control measure Reduction (sum of BMP/control measures categories 1 + 2**) →				N (kg/day) P (kg/day) S (tons/year)		
			3	Reductions achieved through Municipal Stormwater Ordinance Control Measure (Sum of BMP/control measures category 3**)				N (kg/day) P (kg/day) S (tons/year)		
NO CREDITS ARE BEING CLAIMED AT THIS TIME			Total Gross Reduction → (BMP/control measures + Stormwater Ordinance)					N (kg/day) P (kg/day) S (tons/year)		
			Increased Pollutant loadings due to development, additional impervious surfaces, or other sources between March 10, 2003 and December 30, 2015 Total Increase →					N (kg/day) P (kg/day) S (tons/year)		
			TOTAL NET REDUCTION → (Total Gross - Increase) Counted towards meeting the TMDL					N (kg/day) P (kg/day) S (tons/year)		

*BMP/control measure Categories:

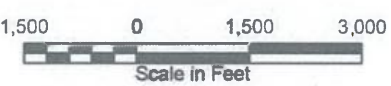
- 1) Voluntary retrofits/control measures – non-structural or structural.
 - 2) Voluntary increased control measures above the NPDES requirements installed as part of land development project.
 - 3) Non-voluntary increased control measures required by the Municipal Stormwater Management Ordinance, which exceed NPDES requirements.
- ** All calculations and supporting documentation are provided in Appendix D.

Figure 2. East Fallowfield Township Locations of Previously Installed and Candidate BMPs/Control Measures



Outfall_ID	Lon	Lat
B05-1	75° 50' 58.25" W	39° 58' 7.03" N
B20-1	75° 51' 35.83" W	39° 56' 36.74" N
B30-1	75° 46' 56.00" W	39° 59' 3.19" N
B06-1	75° 46' 45.07" W	39° 57' 22.50" N

Highland Township



Note: Impaired streams are from Chester County Water Resources Authority, 2015, Christina Basin TMDL: Nutrient or Sediment Impairments from 1996 or 1998

LEGEND

- Regulated Outfalls
- Lakes and Ponds
- Rivers and Streams
- Impaired Streams
- Christina TMDL Subbasins
- Township Boundary
- Local Roads
- State Roads
- Topography (5-ft.)
- 2000 Urbanized Area
- Drainage Area
- TMDL Subbasin
B05 = 53 Acres
B06 = 129 Acres
- Candidate BMP Locations

*East Fallowfield Township,
Chester County, Pennsylvania*
**MS4 STORM SEWER SYSTEM
AND OUTFALL LOCATION MAP**

The PADEP letter further states that “...any municipality that seeks to count pollutant load reductions made in the past can do so only if they satisfy all of the above factors to DEP’s satisfaction.”

There are projects within East Fallowfield Township that were previously implemented. However, the projects are not currently within a TMDL Watershed. East Fallowfield Township will continue to work to properly inventory previously implemented projects and determine if pollutant reduction credits can be justified if or when they become located within a TMDL Watershed.

d. Municipal Stormwater Ordinance Control Measure:

The stormwater ordinance adopted by East Fallowfield Township on September 23, 2014 meets or exceeds the minimum standards required in the “County-wide Act 167 Plan for Chester County”. East Fallowfield Township’s stormwater ordinance exceeds the minimum PADEP NPDES permit requirements for new construction for the following components related to water quality protection:

- Infiltration;
- Volume control;
- Minimum area of proposed impervious surface or proposed or earth disturbance to which ordinance standards apply;
- Peak rate reduction for New Development of 2-yr Post to 1-yr Pre, 5-yr Post to 2-yr Pre, 10-yr Post to 2-yr Pre, 25-yr Post to 10-yr Pre, and 50-yr Post to 25-yr Pre, 24-hr storm events.

East Fallowfield Township may document all future BMPs/control measures installed as part of new construction or redevelopment projects that meet the requirements of its Ordinance and achieve pollutant load reductions that exceed the minimum requirements of a PADEP NPDES permit for new construction. Only the portion of pollutant load removal that is above and beyond the PADEP NPDES permit requirement is counted towards the required TMDL pollutant Load Reductions and will be counted toward the TMDL implementation timeline and milestones for East Fallowfield Township (see Subsection 3.IX).

e. Proposed Control Measures to be Implemented:

Table 4 and Figure 2 present the candidate BMPs/control measures to be implemented by East Fallowfield Township during this 5-year permit cycle. East Fallowfield Township is reviewing the opportunities to implement these or other BMP/control measures at locations where the water quality benefits will be maximized.

For each BMP/control measure listed in Table 4, justification for load reduction performance, including calculations and a brief analysis to explain and justify the selection of BMP/control measures proposed, have been provided in Appendix D.

In subsequent permit cycles all BMPs/control measures implemented from Table 4 will be moved to Table 3, and counted towards the MS4 TMDL milestones.

The final list of selected BMP/control measures with the specific location and MS4 TMDL design details will be submitted to PADEP as East Fallowfield Township's MS4 TMDL Plan – Part II, no later than one year from the effective date of authorization of East Fallowfield Township's MS4 permit renewal. All constructed or retrofitted BMP/control measures will be accompanied by the necessary legal and/or administrative arrangements and instruments to establish long term access and inspection, operation and maintenance responsibilities by East Fallowfield Township and permanent protection from disturbance or modification except as authorized by East Fallowfield Township.

**Table 4. List of Candidate BMPs/Control Measures
UNT to Sucker Run (West Branch Brandywine Creek) (TMDL Subbasin B05) – East Fallowfield Township**

BMP/ control measure #	Description of BMP/Control Measure	BMP Category *	TMDL Subbasin	In Urbanized Area?	Pollutant(s) Treated	Removal Efficiency (for each)**	Estimated Pollutant Load Reduction*
1 – 20	Strasburg Hunt Subdivision and Park Avenue BMP 6.4.5 - Voluntary Rain Garden Implementation and/or Township Rain Garden Program for existing single-family residential properties.	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	B05	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Nitrogen <input checked="" type="checkbox"/> Phosphorus <input checked="" type="checkbox"/> Sediment	30% 85% 85%	0.012 (kg/day) 0.007 (kg/day) 0.251 (tons/year)
21	Park Avenue (PECO Property): BMP 6.4.5 - Rain Garden/Bioretenion: possible collaboration with PECO to capture and treat approx. 5.2 acres of storm sewershed along Park Avenue.	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	B05	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Nitrogen <input checked="" type="checkbox"/> Phosphorus <input checked="" type="checkbox"/> Sediment	30% 85% 85%	0.021 (kg/day) 0.012 (kg/day) 0.436 (tons/year)
22	Strasburg Hunt Subdivision Windy Hill Road, Knoll Road, and Stone Lane: BMP 6.4.4 – Infiltration Trenches: disconnect existing stormsewer and connect to candidate Infiltration Trench BMPs to capture and treat approx. 14.3 acres of residential subdivision within public road rights-of-way.	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	B05	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Nitrogen <input checked="" type="checkbox"/> Phosphorus <input checked="" type="checkbox"/> Sediment	30% 85% 85%	0.059 (kg/day) 0.032 (kg/day) 1.200 (tons/year)
23	Park Avenue (Westerly Side on Sheetz Farm Property): BMP 6.7.2 – Tree Planting/Landscape Restoration: partner with local farmer/property owner to provide tree plantings to treat approx. 4 acres of agricultural drainage prior to entering MS4 along Park Avenue.	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	B05	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Nitrogen <input checked="" type="checkbox"/> Phosphorus <input checked="" type="checkbox"/> Sediment	50% 85% 85%	0.027 (kg/day) 0.009 (kg/day) 0.335 (tons/year)
24	Park Avenue (Easterly Side on Shirk Property): BMP 6.7.2 – Tree Planting/Landscape Restoration: partner with property owner to provide tree plantings to treat approx. 4.2 acres of MS4 drainage prior to entering impaired stream along Park Avenue.	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	B05	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Nitrogen <input checked="" type="checkbox"/> Phosphorus <input checked="" type="checkbox"/> Sediment	50% 85% 85%	0.029 (kg/day) 0.009 (kg/day) 0.352 (tons/year)

BMP/ control measure #	Description of BMP/Control Measure	BMP Category *	TMDL Subbasin	In Urbanized Area?	Pollutant(s) Treated	Removal Efficiency (for each)**	Estimated Pollutant Load Reduction*
25	Park Avenue (between Horizon Drive and Municipal Boundary with Valley Township): BMP 5.9.1 – Street Sweeping: Biweekly sweeping program. Seek partnership with adjacent municipalities for equipment sharing to minimize cost.	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	B05	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Nitrogen <input checked="" type="checkbox"/> Phosphorus <input checked="" type="checkbox"/> Sediment	20% 10% 20%	0.0044 (kg/day) 0.0004 (kg/day) 0.032 (tons/year)
26	Strasburg Hunt Subdivision – Windy Hill Road, Knoll Road, and Stone Lane: BMP 5.9.1 – Street Sweeping: Biweekly sweeping program. Seek partnership with adjacent municipalities for equipment sharing to minimize cost.	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	B05	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Nitrogen <input checked="" type="checkbox"/> Phosphorus <input checked="" type="checkbox"/> Sediment	20% 10% 20%	0.0034 (kg/day) 0.0003 (kg/day) 0.025 (tons/year)
TOTAL ESTIMATED REDUCTION → Counted towards meeting the TMDL							0.157 (kg/day) 0.069 (kg/day) 2.63 (tons/year)

*BMP Categories:

- 1) Retrofits/control measures – non-structural or structural.
- 2) Increased control measures above the NPDES requirements installed as part of land development project.
- 3) Increased control measures required by the Municipal Stormwater Management Ordinance, which exceed NPDES requirements.

