

**NOTICE OF INTENT
GENERAL PERMIT
PAG -13 - 0079**

For

**Avondale Borough
Chester County, PA**

Prepared By:
Herbert E. MacCombie, Jr., P.E.
Consulting Engineers & Surveyors, Inc.
1000 Palmers Mill Road
Media, PA 19063

December 31, 2015

NOI



pennsylvania
DEPARTMENT OF ENVIRONMENTAL
PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF POINT AND NON-POINT SOURCE MANAGEMENT

NOTICE OF INTENT (NOI)

FOR COVERAGE UNDER NPDES GENERAL PERMIT FOR STORMWATER DISCHARGES (PAG-13) 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 MS4 discharges into "special protection waters" (or if your MS4 is otherwise ineligible to use PAG-13) do not complete this NOI; you must use an Individual NPDES MS4 Permit application.
- (3) Check the appropriate box if you are submitting this NOI for a RENEWAL of your current permit, or if this NOI is for a NEW permit:

Renewal Permit (if checked, please provide Permit Number) **PAG-13 0079** _____

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 NOI 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 NOI? <input type="checkbox"/> Yes <input type="checkbox"/> No
B. MS4 Operator Information	
1.	Name of MS4 Operator: Avondale Borough
2.	Contact Person: Rebecca Brownback
3.	Title/Role: Secretary
4.	Division: _____ Department: _____
5.	Phone Number: 610-268-8501 Fax: 610-268-8205
6.	E-mail: secretary_avondale-boro@comcast.net
7.	Mailing Address: Address Line 1: P.O. Box 247
	Address Line 2: 110 Pomeroy Avenue
	City: Avondale State: PA
	Zip Code: 19311

- | | |
|----|--|
| 8. | <input checked="" type="checkbox"/> I have reviewed the conditions for General Permit Eligibility and I believe that the regulated MS4 included in this NOI satisfies the conditions. |
| 9. | <input checked="" type="checkbox"/> Are all of the following map requirements 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 Information

Urbanized Area Name(s):	UA #(s):
Philadelphia-PA-NJ-DE-MD	15
Southwest	

D. Description of Receiving Waters (refer to the NOI 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 (^o ,',")	8. Longitude (^o ,',")
a. WCC-EB W04 Unamed Trib	CWF-MF	Same	No	Yes	P. 01 kg/day N-0.82 kg/dy S-35.88 t/yr	W04-1	N39°49'21"	W75°47'9"
b. WCC-EB W-06	CWF, MF	Same	No	Yes	P-.012 kg/day S-15.75 t/yr N-1.80 kg/dy	W06-1	N39°49'25.9"	W75°46'59"
c. Trout Run W07	CWF, MF	Same	Yes	Yes	P - .113 kg/day S-88.39 t/yr N - 1.96 kg/dy	W07-1	N39°49'10"	W75°46'51.8"
d. White Clay Creek-East Branch W08	CWF-MF	Same	Yes	No	No Assigned WLA's	W08-1	N39°49'11"	W75°47'1"
e.								
f.								
g.								
h.								
i.								
j.								
k.								
l.								

E. Stormwater Management Program (SWMP)

MS4 operators must implement a written SWMP with BMPs to meet six minimum control measures (MCMs), including measurable goals and a schedule, as part of their NOI. The SWMP in Appendix A of the Authorization to Discharge meets this requirement and must be implemented to satisfy eligibility for PAG-13.

Check the boxes next to each Minimum Control Measure in the following table to confirm that the Stormwater Management Program contained in Appendix A of the General Permit will be followed. **If the Program in Appendix A of the General Permit cannot be followed, this NOI cannot be used and you must apply for and Individual Permit using the MS4 Individual Permit Application.** In the right-hand column, provide the names of the person(s) responsible for implementing the program for each Minimum Control Measure.

Minimum Control Measures	The MS4 Operator will implement the Minimum Control Measures as described in the <i>SWMP in the General Permit</i>	Name and telephone number of the principal person responsible for implementation.
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.	<input checked="" type="checkbox"/>	REBECCA BROWNBACK 610-268-8501
(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
(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 You must check one of the two boxes in the column to the right and fill-in the blanks as indicated.	<input checked="" type="checkbox"/>	<p>MCM #4.A: The permittee will rely on DEP's statewide program for issuing NPDES Permits for Stormwater Discharges Associated with Construction Activities to satisfy all requirements under MCM #4 and all requirements under BMPs #1 through #3 of MCM #5. 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 first three (3) BMPs listed under MCM #5 in 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 implement all of the BMPs listed under MCM #4 and BMPs #1, #2, and #3 of MCM #5 in Appendix A of the Authorization to Discharge.	Name of person responsible: _____ Telephone number: _____
(5) BMPs #4, #5, and #6 of the MCM for Post Construction Stormwater Management in New Development and Redevelopment	<input checked="" type="checkbox"/>	REBECCA BROWNBACK 610-268-8501
(6) Pollution Prevention and Good Housekeeping for Municipal Operations and Maintenance	<input type="checkbox"/>	SAME

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 an approved TMDL: If any of your regulated MS4s discharge 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 the pollutant reductions consistent with the applicable TMDL. 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 NOI.**

Are any of your regulated small MS4 discharges of stormwater to any portion of receiving waters with applicable waste load allocations 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: Rebecca Brownback - Implementation
James W. MacCombie, P.E., P.L.S. - Preparation

Phone: 610-268-8501
610-356-9550

Check one 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 NOI Instructions.

Signature and Seal by Professional Engineer for MS4 TMDL Plans

If an MS4 TMDL Plan is required, do the components submitted with this NOI 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 12 months of the effective date of your Approval of 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 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 an approved 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 new 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 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 checked box in E(4)-(5).