**All calculations and supporting documentation are provided in Appendix D.

IX. Analysis of Consistency of this Implementation Plan with WLAs and TMDLs:

a. Analysis of Consistency:

As shown in Tables 1, 2, 4, and 5 (presented below), Figures 1 and 2, and as described in the “Key Definitions” and Subsections C.I through C.VIII of this MS4 TMDL Strategy, the implementation actions listed in Subsection C.VIII and this MS4 TMDL Strategy are consistent with the requirements and assumptions of the applicable TMDL Reports listed in Subsection C.I.

b. Timeline and Milestones:

Table 5 presents the TMDL implementation timeline and milestones for East Fallowfield Township. In accordance with the expectations set forth in the PADEP letter dated March 21, 2012 (Appendix B), East Fallowfield Township will attain its full required pollutant Load Reduction(s) within the following timeline:

- *Regulated small MS4s with applicable WLAs requiring reductions of up to 50% should have a timeline no longer than 10 years;*
- *Where reductions of 50-85% are required in the WLA, the timeline should be no longer than 15 years; and*
- *Regulated small MS4s subject to WLAs requiring reductions 85% or greater, should have a timeline no greater than 20 years.*

The PADEP letter further states: “Operators of regulated small MS4s can seek a longer timeframe if they are able to provide a compelling justification in their MS4 TMDL Plan submittal, to DEPs satisfaction, demonstrating why a longer timeframe is necessary.”

**Table 5. Timeline and Milestones for attaining TMDL Pollutant Load Reductions
East Fallowfield Township 2013 -2033**

TMDL WATERSHED	Pollutant	Load Reduction Required	Percent Load Reduction Required	PADEP Required Timeframe for Attaining Reduction *		Cumulative Percent of Required Pollutant Load Reduction Attained by end of Permit Cycle**			
				Total years	Calendar Year	(1) 2018	(2) 2023	(3) 2028	(4) 2033
Brandywine Creek (B05 Subbasin)	Nitrogen	0.29 (kg/day)	40%	20	2033	10%	20%	35%	55%***
	Phosphorus	0.05 (kg/day)	40%	20	2033	10%	35%	75%	100%
	Sediment	2.45 (tons/year)	47%	20	2033	10%	35%	75%	100%

Notes:

*Per PADEP letter dated March 21, 2012 (Appendix B), "Regulated small MS4s with applicable WLAs requiring reductions up to 50% should have a timeline no longer than 10 years. Where reductions of 50 - 85% are required in the WLA, the timeline should be no longer than 15 years. Regulated small MS4s subject to WLAs requiring reductions of 85% or greater should have a timeline no greater than 20 years."

** Per PADEP letter dated March 21, 2012 (Appendix B), "...at least 10-15% of the pollutant load reductions are targeted to be achieved by the end of the first MS4 TMDL permit cycle unless a municipality provides compelling justification in its MS4 TMDL Plan, to DEP's satisfaction, demonstrating the rationale for why alternate load reduction percentages may be merited in the first and other permit terms."

*** See Appendix D

As shown, the following milestones will be achieved by East Fallowfield Township:

- One year from authorization of permit renewal: Proposed BMP/control measure design details will be submitted to PADEP as the East Fallowfield Township MS4 TMDL Plan, Part II, for PADEP approval.
- Proposed control measures will be installed on-the-ground in time for their successful operation to be documented in the periodic report or progress report submitted at the end of the third year of coverage under this permit.
- Prior to next permit cycle, East Fallowfield Township's timeline and milestones will be reviewed and, if necessary, revised based on progress achieved and experience gained in this 5-year permit cycle.

c. **Implementation Tracking:**

East Fallowfield Township will maintain a TMDL Implementation and Attainment Log (Table 6) that will be an official tally of progress toward the incremental (by permit cycle) and total (cumulative) TMDL targets presented in this MS4 TMDL Strategy. This log will document pollutant Load Reductions achieved from previously installed control measures (2003 – 2015) (Subsection C.VIII.c -Table 3), reductions achieved as new control measures are installed or retrofitted during each permit cycle, and reductions achieved through implementation of the East Fallowfield Township stormwater ordinance (Subsection C.VIII.d). The TMDL Implementation and Attainment Log will be included in each periodic municipal MS4 permit report to PADEP.

All pollutant reduction actions taken by the Municipality that satisfy the requirements specified in this MS4 TMDL Strategy and by PADEP will be quantified and recorded in the TMDL Implementation and Attainment Log (Table 6), and applied towards the Adjusted required pollutant Load Reductions (Table 2) (or EPA original MS4 reduction (Table 1), if no adjustment was made). Progress will be reported both numerically (mass/time) and as a percentage of the overall MS4 required Load Reduction.

**Table 6. TMDL Implementation and Attainment Log
East Fallowfield Township - TMDL Watershed B05, 2013 - 2018**

Line	TMDL WATERSHED 1: [Insert Name of TMDL Watershed*]	Nitrogen (kg/day) <input type="checkbox"/> Check if NOT Applicable	Phosphorus (kg/day) <input type="checkbox"/> Check if NOT Applicable	Sediment (tons/year) <input type="checkbox"/> Check if NOT Applicable	Source or Calculation
	REQUIRED POLLUTANT LOAD REDUCTIONS:				
1	Total MS4 Load Reduction Required	0.29	0.05	2.45	Table 2 / Appendix C
	POLLUTANT LOAD REDUCTIONS ACHIEVED:				
2	Total Net Reductions achieved 2003 - 2015	0	0	0	Table 3, Total Net Reduction
3	Reductions estimated through proposed control measures (Permit cycle 1)	0.009	0.0014	0.081	Table 4, Total Estimated Reduction
4	Total Pollutant Reduction estimated by end of MS4 Permit Cycle	0.009	0.0014	0.081	Line 2 + Line 3
	TMDL IMPLEMENTATION PROGRESS:				
5	Percentage of Total TMDL Reduction Achieved during this MS4 Permit Cycle (incremental)	3%	3%	3%	(Line 4 / line 1) x 100
6	Percentage of Total TMDL Reduction Achieved by end of this MS4 Permit Cycle (cumulative)	3%	3%	3%	Same as line 5 (for this permit cycle only)
7	Implementation Milestone (target) for current MS4 Permit Cycle (Percent of Required Pollutant Load Reduction Attained by end of Permit Cycle)	10%	10%	10%	Table 5
8	Percentage of Remaining Pollutant Load Reduction to be achieved in future MS4 Permit Cycles	97%	97%	97%	100% - Line 6

Notes:
All numbers are reported in mass/time, except when % is noted.

d. **Process for Evaluating and Updating MS4 TMDL Plan:**

East Fallowfield Township will review its progress on meeting milestones on a periodic basis, maintain inspections and records to evaluate control measures and will periodically evaluate this MS4 TMDL Strategy for necessary modifications. Any modifications will be coordinated with PADEP prior to implementation. East Fallowfield Township will also continue participation in the C-TIP Partnership and work with the group to evaluate, and, as needed, revise the overall C-TIP approach to ensure timely progress toward the TMDL Watershed implementation targets.

e. **BMP/Control measures Performance Evaluation and Reporting:**

BMP/control measures performance evaluation will consist of inspections conducted by East Fallowfield Township (or its designee) to ensure that the BMP/control measures constructed or retrofitted to meet the TMDL requirements continue to be maintained as designed. The Municipality will insure that an appropriate technical expert will inspect the facility during construction and annually, and will report observations made. Any needs will be identified and reported, and will be scheduled for implementation. Inspection information will be maintained on file and summarized in municipal periodic MS4 permit reports.

X. Additional Information: (See Appendices)

SECTION D – References

2010 Pennsylvania Integrated Water Quality Monitoring and Assessment Report. Undated. Pennsylvania Department of Environmental Protection. Office of Water Management, Bureau of Water Supply & Wastewater Management, Water Quality Assessment and Standards Division, Harrisburg, PA.

Furlan, Ronald C. – PADEP. Letter dated March 21, 2012, re: Christina Basin Total Maximum Daily Load Implementation Plan (C-TIP) (2/13/2012).

Revisions to Total Maximum Daily Loads for Nutrient and Low Dissolved Oxygen Under High-Flow Conditions, Christina River Basin, Pennsylvania, Delaware, and Maryland. September 2006. U.S. Environmental Protection Agency, Philadelphia, PA.

Total Maximum Daily Loads for Bacteria and Sediment in the Christina River Basin, Pennsylvania, Delaware, and Maryland. September 2006. U.S. Environmental Protection Agency, Philadelphia, PA

Total Maximum Daily Load for the Red Clay Creek Basin Chester County, Pennsylvania. April 7, 2007. U.S. Environmental Protection Agency, Philadelphia, PA.

Total Maximum Daily Loads, Polychlorinated Biphenyls (PCBs) and Chlordane, West Branch Brandywine Creek, Chester County, Pennsylvania. March 9, 2001. Pennsylvania Department of Environmental Protection, Harrisburg, PA,

SIGNATURE AND SEAL BY PROFESSIONAL ENGINEER

Name

Signature

PA License Number

Date

**APPENDIX A –
MUNICIPALITIES PARTICIPATING IN C-TIP PARTNERSHIP**

APPENDIX A



**Brandywine
Valley
Association**

This is a list of the Municipalities that are members of the CTIP partnership.

1. Avondale Borough
2. Caln Township
3. Coatesville
4. Downingtown Borough
5. East Bradford Township
6. East Brandywine Township
7. East Caln Township
8. East Fallowfield Township
9. Franklin Township
10. Honey Brook Township
11. Kennett Borough
12. Kennett Township
13. London Grove Township
14. Londonderry Township
15. New Garden Township
16. New London Township
17. Parkesburg Borough
18. Penn Township
19. Pennsbury Township
20. Pocopson Township
21. Sadsbury Township
22. South Coatesville
23. Thornbury Township
24. Upper Uwchlan Township
25. Uwchlan Township
26. Valley Township
27. West Bradford Township
28. West Brandywine Township
29. West Caln Township
30. West Chester Borough
31. West Goshen Township
32. West Whiteland Township

1760 Unionville-Wawaset Road, West Chester, PA 19382-6751

T: 610-793-1090 F: 610- 793-2813 E: water@bva-rcva.org

Web: www.brandywinewatershed.org

**APPENDIX B –
PADEP LETTER DATED MARCH 21, 2012**

**pennsylvania**

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

March 21, 2012

Ms. Jan Bowers
Chester County Water Resources Authority
601 Westtown Rd., Suite 270
West Chester, PA 19380-0990

Re: Christina River Total Maximum Daily Load Implementation Plan (C-TIP)(02/13/2012)

Dear Ms. Bowers:

This letter constitutes the Department of Environmental Protection's (DEP) response to the Chester County Water Resource Authority's (CCWRA) submittal of the February 13, 2012, C-TIP proposal and discussions held in Harrisburg on that date. DEP would like to thank you, along with other CCWRA staff, the CCWRA, the Chester County Board of Commissioners, the Chester County Conservation District, the Brandywine Valley Association, and others who have taken the time and initiative to develop the approach and vet it with the many Christina Basin municipalities in Chester County. This coordinated effort is critical to the preparation and implementation of measures to meaningfully address the complex and geographically large Christina Basin TMDLs for Sediment and Nutrients. We are also appreciative of the efforts expended to revise earlier versions of C-TIP in response to concerns raised in several discussions with our agency.

In sum, DEP generally concurs with your approach, in concept, as a viable way for Christina municipalities to make substantial progress in addressing applicable MS4 TMDL WLAs under PAG-13 or an MS4 Individual NPDES permit to improve this Commonwealth's waters. We believe that your conceptual approach is generally sound, and parts of it, such as the approach to the parsing of WLA load in a municipality, mimic ongoing efforts we have engaged in. Also, we concur with your analysis regarding the non-applicability of bacteria TMDLs to the municipalities due to the absence of bacteria § 303(d) listings in the Christina Basin. In addition, your implementation approach appears sound, as well, though we have specific concerns below that will need to be addressed.

Although we generally concur with your proposal, our concurrence is conditioned on CCWRA and the implementing municipalities addressing our comments on how C-TIP can and should be improved, and some caveats, as set forth in the following paragraphs.

DEP's general conceptual approval of the February 13, 2012, C-TIP approach is subject to these caveats:

1. **Concurrence in Concept Only** - The conceptual approval from DEP of the February 13, 2012, C-TIP proposal is expressly limited to only the concept that has been brought before DEP, not any particulars or specifics in the proposal, except as expressly noted in this letter.

2. **Right to Change Position** - DEP reserves the right to change its position regarding the C-TIP proposal should further information or analysis reveal technical or legal flaws in the concept, as proposed or implemented, or should other circumstances or factors arise meriting a change in position.

3. **No Pre-Approval of Municipal MS4 TMDL Plans** - DEP's conceptual approval of the February 13, 2012, C-TIP proposal does not constitute pre-approval of any municipal MS4 TMDL Plan. The MS4 TMDL Strategy portion of each Plan that each municipality must develop under PAG-13 must be submitted to DEP by September 14, 2012, and will be evaluated on its own merits. Similarly, the MS4 TMDL Design Details part of the Plan that each municipality must develop must be submitted to DEP within one year of approval of coverage by DEP. DEP will not approve a MS4 TMDL Plan for a municipality unless the agency conducts an evaluation of the proposed Plan and then makes a finding that the Plan satisfies all applicable conditions of the permit and federal, state and local law, including a timeline with milestones outlining what will be accomplished, both in the first permit term and ultimately, along with the ten elements required for a Plan on pages 16-17 of Part C of the PAG-13 Authorization to Discharge.

DEP's approval is further conditioned on CCWRA and the implementing municipalities addressing the following concerns to the satisfaction of DEP.

1. **Timeline for Attaining Pollutant Reduction Goals** – The C-TIP proposes a 25 year timeline to meet pollutant reduction targets. While this timeline is markedly better than the 40 year timeline set forth in the prior C-TIP proposal that was presented to DEP, it still falls short of the 15 year timeline recommended by EPA. As a condition of concurring with the C-TIP proposal, the timelines in the C-TIP need to be modified and implemented as follows.

DEP expects timeframes for pollutant reductions to be based on the pollutant load percentage reduction required for each regulated small MS4. Regulated small MS4s with applicable WLAs requiring reductions up to 50% should have a timeline no longer than 10 years. Where reductions of 50-85% are required in the WLA, the timeline should be no longer than 15 years. Regulated small MS4s subject to WLAs requiring reductions of 85% or greater should have a timeline no greater than 20 years. Operators of regulated small MS4s can seek a longer timeframe if they are able to provide a compelling justification in their MS4 TMDL Plan submittal, to DEP's satisfaction, demonstrating why a longer timeframe is necessary. Each MS4 TMDL Plan, including a request for an alternate timeline, will be evaluated on its merits.

2. **Priorities for Municipal Pollutant Load Reductions** – On page 4 of the C-TIP narrative, the C-TIP gives first priority to implementing measures on “municipal owned/operated pollutant sources.” DEP supports the focus on these areas as a way to harvest “low-hanging fruit” pollutant

load reductions in the first permit term and thereafter. Moreover, DEP expects that C-TIP municipalities will prioritize the installation and implementation of BMPs on municipal owned sources and other sources claimed by the municipality to minimize the volume and rate of stormwater flow discharging from the regulated small MS4 to surface waters. DEP also expects that BMPs will be installed and implemented at locations on municipal owned sources within the watershed that are targeted to maximize pollutant load reductions. It is important that pollutant reduction opportunities be undertaken in an efficient manner given the challenges of eliminating impairments and the costs of installing and implementing measures to address these impairments.

As a condition of DEP's concurrence with C-TIP, DEP expects that the C-TIP be amended and implemented to reflect the above-stated priorities, unless the municipality is able to provide a compelling justification, to DEP's satisfaction, demonstrating why a different approach is preferable.

3. **First Term Permit Reductions** - The C-TIP proposal specifies a 5% reduction in pollutant load in the first MS4 TMDL permit cycle (ie, the cycle running from approximately 2013-2018), along with 20-25% reductions listed in the C-TIP for subsequent permit cycles. While we acknowledge that there will be startup issues in obtaining such reductions, 5% seems like a low reduction target for the first permit term. Municipalities should, as specified in the C-TIP, be tackling their "low hanging fruit" in the first permit cycle, such as runoff from municipal owned and operated facilities. DEP questions whether it is reasonable to "backload" reductions to later permit cycles when the low hanging fruit is targeted as a priority in the first permit term. Accordingly, DEP's concurrence in the C-TIP proposal is conditioned on the C-TIP indicating that an effort will be made so that at least 10-15% of pollutant load reductions are targeted to be achieved by the end of the first MS4 TMDL permit cycle unless a municipality provides compelling justification in its MS4 TMDL Plan, to DEP's satisfaction, demonstrating the rationale for why alternate load reduction percentages may be merited in the first and other permit terms. Such demonstration needs to be consistent with any demonstration made for an alternate timeline as set forth above.

4. **Cause or Contribute Terminology** -- Throughout the C-TIP proposal there are references to the term "cause or contribute," or various iterations thereof. As we understand your use of the term, it is meant to address situations where the TMDL erroneously assigns a WLA to a municipality, such as the situation where a regulated small MS4 does not discharge stormwater from its outfalls (assuming they have been correctly identified) into the subbasin subject to the WLA. It could also apply to situations where an operator of a regulated small MS4 is not required under law to submit a MS4 TMDL Plan. We think your use of the term "cause or contribute" is better expressed in the phrase "the operator of the regulated small MS4 is not required to submit an MS4 TMDL Plan because the WLA is not applicable." The term "cause or contribute" is a term of art under the federal Clean Water Act that carries with it many permitting and water-quality based effluent limitations; implications that we believe unduly complicate what you are trying to do. If you choose to continue using the term "cause or contribute" you will need to provide a definition, together with an explanation and requisite justification explaining how, as the term is used in your proposal, a municipality would demonstrate that it does not "cause or contribute" to an existing impairment, including the justifications they would need to provide. This is a critical issue since the C-TIP proposal contains numerous "outs" excusing operators of

regulated small MS4s from preparing and executing MS4 TMDL Plans if they do not “cause or contribute.”