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

<p style="text-align: center;">F.1.</p> <p><input type="checkbox"/> <u>By the end of the first year of coverage under this permit, you will enact and implement either:</u> 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>	OR	<p style="text-align: center;">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>243</u></p> <p>Date: <u>January 28, 2014</u></p> <p><u>Adopted in accordance with the Chester County County-wide Act 167 Plan</u></p>	OR	<p style="text-align: center;">F.3.</p> <p><input type="checkbox"/> The 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.

Rebecca Brownback
Name

610-268-8501
Telephone number

J. Compliance History Review

Has the applicant been in violation during the past 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:

MS-4 Program Deficiencies Yr. 4 & 5

Steps Taken to Return to Compliance and Dates Compliance Achieved: Deficiencies corrected, program in compliance Yrs. 6 to 9.

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 knowing violations."

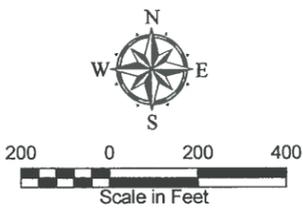
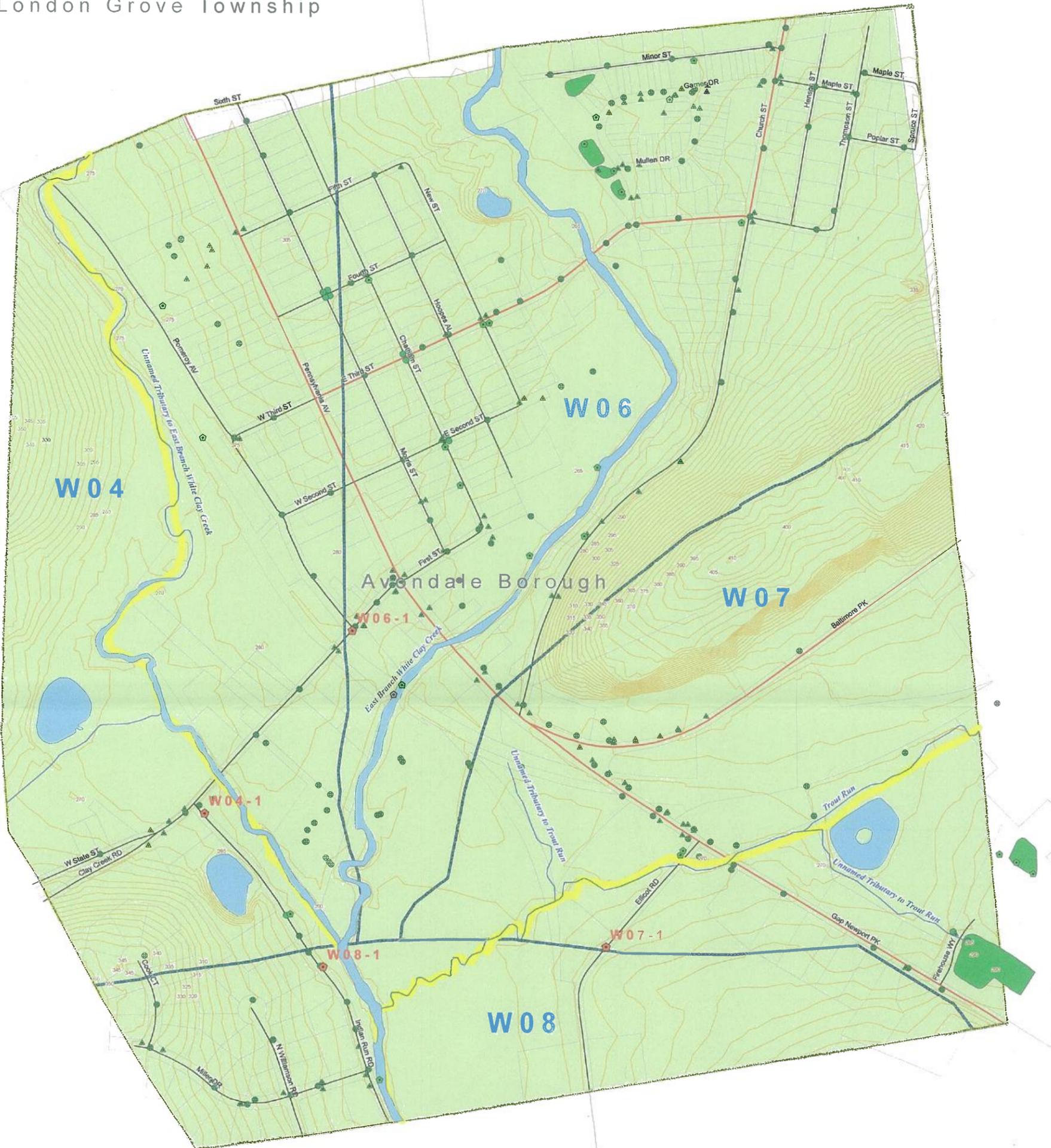
Name and official title: (Please Print or Type name and title. Use corporate or professional seal as appropriate)

William D. Shore, Borough Council President

Signature: _____ Date Signed: _____

New Garden Township

London Grove Township



LEGEND

- Regulated Outfalls
- Outfalls
- Inlets
- Culverts
- Manholes
- Storm Basins
- Lakes and Ponds
- Rivers and Streams
- Impaired Streams
- Topography (5-ft.)
- Township Boundary
- Christina TMDL Subbasins
- Local Roads
- State Roads
- Tax Parcels
- Urbanized Area

*Avondale Borough,
Chester County, Pennsylvania*
**MS4 STORM SEWER SYSTEM
AND OUTFALL LOCATION MAP**

Avondale Borough Christina Basin MS4 TMDL Plan

Part 1 – MS4 TMDL Strategy

Submitted By: *Avondale Borough*

Date: *December 31, 2015*

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 Avondale Borough**
- 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 Avondale Borough

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
- c. Implementation Tracking
- 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

Appendix E – BMP’s sponsored by Chester County Conservation District 2003-2008

Appendix F – Executive Summary

Appendix – Public Notice

SECTION A - INTRODUCTION

This MS4 TMDL Strategy is Part 1 of Avondale Borough's MS4 TMDL Plan. This MS4 TMDL Strategy is submitted in accordance with the requirements of General Permit PAG 13-0079 *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 Avondale Borough. Avondale Borough is a participating member of the C-TIP Partnership as indicated in Appendix A.

This MS4 TMDL Strategy (Part I) for Avondale Borough 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 General Permit instruction packages. Part II, MS4 TMDL Design Details, will be developed by Avondale Borough, 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 A	Introduction
Section B	Key Definitions
Section C	Required Information (as required in the NOI instructions)
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 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.

SECTION C - REQUIRED INFORMATION

I. Title of TMDL(s) that affect: Avondale Borough

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 Avondale Borough 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, Avondale Borough is listed with a WLA in the above Report
 - Not Applicable, Avondale Borough 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, Avondale Borough is listed with a WLA in the above Report
 - Not Applicable, Avondale Borough 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, Avondale Borough 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, Avondale Borough 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.

II. Watershed Name(s) and Hydrologic Unit Code (HUC):

Following are the list of watershed names and the eight-digit HUC for the areas that are addressed in the Christina Basin TMDL Reports. Only watersheds that are checked below discharge through the Avondale Borough Regulated Small MS4 to water bodies with TMDLs:

Brandywine-Christina Watershed, HUC #02040205, including:

- Brandywine Creek Watershed (PA)
- Red Clay Creek Watershed (PA)
- White Clay Creek Watershed (PA)

These watersheds are referred to herein as the TMDL Watersheds (see “Key Definitions”, above). Figure 1 presents the Christina Basin, the TMDL Watersheds and the subbasins used in the TMDL Reports (herein referred to as the TMDL Subbasins - see “Key Definitions”), as well as municipal boundaries, streams and Urbanized Area boundaries.

Figure 1. Christina Basin and its TMDL Watershed

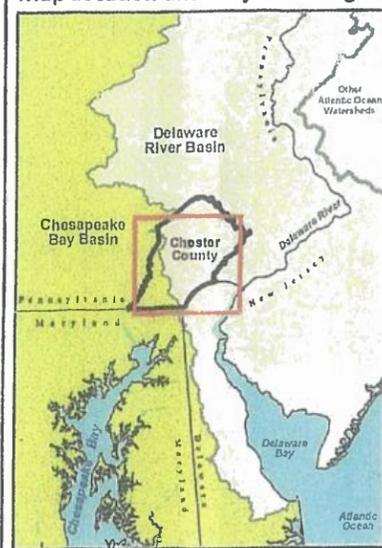
TMDL Subbasins and Municipalities

June 29, 2012 (Revised)

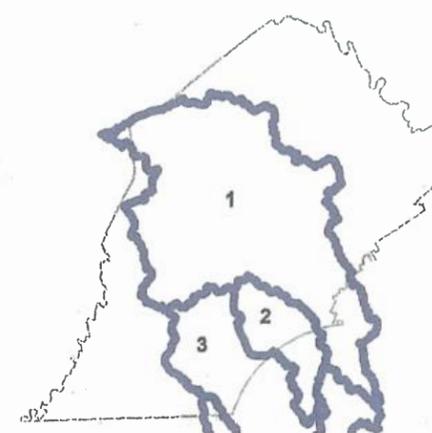
Chester County Water Resources Authority

-  Christina Basin Watersheds
-  Christina Basin HSPF Subbasins (As presented in the Christina Basin EPA TMDL Reports)
-  TMDL Subbasins (Listed with at least 1 WLA)
-  Urbanized Area (Christina Basin)- 2000 Census
-  Chester County Bound
-  Municipalities
-  Water Bodies
-  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 PADEP reports and regulations, the latter supersede this map.

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MUNICIPALITIES PARTICIPATING IN C-TIP

- . Avondale Borough
- . Caln Township
- . City of Coatesville
- . Downingtown Borough
- . East Bradford Township
- . East Brandywine Township
- . East Caln Township
- . East Fallowfield Township
- . Franklin Township
- . Honey Brook Township
- . Kennett Square Borough
- . Kennett Township
- . London Grove Township
- . Londonderry Township
- . New Garden Township
- . New London Township
- . Parkesburg Borough
- . Penn Township
- . Pocopson Township
- . Sadsbury Township
- . South Coatesville Borough
- . Thornbury Township
- . Uwchlan Township
- . Valley Township
- . West Bradford Township
- . West Brandywine Township
- . West Caln Township
- . West Chester Borough
- . West Goshen Township
- . West Whiteland Township