In sum, DEP’s concurrence is conditioned on the C-TIP proposal being amended in either of two ways. First, the proposal can be amended to delete any references to the term “cause or contribute” and replace them with terminology such as “the permittee is not required to submit an MS4 TMDL Plan because the WLA is not applicable,” or some similar language, along with conforming revisions. A second alternative is to provide an explanation with requisite definitions and justifications explaining how, as the term is used in your proposal, a permittee would demonstrate that it does not “cause or contribute” to an existing impairment, including the justifications they would need to provide.

5. *Eligible Past Pollutant Reductions* – A question arises whether a municipality participating in the C-TIP will be able to count pollutant reductions the permittee made at some time after the assessment that resulted in the impairment listing for which a TMDL (and WLA) was prepared. In prior C-TIP correspondence between DEP and CCWRA (July 15, 2011), DEP set out the following prerequisites for a municipality seeking to count pollutant load reductions from past actions. Any pollutant reductions claimed by a municipality for past BMP implementations will be analyzed under these factors: (1) the municipality must demonstrate that the subject BMPs satisfy all applicable legal requirements; (2) the municipal actions must have occurred after the more recent of: (a) March 10, 2003, (the date PCSM began to be implemented statewide) or (b) the completion date of the stream assessment for the applicable TMDL; (3) the municipality must demonstrate that any actions taken by the municipality to reduce pollutant loads were voluntary and not required by any permit, order, or other enforceable mechanism, or by any state, federal or local law; (4) the municipality must demonstrate that any actions taken reduced pollutant loads from the *status quo ante* prior to the action; (5) pollutant load reductions may not be claimed for open space or agricultural preservation; to count an action to reduce pollutant loads must be restorative not preservative; (6) net pollutant loading reductions must be calculated by netting the demonstrated pollutant load reductions of the applicable restoration BMPs installed after the applicable eligibility date against the increased pollutant loadings, if any, due to the addition of impervious surface and other development in and otherwise impacting the municipality during the timeframe in which credit for an applicable pollutant load reduction is sought; and (7) pollutant load reductions may be counted upon DEP’s determination that all applicable legal requirements have been satisfied and there is a demonstrated quantifiable net decrease in applicable pollutant loadings in the municipality for the identified timeframe.

DEP’s concurrence in the C-TIP concept is conditioned such that any municipality that seeks to count pollutant load reductions made in the past can do so only if they satisfy all of the above factors to DEP’s satisfaction.

6. *Eligibility of Reductions Outside the Urbanized Area (UA)* – A question arises whether pollutant reductions undertaken outside the UA by any entity can be counted by a municipality toward meeting a permittee’s MS4’s TMDL WLA obligations. In prior C-TIP correspondence between DEP and CCWRA (July 15, 2011), DEP set out the following prerequisites that a municipality must demonstrate, to DEP’s satisfaction, to count reductions undertaken outside of

the UA toward meeting a permittee's MS4's TMDL WLA obligation: (1) the municipality must demonstrate that it satisfies all applicable legal requirements; (2) any load reductions outside the UA can only be counted if they are consistent with DEP's forthcoming applicable credit, trading and offset policies; (3) the performance of any BMPs must be substantiated to the satisfaction of DEP with appropriate analyses to satisfy the claimed pollutant load reduction; (4) the permittee must establish suitable authority (e.g. ownership and control) over the BMP facilities; (5) the facilities and BMPs cannot also be counted toward meeting some other party's TMDL obligations; and (6) the target pollutant load reductions must be quantifiable at the impaired stream segment that receives stormwater discharges from the municipality's regulated small MS4.

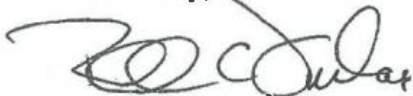
DEP's concurrence in the C-TIP concept is conditioned such that any municipality that seeks credits for pollutant load reductions undertaken outside the UA may do so only if they satisfy all of the above factors to DEP's satisfaction.

7. *Offsets, Trading and Credits in MS4 TMDL Plans* – As referenced above, any offset or credit sought by a municipality must be in accordance with DEP's applicable credit, trading and offset policies. As you are aware, DEP currently has an ongoing stakeholder group (in which you are a participant) that is discussing how offsets, trading and credits would be applied in a stormwater context. As such, municipalities that seek to include offsets and/or credits for pollutant load reductions in an MS4 TMDL Plan will need to ensure that such proposals conform with DEP's applicable credit, trading and offset policies as they evolve and are finalized and implemented.

8. *Adjustment of Allocations After First Permit Cycle* – The C-TIP proposal provides no explanation of how load reductions will be allocated by a municipality after the first MS4 TMDL permit cycle. DEP's concurrence in the C-TIP approach is conditioned on CCWRA providing language to DEP detailing how such load reductions will be re-allocated after the first MS4 TMDL permit cycle.

In closing, DEP thanks you again for your contributions toward planning, coordinating and implementing a program that has the tremendous potential to improve and protect Pennsylvania's water resources. We look forward to a continuing dialogue as PAG-13 implementation dates approach. If you have any questions about this letter, please contact me by e-mail at rfurlan@pa.gov or by telephone at 717.787.8184.

Sincerely,



Ronald C. Furlan, PE, Division Manager
Division of Planning and Permitting

APPENDIX C –

**MS4 WORKSHEET FOR CALCULATING ADJUSTED MS4 BASELINE
LOADS, ADJUSTED MS4 ALLOCATIONS, AND ADJUSTED MS4 LOAD
REDUCTIONS**

**APPENDIX C.2 - MS4 WORKSHEET FOR CALCULATING ADJUSTED MS4 BASELINE LOADS,
ADJUSTED MS4 ALLOCATIONS AND ADJUSTED MS4 LOAD REDUCTIONS -
TOTAL LAND AREA METHOD**

MUNICIPALITY NAME: , CHESTER COUNTY, PA

DATE OF TMDL PLAN SUBMISSION:

LIST APPLICABLE TMDL WATERSHED(S):	LIST ONLY THE TMDL SUBBASINS WITHIN EACH TMDL WATERSHED:
1) <i>Brandywine Creek</i>	<i>B05, B06; B20 (is in U.A. but not impaired); B22 & B23 (not in the U.A.); B30 (no TMDL in Twp)</i>
2)	

FOR ALL LISTED TMDL SUBBASINS FILL IN SECTIONS 1, 2 and 4 WITH THE VALUES REFERENCED FROM THE APPLICABLE TMDL REPORT ALL OTHER VALUES ARE CALCULATED AS DESCRIBED. CALCULATIONS MUST BE APPLIED TO ALL NEW ROWS ADDED.

1 LAND USE AREAS (ACRES):
Copied from Tables C-1. - C-4. in Appendix C of TMDL Report; Total (Watershed) is the sum of all acres for all land uses in each TMDL Watershed

TMDL subbasin	MS4 Total	Total (Watershed)
B05 West Branch Brandywine Creek (Sucker Run)	1189.81	9986.61
B06 West Branch Brandywine Creek	3940.03	
B20 Upper Buck Run (Not Impaired)	3998.54	
B22 Lower Doe Run (Not in Urbanized Area)	19.51	
B23 Lower Buck Run (Not in Urbanized Area)	624.16	
B30 Beaver Creek (no TMDL in East Fallowfield Twp)	214.56	

2 TMDL STORM SEWERSHED AREA (ACRES): To be calculated by Municipality and inserted below
The following method, as described in Subsection VII.B, was used to assign these TMDL Storm Sewershed areas:
Total Land Area

TMDL subbasin	MS4 Total	Total (Watershed)
B05 West Branch Brandywine Creek (Sucker Run)	53.00	182.00
B06 West Branch Brandywine Creek	129.00	
B20 Upper Buck Run (Not Impaired)	0.00	
B22 Lower Doe Run (Not in Urbanized Area)	0.00	
B23 Lower Buck Run (Not in Urbanized Area)	0.00	
B30 Beaver Creek (no TMDL in East Fallowfield Twp)	0.00	

3 LAND USE ADJUSTMENT RATIOS:
Divide the TMDL Storm Sewershed area from Section 2 by the corresponding land use area from Section 1

TMDL subbasin	MS4 Total	Total (Watershed)
B05 West Branch Brandywine Creek (Sucker Run)	0.04	0.02
B06 West Branch Brandywine Creek	0.03	
B20 Upper Buck Run (Not Impaired)	0.00	
B22 Lower Doe Run (Not in Urbanized Area)	0.00	
B23 Lower Buck Run (Not in Urbanized Area)	0.00	
B30 Beaver Creek (no TMDL in East Fallowfield Twp)	0.00	