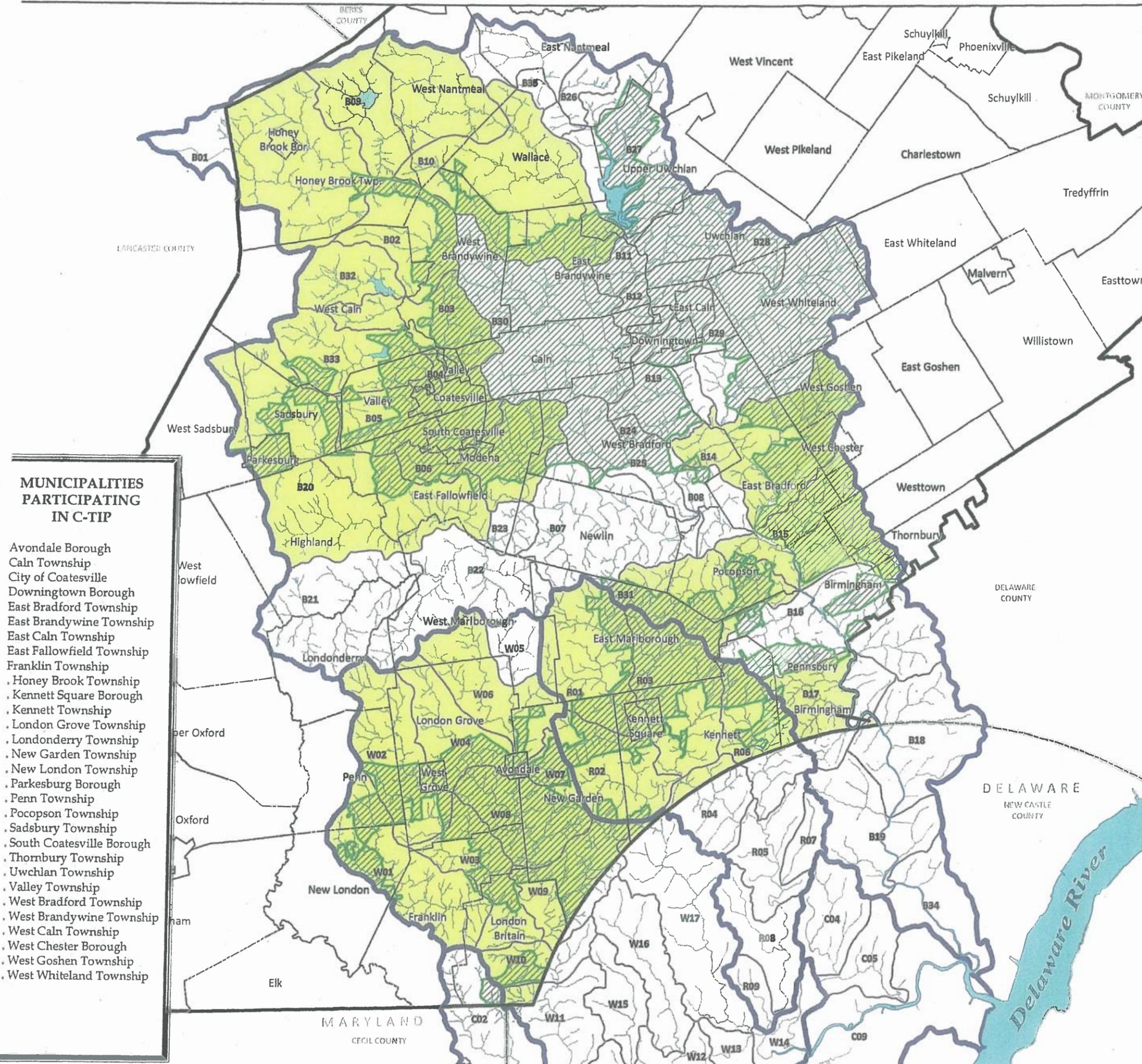


Figure 1. Christina Basin and its TMDL Watersheds, TMDL Subbasins and Municipalities

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

This NOI is for Avondale Borough.

a. Pollutants Assigned:

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

- X Total Suspended Solids (Sediment)
- X Total Nitrogen
- X 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 Avondale Borough 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-Cinnissegut Watershed (TDC # 02040205)
EPA TMDL MS4 Baseline Pollutant Loadings, MS4 Allocations, and Reductions

MUNICIPALITIES LISTED IN TMDL REPORTS Brandywine Creek Watershed	Sediment (tons/year)				Total Nitrogen (kg/day)				Total Phosphorus (kg/day)			
	Baseline MS4 Load ^{1b}	MS4 Load Allocation ^{1b}	MS4 Load Reduction ^{1c}	% Reduction ^{1b}	MS4 Baseline Load ^{2a}	MS4 Allocation ^{2a}	MS4 Load Reduction ^{2m}	% Reduction ^{2m}	MS4 Baseline Load ²ⁱ	MS4 Allocation ²ⁱ	MS4 Load Reduction ^{2m}	% Reduction ^{2m}
BIRMINGHAM TWP	310.81	130.35	180.46	58.06%								
COATESVILLE CITY	231.29	79.76	151.53	65.52%	16.08	10.86	5.22	32.46%	3.015	2.031	0.984	32.64%
EAST BRADFORD TWP	1185.00	467.17	717.83	60.58%								
EAST BRANDYWINE TWP					54.19	44.44	9.75	17.98%	0.826	0.677	0.149	18.04%
EAST FALLOWFIELD TWP	803.23	428.42	376.81	46.91%	110.54	75.74	34.80	31.48%	22.365	15.348	7.017	31.37%
EAST MARLBOROUGH TWP	366.70	139.44	227.26	61.98%								
HIGHLAND TWP	384.80	238.86	145.94	37.93%								
HONEY BROOK BORO	20.58	13.23	7.35	35.70%	9.61	5.78	3.85	40.08%	0.184	0.11	0.074	40.22%
HONEY BROOK TWP	813.84	558.76	255.08	31.34%	421.64	279.02	142.62	33.83%	7.599	4.958	2.643	34.78%
KENNETT TWP			0.00		2.38	2.22	0.16	6.72%	0.213	0.198	0.015	7.04%
MODENA BORO	27.96	12.46	15.50	55.43%	4.80	3.25	1.55	32.29%	0.988	0.658	0.31	32.09%
NEWLIN TWP	144.18	59.59	84.59	58.67%	6.53	4.57	1.96	30.02%	1.337	0.938	0.401	29.99%
PARKESBURG BORO	52.11	32.35	19.76	37.93%								
PENNSBURY TWP	113.98	43.48	70.50	61.85%	47.00	43.71	3.29	7.00%	4.208	3.911	0.295	7.01%
POCOPSON TWP	821.21	320.79	500.42	60.94%								
SADSBURY TWP	289.73	172.13	117.60	40.59%	3.05	2.28	0.79	25.90%	0.329	0.205	0.124	37.69%
THORNBURY TWP	82.17	34.46	47.71	58.06%								
UPPER UWCHLAN TWP			0.00		10.92	8.96	1.96	17.95%	0.166	0.137	0.029	17.47%
VALLEY TWP	485.14	164.64	320.50	66.06%	57.57	43.75	13.82	24.01%	6.941	4.728	2.215	31.91%
WALLACE TWP	21.74	17.41	4.33	19.92%	126.53	103.76	22.77	18.00%	1.929	1.582	0.347	17.99%
WEST BRADFORD TWP	283.22	121.6	161.62	57.07%	17.25	12.08	5.17	29.97%	3.532	2.473	1.059	29.98%
WEST BRANDYWINE TWP			0.00		136.01	104.78	31.23	22.96%	9.63	8.344	1.286	13.35%
WEST CALN TWP	68.28	43.07	25.21	36.92%	183.72	149.28	34.48	18.78%	9.95	8.649	1.301	13.08%
WEST GOSHEN TWP	461.32	180.51	280.81	60.87%								

Red Clay Creek Watershed	Sediment (tons/year)				Total Nitrogen (kg/day)				Total Phosphorus (kg/day)			
	Baseline MS4 Load ^{1c}	MS4 Load Allocation ^{1c}	MS4 Load Reduction ^{1c}	% Reduction ^{1c}	MS4 Baseline Load ^{2b}	MS4 Allocation ^{2b}	MS4 Load Reduction ^{2m}	% Reduction ^{2m}	MS4 Baseline Load ^{2k}	MS4 Allocation ^{2k}	MS4 Load Reduction ^{2m}	% Reduction ^{2m}
EAST MARLBOROUGH TWP	8791.41	4,193.24	4598.17	52.30%	137.13	68.56	68.57	50.00%	2.742	1.372	1.37	49.98%
KENNETT SQUARE BORO	840.10	405.41	434.69	51.74%	13.26	6.63	6.63	50.00%	0.452	0.151	0.301	66.59%
KENNETT TWP	6751.63	3,312.06	3439.57	50.94%	157.97	97.83	60.14	38.07%	21.517	3.731	17.786	82.66%
NEW GARDEN TWP	4709.65	2,118.72	2590.93	55.01%	77.03	38.52	38.51	49.99%	27.708	2.87	24.838	89.64%
PENNSBURY TWP					4.32	4.32	0.00	0.00%	0.082	0.082	0.00	0.00%

White Clay Creek Watershed	Sediment (tons/year)				Total Nitrogen (kg/day)				Total Phosphorus (kg/day)			
	Baseline MS4 Load ^{1d}	MS4 Load Allocation ^{1d}	MS4 Load Reduction ^{1c}	% Reduction ^{1d}	MS4 Baseline Load ^{2l}	MS4 Allocation ^{2c}	MS4 Load Reduction ^{2m}	% Reduction ^{2m}	MS4 Baseline Load ^{2j}	MS4 Allocation ^{2j}	MS4 Load Reduction ^{2m}	% Reduction ^{2m}
AVONDALE BORO	463.65	140.02	323.63	69.80%	9.16	4.58	4.58	50.00%	0.322	0.135	0.187	58.07%
FRANKLIN TWP	4220.43	2,305.87	1914.56	45.36%	122.01	61.01	61	50.00%	15.219	5.557	9.662	63.49%
KENNETT TWP					2.17	2.17	0.00	0.00%	0.055	0.055	0	0.00%
LONDON BRITAIN TWP	2634.66	1,620.44	1014.22	38.50%	96.47	49.9	46.57	48.27%	15.732	7.333	8.399	53.39%
LONDON GROVE TWP	13816.33	4,842.81	8773.52	64.43%	262.78	128.47	134.29	51.11%	25.875	7.985	17.91	69.22%
NEW GARDEN TWP	6746.80	2,988.68	3759.84	55.73%	167.06	83.83	83.23	49.82%	41.916	13.374	28.542	68.09%
NEW LONDON TWP	1913.97	1,008.60	905.37	47.30%	53.58	26.61	26.95	50.32%	0.65	0.292	0.358	55.08%
PENN TWP	3584.76	1,410.29	2174.47	60.66%	71.23	33.36	37.87	53.17%	0.798	0.359	0.439	55.01%
WEST GROVE BORO	562.29	182.63	369.66	65.74%	9.24	4.36	4.88	52.81%	0.112	0.05	0.062	55.36%

(1) U.S. EPA Region III, 6 April 2005. Total Maximum Daily Loads for Bacteria and Sediment in the Christine River Basin Watershed Pennsylvania, Delaware, and Maryland. Philadelphia, PA.