4 MS4 BASELINE LOADS AND MS4 ALLOCATIONS:			
Total nitrogen MS4 baseline loads (kg/day):			
Copied from TMDL Report Appendix C, Table(s): <u>C-5a</u>			
TMDL Subbasin	Subtotal	Total (Watershed)	
B05 West Branch Brandywine Creek (Sucker Run)	16.34	110.54	
B06 West Branch Brandywine Creek	94.20		
B20 Upper Buck Run (Not Impaired)	0.00		
Total nitrogen MS4 allocations (kg/day):			
Copied from TMDL Report Appendix C, Table(s): <u>C-5b</u>			
TMDL Subbasin	Subtotal	Total (Watershed)	
B05 West Branch Brandywine Creek (Sucker Run)	9.80	75.74	
B06 West Branch Brandywine Creek	65.94		
B20 Upper Buck Run (Not Impaired)	0.00		
Total phosphorus MS4 baseline loads (kg/day):			
Copied from TMDL Report Appendix C, Table(s): <u>C-6a</u>			
TMDL Subbasin	Subtotal	Total (Watershed)	
B05 West Branch Brandywine Creek (Sucker Run)	3.081	22,365	
B06 West Branch Brandywine Creek	19,284		
B20 Upper Buck Run (Not Impaired)	0.000		
Total phosphorus MS4 allocations (kg/day):			
Copied from TMDL Report Appendix C, Table(s): <u>C-6b</u>			
TMDL Subbasin	Subtotal	Total (Watershed)	
B05 West Branch Brandywine Creek (Sucker Run)	1.849	15,348	
B06 West Branch Brandywine Creek	13,499		
B20 Upper Buck Run (Not Impaired)	0.000		
Sediment baseline MS4 loads (tons/year):			
Copied from TMDL Report Appendix C, Table(s): <u>C-5b</u>			
TMDL Subbasin	Subtotal	Total (Watershed)	
B05 West Branch Brandywine Creek (Sucker Run)	117.36	803.25	
B06 West Branch Brandywine Creek	365.66		
B20 Upper Buck Run (Not Impaired)	320.23		
Sediment MS4 WLAs (tons/year):			
Copied from TMDL Report Appendix C, Table(s): <u>C-5a</u>			
TMDL Subbasin	Subtotal	Total (Watershed)	
B05 West Branch Brandywine Creek (Sucker Run)	62.30	426.42	
B06 West Branch Brandywine Creek	194.12		
B20 Upper Buck Run (Not Impaired)	170.00		

5 ADJUSTED MS4 BASELINE LOADS AND MS4 ALLOCATIONS		
Adjusted nitrogen MS4 baseline loads (kg/day):		
Multiply the MS4 Baseline Loads from section 4 by the corresponding Land Use Adjustment Ratio from section 3		
TMDL Subbasin	Subtotal	Total (Watershed)
B05 West Branch Brandywine Creek (Sucker Run)	0.73	3.81
B06 West Branch Brandywine Creek	3.08	
B20 Upper Buck Run (Not Impaired)	0.00	
Adjusted nitrogen MS4 allocations (kg/day):		
Multiply the MS4 Allocations (WLA) from section 4 by the corresponding Land Use Adjustment Ratio from section 3		
TMDL Subbasin	Subtotal	Total (Watershed)
B05 West Branch Brandywine Creek (Sucker Run)	0.44	2.60
B06 West Branch Brandywine Creek	2.16	
B20 Upper Buck Run (Not Impaired)	0.00	
Adjusted phosphorus MS4 baseline loads (kg/day):		
Multiply the MS4 Baseline Loads from section 4 by the corresponding Land Use Adjustment Ratio from section 3		
TMDL Subbasin	Subtotal	Total (Watershed)
B05 West Branch Brandywine Creek (Sucker Run)	0.14	0.77
B06 West Branch Brandywine Creek	0.63	
B20 Upper Buck Run (Not Impaired)	0.00	
Adjusted phosphorus MS4 allocations (kg/day):		
Multiply the MS4 Allocations (WLA) from section 4 by the corresponding Land Use Adjustment Ratio from section 3		
TMDL Subbasin	Subtotal	Total (Watershed)
B05 West Branch Brandywine Creek (Sucker Run)	0.08	0.52
B06 West Branch Brandywine Creek	0.44	
B20 Upper Buck Run (Not Impaired)	0.00	
Adjusted Sediment baseline MS4 loads (tons/year):		
Multiply the MS4 Baseline Loads from section 4 by the corresponding Land Use Adjustment Ratio from section 3		
TMDL Subbasin	Sub-Total	Total (Watershed)
B05 West Branch Brandywine Creek (Sucker Run)	5.23	17.20
B06 West Branch Brandywine Creek	11.97	
B20 Upper Buck Run (Not Impaired)	0.00	
Adjusted Sediment MS4 WLAs (tons/year):		
Multiply the MS4 Allocations (WLA) from section 4 by the corresponding Land Use Adjustment Ratio from section 3		
TMDL Subbasin	Sub-Total	Total (Watershed)
B05 West Branch Brandywine Creek (Sucker Run)	2.78	9.13
B06 West Branch Brandywine Creek	6.36	
B20 Upper Buck Run (Not Impaired)	0.00	

6 MUNICIPAL TMDL SUMMARY (BY WATERSHED)			
Note: All values are calculated in this section from the Watershed Totals in Appendix C.2, column E		TMDL Watershed 1	TMDL Watershed 1
NITROGEN -	Applicable <input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/>	B05	B06**
Total Nitrogen MS4 baseline Load (kg/day):		16.34	94.20
Total Nitrogen MS4 Allocation (kg/day):		9.80	65.94
Nitrogen Reduction (kg/day):		6.54	28.26
TMDL Percent Reduction:		40.0%	30.0%
Adjusted Total Nitrogen MS4 baseline Load (kg/day):		0.73	3.08
Adjusted Total Nitrogen MS4 Allocation (kg/day):		0.44	2.16
Adjusted Nitrogen Reduction (kg/day)		0.29	0.93
Adjusted Nitrogen Percent Reduction		40.0%	30.0%
New Nitrogen Municipal Load Allocation (kg/day):*		9.36	63.78
PHOSPHORUS -	Applicable <input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/>		
Total Phosphorus MS4 baseline Load (kg/day):		3.08	19.28
Total Phosphorus MS4 Allocation (kg/day):		1.85	13.50
Phosphorus Reduction (kg/day):		1.23	5.79
TMDL Percent Reduction:		40.0%	30.0%
Adjusted Total Phosphorus MS4 baseline Load (kg/day):		0.14	0.63
Adjusted Total Phosphorus MS4 Allocation (kg/day):		0.08	0.44
Adjusted Phosphorus Reduction (kg/day):		0.05	0.19
Adjusted Phosphorus Percent Reduction:		40.0%	30.0%
New Phosphorus Municipal Load Allocation (kg/day):*		1.77	13.06
SEDIMENT -	Applicable <input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/>		
Total Sediment baseline MS4 Load (tons/year):		117.36	365.66
Total Sediment MS4 Allocation (tons/year):		62.30	194.12
Sediment Reduction (tons/year):		55.06	171.54
TMDL Percent Reduction:		46.9%	47%
Adjusted Total Sediment MS4 baseline Load (tons/year):		5.23	11.97
Adjusted Total Sediment MS4 Allocation (tons/year):		2.78	6.36
Adjusted Sediment Reduction (tons/year):		2.45	5.62
Adjusted Sediment Percent Reduction:		46.9%	46.9%
New Sediment Municipal Load Allocation (tons/year)*		59.52	187.76

* The new Municipal Load Allocations are not addressed by this MS4 TMDL Strategy

** Refer to Appendix D

**APPENDIX D –
BMP/CONTROL MEASURE DOCUMENTATION AND CALCULATIONS**

EAST FALLOWFIELD TOWNSHIP
Strategy to Address TMDLs in the Christina Watershed

APPENDIX D

STREET SWEEPING PROGRAM

Table A-4 in the PA BMP Manual lists the pollutant removal efficiency for street sweeping as 50% for Nitrogen, 85% for Phosphorus, and 85% for Total Suspended Solids. Appendix A also provides a tabular breakdown of the results of various studies, which compared sweeping frequency, type of equipment, and the associated pollutant removal efficiencies. Biweekly sweeping is listed with removal efficiencies for TP (20-40%) and TSS (40-60%) with no removal efficiency listed for TN. The table does not indicate what type of machine was used. Vacuum-assisted sweeper efficiencies are listed for TN (77%), TP (74%), and TSS (42%) but the table does not indicate the frequency that the sweeping occurred. A tabular summary is also provided with a range of pollutant removal efficiencies: TN (42–70%), TP (20–74%), and TSS (40–70%). The pollutant removal efficiencies used in this Strategy are taken from the low end of the ranges listed in the tabular summary and further reduced by half as a factor of safety to be conservative: TN 20%, TP, 10%, and TSS 20%.

The drainage area to Park Avenue was analyzed by just taking the cartway and lineal feet of roadway to determine the loading and pollutant reductions for street sweeping. The Park Avenue area used for analysis purposes was 1.6 acres. There are approximately 29.2 acres that would drain to Park Avenue from adjacent agricultural lands, woodlands, and existing residential properties. The 29.2 acres excludes drainage areas to candidate BMPs No. 23 and 24 (Tree Plantings/Landscape Restoration along Park Avenue), which total approximately 8.2 acres. Much of the surrounding area draining to Park Avenue, not only drains to Park Avenue, but also drains across Park Avenue, ultimately reaching the impaired Unnamed Tributary to Sucker Run (within the West Branch Brandywine watershed). If pollutant loading and the resultant pollutant reduction numbers from the 29.2 acres tributary to Park Avenue are considered in the analysis the Total Nitrogen reduction would increase from 54% to approximately 80%. Until a street sweeping program is implemented and quantifiable data is gained, a conservative approach is presented in this Strategy.

If the pollutant removal efficiency for Nitrogen listed in Appendix A for a vacuum assisted street sweeper (TN 77%) along with including the loading and pollutant removal from the 29.2 acre tributary area to Park Avenue, the Total Cumulative percent removal for TN would be 162%. However, since limited data is available it is felt that a conservative approach be taken at this juncture.

VOLUNTEER RAIN GARDEN IMPLEMENTATION/TOWNSHIP RAIN GARDEN PROGRAM

Township should reach out to property owners as part of the Public Outreach and Education to promote water quality improvement BMPs that individual private property owners could

implement, such as Rain Gardens. The outreach and education should include information relating to grant opportunities. The Township should also consider implementing a Rain Garden program, which could be partially or fully funded by the MS4 Program stormwater fees, or other method selected by the Township to fund the MS4 Program. The Township could also pursue credits or reductions to stormwater fees if Rain Gardens are implemented on a voluntary basis by private property owners, or the Township could seek grant funding in order to implement a certain number of Rain Gardens per year through funding by grants.

WATERSHED B06 – WEST BRANCH BRANDYWINE CREEK

The TMDL Subbasin area for B06 within East Fallowfield Township is 3,940.03 acres. The B06 subbasin drains to the West Branch Brandywine Creek, which is impaired. Based on the Urbanized Area in the 2000 Census, East Fallowfield has Urbanized Area within subbasin B06 draining to the West Branch Brandywine Creek. Within B06, the contributory UA draining to the impaired creek is approximately 1,972 acres. Of this area, only approximately 129 acres represents storm sewershed area.

The northerly portion of subbasin B06 consists of residential subdivisions interspersed among agricultural tracts and areas of heavily wooded very steep slopes, which slope down to the many unnamed tributaries to the West Branch Brandywine Creek. These tributaries are not impaired. In fact, one (1) is listed as Exceptional Value (EV). The southerly portion of the subbasin is transected by a State Highway (Strasburg Road – SR 3062) and an active railroad. The railroad parallels the West Branch Brandywine Creek. Both the railroad and state highway take drainage from the MS4 prior to discharge to the impaired creek. As previously mentioned, the storm sewershed was parsed down to approximately 129 acres. The storm sewershed consists mainly of mature, undisturbed, very steeply sloped woodlands along Mortonville Road, which collects drainage from the sloped areas and conveys it along and across Mortonville Road to eventually drain to the impaired West Branch Brandywine Creek. There is no inlet and storm sewer system along Mortonville Road.

In addition, the UA according to the 2010 Census has been reduced and is limited to areas north of Mortonville Road. The impaired creek is no longer within the UA. Anticipating the Township's responsibility in the next permit cycle and the significant cost associated with the BMPs that would be necessary to achieve the pollutant reductions identified in this permit cycle, it does not appear prudent to move forward with a BMP implementation strategy at this time. Therefore, East Fallowfield Township is proposing no BMPs in this Strategy within the B06 watershed.

As a matter of discussion and to identify potential future candidate BMPs, should circumstances change and the Township again becomes obligated to address pollutant load reductions the following areas were analyzed. An approximately 1,700 l.f. bank stabilization project was completed along an approximately 13.5 acre EPA capped property along the northerly bank of the West Branch Brandywine Creek. The property is part of the former Luria Brothers owned properties, which also extend into Modena Borough. The property was a former scrap metal yard and is presently capped. The estimated pollutant load reduction was calculated using the

Pollutants Controlled Calculation and Documentation for Section 319 Watersheds Training Manual, Revised June 1999, prepared by the Michigan Department of Environmental Quality, Water Division, Nonpoint Source Unit along with an Excel Workbook, which utilizes the same training manual. A conservative assumption was made with regard to the estimated amount of bank erosion per year (lateral recession rate). The amount of nutrients reduction is based on the tons of soil (sediment) kept in place by the stabilization. Default values for Nitrogen and Phosphorus were used, which are based on the soil type selected (silt loam in this case). Based on the model the resultant pollutant reduction was 0.0224 kg/day (2 %) for TN, 0.0112 kg/day (6%) for TP, and 9.03 tons/yr (161%) for TSS. Other areas along the West Bank Brandywine Creek would benefit from bank stabilization, in particular, the area along the westerly side of Mortonville Road between Strasburg Road and Sawmill Road, which is collapsing due to undercutting of the bank. That stretch of Mortonville Road is currently closed to vehicle traffic. The Township will need to conduct the bank stabilization for approximately 500 l.f. of stream bank as part of the road restoration project in order to reopen the road. The pollutant load reduction as part of that project is estimated to achieve reductions of 0.0132 kg/day (1 %) for TN, 0.0066 kg/day (3%) for TP, and 5.31 tons/yr (95%) for TSS using the same model for calculations. Several other candidate BMPs were considered including, another bank stabilization of 1,700 l.f. and one of 550 l.f., both along the southerly and westerly sides of Mortonville Road; Landscape Restoration on the 13.5 acre former Luria Bros. scrap yard (if it will not conflict with the EPA cap), Tree Plantings in two (2) locations between Mortonville Road and the West Branch Brandywine Creek totaling approximately 4.2 acres. In total, if implementing all of the candidate BMPs and taking credit for the previous 1,700 l.f. bank stabilization project, the pollutant load reduction would be 0.284 kg/day (31 %) for TN, 0.110 kg/day (58%) for TP, and 30.61 tons/yr (545%) for TSS.

Again, as previously mentioned, given the topography (very steeply sloped) and ground cover (mature woodlands) of the stream corridor, as well as the nature of the MS4 (roadside drainage and drainage across the road), as well as considering the fact that the impaired stream will no longer be within the UA in the next Permit Cycle, the Strategy for East Fallowfield, in the current Permit Cycle is to continue with the MCMs, work to update mapping of the MS4, work to develop an inventory of previous projects where credits may be taken for pollutant reduction, and to work with private property owners to find opportunities for future candidate BMPs if the requirement arises.

D.A. in Basin		B05 BASIN - UNIT POLLUTANT LOADING		
B05	Ac	TN	TP	TSS
		kg/Ac/day	kg/Ac/day	tons/Ac/yr
53.0	0.0137	0.0026	0.0986	

B05 BASIN - POLLUTANT REDUCTION TARGET			
TN	TP	TSS	
kg/day	kg/day	tons/yr	
0.29	0.05	2.45	

	D.A. to BMP	BMP POLLUTANT LOADING			BMP WQ FUNCTION (% REMOVAL)			BMP POLLUTANT REMOVAL			CUMULATIVE POLLUTANT REMOVAL		
		TN	TP	TSS	TN	TP	TSS	TN	TP	TSS	TN	TP	TSS
	Ac.	kg/day	kg/day	tons/yr	%	%	%	kg/day	kg/day	tons/yr	kg/day	kg/day	tons/yr
Voluntary Rain Gardens/Rain Garden Program													
1	6.4.5	0.150	0.0021	0.0004	0.0148	30%	85%	0.0006	0.0003	0.0126			
2	6.4.5	0.150	0.0021	0.0004	0.0148	30%	85%	0.0006	0.0003	0.0126			
3	6.4.5	0.150	0.0021	0.0004	0.0148	30%	85%	0.0006	0.0003	0.0126			
4	6.4.5	0.150	0.0021	0.0004	0.0148	30%	85%	0.0006	0.0003	0.0126			
5	6.4.5	0.150	0.0021	0.0004	0.0148	30%	85%	0.0006	0.0003	0.0126			
6	6.4.5	0.150	0.0021	0.0004	0.0148	30%	85%	0.0006	0.0003	0.0126			
7	6.4.5	0.150	0.0021	0.0004	0.0148	30%	85%	0.0006	0.0003	0.0126			
8	6.4.5	0.150	0.0021	0.0004	0.0148	30%	85%	0.0006	0.0003	0.0126			
9	6.4.5	0.150	0.0021	0.0004	0.0148	30%	85%	0.0006	0.0003	0.0126			
10	6.4.5	0.150	0.0021	0.0004	0.0148	30%	85%	0.0006	0.0003	0.0126			
11	6.4.5	0.150	0.0021	0.0004	0.0148	30%	85%	0.0006	0.0003	0.0126			
12	6.4.5	0.150	0.0021	0.0004	0.0148	30%	85%	0.0006	0.0003	0.0126			
13	6.4.5	0.150	0.0021	0.0004	0.0148	30%	85%	0.0006	0.0003	0.0126			
14	6.4.5	0.150	0.0021	0.0004	0.0148	30%	85%	0.0006	0.0003	0.0126			
15	6.4.5	0.150	0.0021	0.0004	0.0148	30%	85%	0.0006	0.0003	0.0126			
16	6.4.5	0.150	0.0021	0.0004	0.0148	30%	85%	0.0006	0.0003	0.0126			
17	6.4.5	0.150	0.0021	0.0004	0.0148	30%	85%	0.0006	0.0003	0.0126			
18	6.4.5	0.150	0.0021	0.0004	0.0148	30%	85%	0.0006	0.0003	0.0126			
19	6.4.5	0.150	0.0021	0.0004	0.0148	30%	85%	0.0006	0.0003	0.0126			
20	6.4.5	0.150	0.0021	0.0004	0.0148	30%	85%	0.0006	0.0003	0.0126			
		TOTALS:		3.000	0.0411	0.0078							
		PERCENTAGES:						4.25%	13.26%	10.26%	0.0123	0.0066	0.2514
											4.25%	13.26%	10.26%
											0.0123	0.0066	0.2514