(2) U.S. EPA Region III, 26 September 2008. Revisions to Total Maximum Daily Loads for Nutrient and Low Dissolved Oxygen under High-flow Conditions: Christine River Basin Watershed, Pennsylvania, Delaware, and Maryland. Philadelphia, PA.

a. Table 4.2 Fecal coliform TMDL allocations for MS4 municipalities. p. 4-5

b. Table 4.8 Sediment allocations for towns in Brandywine Creek Watershed. p. 4-16

c. Table 4.9 Sediment allocations for towns in Red Clay Creek Watershed. p. 4-16

d. Table 4.10 Preliminary sediment allocations for towns in White Clay Creek Watershed. p. 4-16

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

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

a. Appendix C-Table C-5b. Total nitrogen MS4 allocations for Brandywine Creek watershed (kg/day) p. C-6

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-8b. Total nitrogen MS4 allocations for White Clay Creek watershed (kg/day) p. C-11

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

e. Appendix C-Table C-8b. Total phosphorus MS4 allocations for Red Clay Creek watershed (kg/day) p. C-10

f. Appendix C-Table C-10b. Total phosphorus MS4 allocations for White Clay Creek watershed (kg/day) p. C-13

g. Appendix C-Table C-5e. Total nitrogen MS4 baseline loads for Brandywine Creek watershed (kg/day) p. C-5

h. Appendix C-Table C-7a. Total nitrogen MS4 baseline loads for Red Clay Creek watershed (kg/day) p. C-8

i. Appendix C-Table C-8a. Total nitrogen MS4 baseline loads for White Clay Creek watershed (kg/day) p. C-10

j. Appendix C-Table C-8a. Total phosphorus MS4 baseline loads for Brandywine Creek watershed (kg/day) p. C-7

k. Appendix C-Table C-8a. Total phosphorus MS4 baseline loads for Red Clay Creek watershed (kg/day) p. C-9

l. Appendix C-Table C-10a. Total phosphorus MS4 baseline loads for White Clay Creek watershed (kg/day) p. C-12

m. Calculated by CCWRA using Tables listed in 2a-2l. listed above. MS4 Reduction = (MS4 Baseline Load) - (MS4 Allocation). %Reduction = (MS4 Load Reduction) / (MS4 Baseline Load)

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

b. Pollutants Not Applicable:

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

- Sediment (Total Suspended Solids)** – There is NO WLA listed for Avondale Borough. Therefore, implementation of the Sediment TMDL is not addressed in this Avondale Borough MS4 TMDL Strategy.
- Total Nitrogen** - There is NO WLA listed for Avondale Borough. Therefore, implementation of the Total Nitrogen TMDL is not addressed in this Avondale Borough MS4 TMDL Strategy.
- Total Phosphorus** - There is NO WLA listed for Avondale Borough. Therefore, implementation of the Total Phosphorus TMDL is not addressed in this Avondale Borough MS4 TMDL Strategy.
- Bacteria** – Avondale Borough is:
 - x **a)** not listed with a WLA for bacteria. Therefore, implementation of the Bacteria TMDL is not addressed in this Avondale Borough 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 Avondale Borough, or within the Christina Basin, PA. Therefore, implementation of the Bacteria TMDL is not addressed in this Avondale Borough 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 Avondale Borough MS4 TMDL Strategy.
 - X **b)** Avondale Borough has no land area in the Brandywine Creek Watershed. Therefore, implementation of the Brandywine Creek PCB/Chlordane TMDL is not addressed in this Avondale Borough MS4 TMDL Strategy.

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 (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 Avondale Borough MS4 TMDL Strategy.
- b)** Avondale Borough has no land area in the Red Clay Creek Watershed. Therefore, implementation of the Red Clay Creek PCB TMDL is not addressed in this Avondale Borough 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 Avondale Borough 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. Avondale Borough is located within the White Clay Creek East Branch – UNT (W04), White Clay Creek East Branch (W06), and Trout Run (W07) and very small section of the East Branch in the W08 watershed for which there are no TMDL’s assigned. Table 1 indicates that pollutant Load Reductions are required by Avondale Borough 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:

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

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:

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

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:

Avondale Borough

X 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 Avondale Borough 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 Avondale Borough 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 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 Avondale Borough 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.

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:

$$\text{Adjustment Ratio} = \frac{\left(\text{Actual Contributing land area (acres)} \right)}{\left(\text{Land area (acres) used by EPA to calculate the EPA MS4 Allocation} \right)}$$

Adjusted MS4 Baseline = Adjustment Ratio x (EPA MS4 Baseline)
Adjusted MS4 Allocation = Adjustment Ratio x (EPA MS4 Allocation)
Adjusted MS4 Load Reduction = (Adjusted MS4 Baseline) – (Adjusted MS4 Allocation)

The adjustment calculations are provided in Appendix C:

- Appendix C.1 – MS4 Worksheet for Calculating Adjusted MS4 Baseline Loads, MS4 Allocations, required Load Reductions and new Municipal LAs - Land Use Area method.
- 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 Avondale Borough. The total TMDL Allocation for Avondale Borough 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 Avondale Borough. The new LA for Avondale Borough is also shown for each TMDL Watershed.