By End of Permit Cycle 1 (2018)

BMP	TN	TP	TSS
25	0.0044	0.0004	0.0316
26	0.0034	0.0003	0.0247
1	0.0006	0.0003	0.0126
2	0.0006	0.0003	0.0126
Permit Cycle 1 Total =	0.0090	0.0014	0.0813
Permit Cycle 1 % Removed =	3.12%	2.81%	3.32%

By End of Permit Cycle 2 (2023)

BMP	TN	TP	TSS
22	0.0588	0.0316	1.1985
3	0.0006	0.0003	0.0126
4	0.0006	0.0003	0.0126
5	0.0006	0.0003	0.0126
6	0.0006	0.0003	0.0126
7	0.0006	0.0003	0.0126
8	0.0006	0.0003	0.0126
Permit Cycle 2 Total =	0.0625	0.0336	1.2739
Permit Cycle 2 % Removed =	21.54%	67.18%	52.00%
Cumulative Total =	0.0715	0.0350	1.3553
Cumulative % Removed =	24.66%	69.99%	55.32%

By End of Permit Cycle 3 (2028)

BMP	TN	TP	TSS
21	0.0214	0.0115	0.4358
23	0.0274	0.0088	0.3352
9	0.0006	0.0003	0.0126
10	0.0006	0.0003	0.0126
11	0.0006	0.0003	0.0126
12	0.0006	0.0003	0.0126
13	0.0006	0.0003	0.0126
14	0.0006	0.0003	0.0126
Permit Cycle 3 Total =	0.0525	0.0223	0.8465
Permit Cycle 3 % Removed =	18.09%	44.64%	34.55%
Cumulative Total =	0.1240	0.0573	2.2017
Cumulative % Removed =	42.75%	114.63%	89.87%

By End of Permit Cycle 4 (2033)

BMP	TN	TP	TSS
24	0.0288	0.0093	0.3520
15	0.0006	0.0003	0.0126
16	0.0006	0.0003	0.0126
17	0.0006	0.0003	0.0126
18	0.0006	0.0003	0.0126
19	0.0006	0.0003	0.0126
20	0.0006	0.0003	0.0126
Permit Cycle 2 Total =	0.0325	0.0113	0.4274
Permit Cycle 2 % Removed =	11.20%	22.54%	17.45%
Cumulative Total =	0.1565	0.0686	2.6292
Cumulative % Removed =	53.95%	137.18%	107.31%

Bank Stabilization

Please fill in the **gray** areas below. Once you have estimated the load reductions, print a copy of this worksheet and attach it to the 319A or 319U Cost-Share Form.

Project Name:	B06 WEST BRANCH BRANDYWINE CREEK
Project Number:	BMP 1 (Ex. Proj. on former Luria Bros. Yard)
Grantee:	
Date practice completed:	

BMPs in this category may include:
 Recreational Access Site Stabilization (Animal trails and walkways)
 Stream Channel Stabilization
 Streambank Stabilization (Streambank Protection)

STEP 1

Please select a soil textural class:

<input type="radio"/> Sands, loamy sands	<input type="radio"/> Silty clay loam, silty clay
<input type="radio"/> Sandy loam	<input type="radio"/> Clay loam
<input type="radio"/> Fine sandy loam	<input type="radio"/> Clay
<input type="radio"/> Loams, sandy clay loams, sandy clay	<input type="radio"/> Organic
<input checked="" type="radio"/> Silt loam	

STEP 2

Please fill in the **gray** areas below:

If estimating for just one bank, put "0" in areas for Bank #2. See Table 1 below for the Lateral Recession Rate.

Parameter	Bank #1	Bank #2	
Length (ft)	1700	0	
Height (ft)	5	0	
Lateral Recession Rate (ft/yr)*	0.1	0	
Soil Weight (tons/ft ³)	0.0425	0.0425	
Soil P Conc (lb/lb soil)**	<input type="text" value="DEFAULT"/>	0.0005	0.0005
Soil N Conc (lb/lb soil)**	<input type="text" value="DEFAULT"/>	0.001	0.001

** If not using the default values, users must provide input for Total P and Total N soil concentrations
 *Lateral Recession Rate (LRR) is the rate at which bank deterioration has taken place and is measured in feet per year. This rate may not be easily determined by direct measurement. Therefore best professional judgement may be required to estimate the LRR. Please refer to the narrative descriptions in Table 1.

STEP 3

If you used the default values for Total P and Total N soil concentrations, enter the BMP Efficiency for sediment only. The results are shown in yellow below.

Estimated Load Reductions	BMP Efficiency*		RESULTS:		
	Bank #1	Bank #2	Bank #1	Bank #2	
Sediment Load Reduction (ton/year)	0.25	0.0	9.03	0.0	
Phosphorus Load Reduction (lb/year)			9.03	0.0	0.0112 kg/day
Nitrogen Load Reduction (lb/yr)			18.06	0.0	0.0224 kg/day

* BMP efficiency values should be between 0 and 1, and 1 means 100% pollutant removal efficiency.

Bank Stabilization

Please fill in the gray areas below. Once you have estimated the load reductions, print a copy of this worksheet and attach it to the 319A or 319U Cost-Share Form.

Project Name:	B06 WEST BRANCH BRANDYWINE CREEK
Project Number:	BMP 2 (Mortonville Road - North)
Grantee:	
Date practice completed:	

BMPs in this category may include:
 Recreational Access Site Stabilization (Animal trails and walkways)
 Stream Channel Stabilization
 Streambank Stabilization (Streambank Protection)

STEP 1

Please select a soil textural class:

<input type="radio"/> Sands, loamy sands	<input type="radio"/> Silty clay loam, silty clay
<input type="radio"/> Sandy loam	<input type="radio"/> Clay loam
<input type="radio"/> Fine sandy loam	<input type="radio"/> Clay
<input type="radio"/> Loams, sandy clay loams, sandy clay	<input type="radio"/> Organic
<input checked="" type="radio"/> Silt loam	

STEP 2

Please fill in the gray areas below:

If estimating for just one bank, put "0" in areas for Bank #2. See Table 1 below for the Lateral Recession Rate.

Parameter	Bank #1	Bank #2	
Length (ft)	1700	0	
Height (ft)	5	0	
Lateral Recession Rate (ft/yr)*	0.1	0	
Soil Weight (tons/ft ³)	0.0425	0.0425	
Soil P Conc (lb/lb soil)**	<input type="text" value="DEFAULT"/>	0.0005	0.0005
Soil N Conc (lb/lb soil)**	<input type="text" value="DEFAULT"/>	0.001	0.001

** If not using the default values, users must provide input for Total P and Total N soil concentrations
 *Lateral Recession Rate (LRR) is the rate at which bank deterioration has taken place and is measured in feet per year. This rate may not be easily determined by direct measurement. Therefore best professional judgement may be required to estimate the LRR. Please refer to the narrative descriptions in Table 1.

STEP 3

If you used the default values for Total P and Total N soil concentrations, enter the BMP Efficiency for sediment only. The results are shown in yellow below.

Estimated Load Reductions	BMP Efficiency*	BMP Efficiency*	RESULTS:		
	Bank #1	Bank #2	Bank #1	Bank #2	
Sediment Load Reduction (ton/year)	0.25	0.0	9.03	0.0	
Phosphorus Load Reduction (lb/year)			9.03	0.0	0.0112
Nitrogen Load Reduction (lb/yr)			18.06	0.0	0.0224

* BMP efficiency values should be between 0 and 1, and 1 means 100% pollutant removal efficiency.

Bank Stabilization

Please fill in the gray areas below. Once you have estimated the load reductions, print a copy of this worksheet and attach it to the 319A or 319U Cost-Share Form.

Project Name:	B06 WEST BRANCH BRANDYWINE CREEK
Project Number:	BMP 3 (Mortonville Road - East-1)
Grantee:	
Date practice completed:	

BMPs in this category may include:
 Recreational Access Site Stabilization (Animal trails and walkways)
 Stream Channel Stabilization
 Streambank Stabilization (Streambank Protection)

STEP 1

Please select a soil textural class:

<input type="radio"/> Sands, loamy sands	<input type="radio"/> Silty clay loam, silty clay
<input type="radio"/> Sandy loam	<input type="radio"/> Clay loam
<input type="radio"/> Fine sandy loam	<input type="radio"/> Clay
<input type="radio"/> Loams, sandy clay loams, sandy clay	<input type="radio"/> Organic
<input type="radio"/> Silt loam	

STEP 2

Please fill in the gray areas below:

If estimating for just one bank, put "0" in areas for Bank #2. See Table 1 below for the Lateral Recession Rate.