**Table 2. Adjusted MS4 Baselines, MS4 Allocations Required Load Reductions
and New LA for Avondale Borough**

**TABLE 1. Brandywine-Cristina Watershed (RUC # 02040203)
EPA TMDL MS4 Baseline Pollutant Loadings, MS4 Allocations, and Reductions**

MUNICIPALITIES LISTED IN TMDL REPORTS Brandywine Creek Watershed	Sediment (tons/year)				Total Nitrogen (kg/day)				Total Phosphorus (kg/day)			
	Baseline MS4 Load ^{1b}	MS4 Load Allocation ^{1b}	MS4 Load Reduction ^{1c}	% Reduction ^{1b}	MS4 Baseline Load ^{2a}	MS4 Allocation ^{2a}	MS4 Load Reduction ^{2m}	% Reduction ^{2m}	MS4 Baseline Load ²ⁱ	MS4 Allocation ^{2d}	MS4 Load Reduction ^{2m}	% Reduction ^{2m}
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KENNETT TWP			0.00		2.38	2.22	0.16	6.72%	0.213	0.198	0.015	7.04%
MODENA BORO	27.96	12.46	15.50	55.43%	4.80	3.25	1.55	32.29%	0.968	0.658	0.31	32.09%
NEWLIN TWP	144.18	59.59	84.59	58.67%	6.53	4.57	1.96	30.02%	1.337	0.938	0.401	29.99%
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PENNSBURY TWP	113.98	43.48	70.50	61.85%	47.00	43.71	3.29	7.00%	4.208	3.911	0.295	7.01%
POCOPSON TWP	821.21	320.79	500.42	60.94%								
SADSBURY TWP	289.73	172.13	117.60	40.59%	3.05	2.26	0.79	25.90%	0.329	0.205	0.124	37.69%
THORNBURY TWP	82.17	34.46	47.71	58.06%								
UPPER UWCHLAN TWP			0.00		10.92	8.96	1.96	17.95%	0.166	0.137	0.029	17.47%
VALLEY TWP	485.14	164.64	320.50	66.06%	57.57	43.75	13.82	24.01%	6.941	4.726	2.215	31.91%
WALLACE TWP	21.74	17.41	4.33	19.92%	126.53	103.76	22.77	18.00%	1.929	1.582	0.347	17.99%
WEST BRADFORD TWP	283.22	121.6	161.62	57.07%	17.25	12.08	5.17	29.97%	3.532	2.473	1.059	29.98%
WEST BRANDYWINE TWP			0.00		138.01	104.78	31.23	22.96%	9.63	8.344	1.286	13.35%
WEST CALN TWP	68.28	43.07	25.21	36.92%	183.72	149.26	34.46	18.76%	9.95	8.649	1.301	13.08%
WEST GOSHEN TWP	461.32	180.51	280.81	60.87%								

Red Clay Creek Watershed	Sediment (tons/year)				Total Nitrogen (kg/day)				Total Phosphorus (kg/day)			
	Baseline MS4 Load ^{1c}	MS4 Load Allocation ^{1c}	MS4 Load Reduction ^{1c}	% Reduction ^{1c}	MS4 Baseline Load ^{2h}	MS4 Allocation ^{2b}	MS4 Load Reduction ^{2m}	% Reduction ^{2m}	MS4 Baseline Load ^{2k}	MS4 Allocation ^{2e}	MS4 Load Reduction ^{2m}	% Reduction ^{2m}
EAST MARLBOROUGH TWP	8791.41	4,193.24	4598.17	52.30%	137.13	68.56	68.57	50.00%	2.742	1.372	1.37	49.96%
KENNETT SQUARE BORO	840.10	405.41	434.69	51.74%	13.26	6.63	6.63	50.00%	0.452	0.151	0.301	66.59%
KENNETT TWP	6751.63	3,312.05	3439.57	50.94%	157.97	97.83	60.14	38.07%	21.517	3.731	17.786	82.66%
NEW GARDEN TWP	4709.65	2,118.72	2590.93	55.01%	77.03	38.52	38.51	49.99%	27.708	2.87	24.838	89.64%
PENNSBURY TWP					4.32	4.32	0.00	0.00%	0.082	0.082	0.00	0.00%

White Clay Creek Watershed	Sediment (tons/year)				Total Nitrogen (kg/day)				Total Phosphorus (kg/day)			
	Baseline MS4 Load ^{1d}	MS4 Load Allocation ^{1d}	MS4 Load Reduction ^{1c}	% Reduction ^{1d}	MS4 Baseline Load ^{2l}	MS4 Allocation ^{2c}	MS4 Load Reduction ^{2m}	% Reduction ^{2m}	MS4 Baseline Load ^{2j}	MS4 Allocation ^{2f}	MS4 Load Reduction ^{2m}	% Reduction ^{2m}
AVONDALE BORO	463.65	140.02	323.63	69.80%	9.16	4.58	4.58	50.00%	0.322	0.135	0.187	58.07%
FRANKLIN TWP	4220.43	2,305.87	1914.56	45.36%	122.01	61.01	61	50.00%	15.219	5.557	9.662	63.49%
KENNETT TWP					2.17	2.17	0.00	0.00%	0.055	0.055	0	0.00%
LONDON BRITAIN TWP	2634.66	1,620.44	1014.22	38.50%	96.47	49.9	46.57	48.27%	15.732	7.333	8.399	53.39%
LONDON GROVE TWP	13616.33	4,842.81	8773.52	64.43%	262.76	128.47	134.29	51.11%	25.875	7.965	17.91	69.22%
NEW GARDEN TWP	6746.50	2,986.66	3759.84	55.73%	167.06	83.83	83.23	49.82%	41.916	13.374	28.542	68.09%
NEW LONDON TWP	1913.97	1,008.60	905.37	47.30%	53.56	26.61	26.95	50.32%	0.65	0.292	0.358	55.08%
PENN TWP	3584.76	1,410.29	2174.47	60.68%	71.23	33.36	37.87	53.17%	0.798	0.359	0.439	55.01%
WEST GROVE BORO	562.29	192.83	369.66	65.74%	9.24	4.36	4.88	52.81%	0.112	0.05	0.062	55.36%

(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, 26 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. Table 4.2 Fecal coliform TMDL allocations for MS4 municipalities. p. 4-5

b. Table 4.8 Sediment allocations for towns in Brandywine Creek Watershed. p. 4-16

c. Table 4.9 Sediment allocations for towns in Red Clay Creek Watershed. p. 4-16

d. Table 4.10 Preliminary sediment allocations for towns in White Clay Creek Watershed. p. 4-16