Parameter	Bank #1	Bank #2	
Length (ft)	550	0	
Height (ft)	10	0	
Lateral Recession Rate (ft/yr)*	0.1	0	
Soil Weight (tons/ft ³)	0.0425	0.0425	
Soil P Conc (lb/lb soil)**	<input type="text" value="DEFAULT"/>	0.0005	0.0005
Soil N Conc (lb/lb soil)**	<input type="text" value="DEFAULT"/>	0.001	0.001

** If not using the default values, users must provide input for Total P and Total N soil concentrations
 *Lateral Recession Rate (LRR) is the rate at which bank deterioration has taken place and is measured in feet per year. This rate may not be easily determined by direct measurement. Therefore best professional judgement may be required to estimate the LRR. Please refer to the narrative descriptions in Table 1.

STEP 3

If you used the default values for Total P and Total N soil concentrations, enter the BMP Efficiency for sediment only. The results are shown in yellow below.

Estimated Load Reductions	BMP Efficiency*	BMP Efficiency*	RESULTS:		
	Bank #1	Bank #2	Bank #1	Bank #2	
Sediment Load Reduction (ton/year)	0.25	0.0	5.84	0.0	
Phosphorus Load Reduction (lb/year)			5.84	0.0	0.0073
Nitrogen Load Reduction (lb/yr)			11.69	0.0	0.0145

* BMP efficiency values should be between 0 and 1, and 1 means 100% pollutant removal efficiency.

Bank Stabilization

Please fill in the gray areas below. Once you have estimated the load reductions, print a copy of this worksheet and attach it to the 319A or 319U Cost-Share Form.

Project Name:	B06 WEST BRANCH BRANDYWINE CREEK
Project Number:	BMP 4 (Mortonville Road - East-2)
Grantee:	
Date practice completed:	

BMPs in this category may include:
 Recreational Access Site Stabilization (Animal trails and walkways)
 Stream Channel Stabilization
 Streambank Stabilization (Streambank Protection)

STEP 1

Please select a soil textural class:

<input type="radio"/> Sands, loamy sands	<input type="radio"/> Silty clay loam, silty clay
<input type="radio"/> Sandy loam	<input type="radio"/> Clay loam
<input type="radio"/> Fine sandy loam	<input type="radio"/> Clay
<input type="radio"/> Loams, sandy clay loams, sandy clay	<input type="radio"/> Organic
<input checked="" type="radio"/> Silt loam	

STEP 2

Please fill in the gray areas below:

If estimating for just one bank, put "0" in areas for Bank #2. See Table 1 below for the Lateral Recession Rate.

Parameter	Bank #1	Bank #2	
Length (ft)	500	0	
Height (ft)	10	0	
Lateral Recession Rate (ft/yr)*	0.1	0	
Soil Weight (tons/ft3)	0.0425	0.0425	
Soil P Conc (lb/lb soil)**	<input type="text" value="DEFAULT"/>	0.0005	0.0005
Soil N Conc (lb/lb soil)**	<input type="text" value="DEFAULT"/>	0.001	0.001

** If not using the default values, users must provide input for Total P and Total N soil concentrations
 *Lateral Recession Rate (LRR) is the rate at which bank deterioration has taken place and is measured in feet per year. This rate may not be easily determined by direct measurement. Therefore best professional judgement may be required to estimate the LRR. Please refer to the narrative descriptions in Table 1.

STEP 3

If you used the default values for Total P and Total N soil concentrations, enter the BMP Efficiency for sediment only. The results are shown in yellow below.

Estimated Load Reductions	BMP Efficiency*	BMP Efficiency*	RESULTS:		
			Bank #1	Bank #2	
Sediment Load Reduction (ton/year)	0.25	0.0	5.31	0.0	
Phosphorus Load Reduction (lb/year)			5.31	0.0	0.0066
Nitrogen Load Reduction (lb/yr)			10.63	0.0	0.0132

* BMP efficiency values should be between 0 and 1, and 1 means 100% pollutant removal efficiency.

Table 1		
LRR (ft/yr)	Category	Description
0.01 - 0.05	Slight	Some bare bank but active erosion not readily apparent. Some rills but no vegetative overhang. No exposed tree roots.
0.06 - 0.2	Moderate	Bank is predominantly bare with some rills and vegetative overhang.
0.3 - 0.5	Severe	Bank is bare with rills and severe vegetative overhang. Many exposed tree roots and some fallen trees and slumps or slips. Some changes in cultural features such as fence corners missing and realignment of roads or trails. Channel cross-section becomes more U-shaped as opposed to V-shaped.
0.5+	Very Severe	Bank is bare with gullies and severe vegetative overhang. Many fallen trees, drains and culverts eroding out and changes in cultural features as above. Massive slips or washouts common. Channel cross-section is U-shaped and streamcourse or gully may be meandering.
Source:	Steffen, L.J. 1982. Channel Erosion (personal communication), as printed in "Pollutants Controlled Calculation and Documentation for Section 319 Watersheds Training Manual," June 1999 Revision; Michigan Department of Environmental Quality - Surface Water Quality Division - Nonpoint Source Unit. EQP 5841 (6/99).	

5.9.1 STREETSWEEEPING

Type	Pollutant Removal % Efficiency						TP	Primary Source	Secondary Source	Comments
	TSS	TN	NO ₃	NO _x	TKN					
Biweekly Sweeping	40-60					20-40	Kurahashi & Associates, Inc. 1997. Port of Seattle - Stormwater Treatment BMP Evaluation. Prepared for the Port of Seattle. Pier 66. Prepared by Kurahashi & Associates, in association with AGI Technologies.	Federal Highway Administration (FHWA). "Stormwater Best Management Practices in an Ultra-Urban Setting: Selection and Monitoring – Monitoring Case Study-Streetsweeping BMP Evaluation, Port of Seattle, Washington." U.S. Department of Transportation.	Land Use = cargo container yards	
Weekly Sweeping	45-65					30-55	Kurahashi & Associates, Inc. 1997. Port of Seattle - Stormwater Treatment BMP Evaluation. Prepared for the Port of Seattle. Pier 66. Prepared by Kurahashi & Associates, in association with AGI Technologies.	Federal Highway Administration (FHWA). "Stormwater Best Management Practices in an Ultra-Urban Setting: Selection and Monitoring – Monitoring Case Study-Streetsweeping BMP Evaluation, Port of Seattle, Washington." U.S. Department of Transportation.	Land Use = cargo container yards	
Twice Weekly Sweeping	45-70					35-60	Kurahashi & Associates, Inc. 1997. Port of Seattle - Stormwater Treatment BMP Evaluation. Prepared for the Port of Seattle. Pier 66. Prepared by Kurahashi & Associates, in association with AGI Technologies.	Federal Highway Administration (FHWA). "Stormwater Best Management Practices in an Ultra-Urban Setting: Selection and Monitoring – Monitoring Case Study-Streetsweeping BMP Evaluation, Port of Seattle, Washington." U.S. Department of Transportation.	Land Use = cargo container yards	
Vacuum-assisted sweeper efficiency	42	77				74	NVPDC. 1992. Northern Virginia BMP Handbook: A Guide to Planning and Designing Best Management Practices in Northern Virginia. Prepared by Northern Virginia Planning District Commission (NVPDC) and Engineers and Surveyors Institute.	Federal Highway Administration (FHWA). "Stormwater Best Management Practices in an Ultra-Urban Setting: Selection and Monitoring: Fact Sheet - Street Sweepers." U.S. Department of Transportation.		
Mechanical Sweeper	55	42				40	NVPDC. 1992. Northern Virginia BMP Handbook: A Guide to Planning and Designing Best Management Practices in Northern Virginia. Prepared by Northern Virginia Planning District Commission (NVPDC) and Engineers and Surveyors Institute.	Federal Highway Administration (FHWA). "Stormwater Best Management Practices in an Ultra-Urban Setting: Selection and Monitoring: Fact Sheet - Street Sweepers." U.S. Department of Transportation.		
RANGE	40 - 70	42 - 77				20 - 74				

2000 Urbanized Areas & 2010 Urbanized Areas

According to the 1999 Phase II Stormwater Rule, the universe of the regulated small MS4 program expands every ten years based on the decennial Census definition of urbanized area.





The U.S. Census Bureau recently completed the maps of 2010 urbanized areas. These maps can assist municipalities to determine which parts of their jurisdiction are located in the 2010 urbanized area where the MS4 program would apply.

For the 2010 Census, an urban area will comprise a densely settled core of census tracts and/or census blocks that meet minimum population density requirements, along with adjacent territory containing non-residential urban land uses as well as territory with low population density included to link outlying densely settled territory with the densely settled core. The Census Bureau identifies two types of urban areas:

- a) Urbanized Areas of 50,000 or more people, and
- b) Urban Clusters of at least 2,500 and less than 50,000 people.

Urban Clusters are not mapped as they are not subject to MS4 permits.

Urbanized Area - U.S. Census Bureau

-  2010 Urbanized Areas (Philadelphia and Pottstown)
-  2000 Urbanized Areas (Philadelphia and Pottstown)
-  Municipalities
-  County Boundary

DATA SOURCES:
Urbanized Areas - U.S. Census Bureau, U.S. Department of Commerce, 2015 and 2012.
Administrative Boundaries and Watersheds - Chester County, 2015.

DISCLAIMER:
This map was generated using the best information available at the time of publication. This map should not be relied upon as the sole basis of determination of regulatory requirements or responsibilities. The relevant PADEP reports and other documents should be consulted for official designations and associated regulatory information. Should any conflicts exist between this map and the PADEP reports and regulations, the latter supersede this map.

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