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

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

a. Appendix C-Table C-5b. Total nitrogen MS4 allocations for Brandywine Creek watershed (kg/day) p. C-6

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

c. Appendix G, Table C-9b. Total nitrogen MS4 allocations for White Clay Creek watershed (kg/day) p. C-11

d. Appendix C, Table C-6b. Total phosphorus MS4 allocations for Brandywine Creek watershed (kg/day) p. C-8

e. Appendix C, Table C-8b. Total phosphorus MS4 allocations for Red Clay Creek watershed (kg/day) p. C-10

f. Appendix C, Table C-10b. Total phosphorus MS4 allocations for White Clay Creek watershed (kg/day) p. C-13

g. Appendix C-Table C-5a. Total nitrogen MS4 baseline loads for Brandywine Creek watershed (kg/day) p. C-5

h. Appendix C, Table C-7a. Total nitrogen MS4 baseline loads for Red Clay Creek watershed (kg/day) p. C-8

i. Appendix C, Table C-9a. Total nitrogen MS4 baseline loads for White Clay Creek watershed (kg/day) p. C-10

j. Appendix C, Table C-6a. Total phosphorus MS4 baseline loads for Brandywine Creek watershed (kg/day) p. C-7

k. Appendix C, Table C-8a. Total phosphorus MS4 baseline loads for Red Clay Creek watershed (kg/day) p. C-9

l. Appendix C, Table C-10a. Total phosphorus MS4 baseline loads for White Clay Creek watershed (kg/day) p. C-12

m. Calculated by CCWRA using Tables listed in 2a.-2l. listed above. MS4 Reduction = (MS4 Baseline Load) - (MS4 Allocation);

%Reduction = (MS4 Load Reduction) / (MS4 Baseline Load)

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

a. MS4 TMDL Implementation Area:

The TMDL Implementation Area for placing TMDL BMPs/control measures consists of any location within a TMDL Subbasin that drains to a stream with a stormwater-related impairment, and within the Urbanized Area. Once PADEP credit, trading, and offset policies are in place, BMPs/control measures may be located outside the Urbanized Area, subject to those policies. The MS4 TMDL Implementation Area for Avondale Borough is based on the information above and the definition presented in “Key Definitions”.

b. Priorities for Implementation:

Based on PADEP feedback from the letter dated March 21, 2012 (Appendix B), BMP/control measure selection has been prioritized within the Implementation Area in the following order:

- First on properties owned by the Municipality that will minimize the volume and rate of stormwater flow discharging from the Regulated Small MS4 and are within the TMDL watershed and the Urbanized Area;
- Second, on non-Municipal properties that will minimize the volume and rate of stormwater flow discharging from the Regulated Small MS4 and are within the TMDL watershed and Urbanized Area;
- Third, on non-Municipal properties within the Urbanized Area that are a source of sediment or nutrients; and
- Fourth, on any sources outside the Urbanized Area located within the TMDL watershed and targeted to maximize pollutant load reductions, and in accordance with DEP’s forthcoming applicable credit, trading, and offset policies.

Avondale Borough will formally establish its responsibilities associated with protecting the permanence of each BMP/control measure implemented for achieving the TMDL Load Reductions presented in this MS4 TMDL Strategy, in order to sustain those water quality improvements into the long-term future. This includes establishing the necessary legal and administrative arrangements and instruments to insure that Avondale Borough can fulfill its responsibilities for access, and inspection, maintenance, and operation (O, M & I) of any constructed TMDL BMP/control measure, and protect each measure against future disturbance except as authorized by Avondale Borough. These responsibilities will be established and implemented for each BMP/control measure installation or retrofit for which a Load Reduction is counted by Avondale Borough toward its incremental and total TMDL targets.

c. **Inventory of Previously Installed Pollutant Reduction Control Measures (March 10, 2003 - July 2008)**

Avondale Borough:

- has previously installed pollutant reduction control measures to claim (2003-2012). See below.
- has NO previously installed pollutant reduction control measures to claim at this time (2003-2012). (Skip below and go to Subsection VIII.d).

Table 3 provides an inventory of control measures implemented by Avondale Borough between March 10, 2003 and July 2008 and the pollutant load reduction provided by each. Each control measure listed has been inspected by Avondale Borough to confirm it has been operated and maintained consistent with its original design. Locations of these control measures are shown in Figure 2 along with the Urbanized Area and stormwater impaired streams.

For each installed control measure included in Table 3, the Municipality's engineer has determined the pollutant load reduction achieved. This pollution reduction is only counted toward Avondale Borough's first 5-year incremental target and total (cumulative) TMDL target. These control measures satisfy the following conditions as specified by PADEP in its letter dated March 21, 2012 (Appendix B) (the following is PADEP exact language):

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 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.*
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.*

**Table 3. Previously Installed BMPs/Control Measures and Pollutant Reductions
For Avondale Borough in Trout Run – W-07 to the White Clay Creek East Branch**

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	Nov. 2003 to Nov. 2008	Riparian buffer planting s, Constructed Wetlands, etc. See CCCD reports in Appendix D	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	Trout Run	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	x Nitrogen x Phosphorus x Sediment	X% X% X%	N (kg/day) P (kg/day) S (tons/year)	UNK	
			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)		
				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 [Date of Submission]				N (kg/day) P (kg/day) S (tons/year)		
				Total Increase →				N (kg/day) P (kg/day) S (tons/year)		
				<u>TOTAL NET REDUCTION</u> → (Total Gross – Increase) Counted towards meeting the TMDL				N (kg/day) P (kg/day) S (tons/year)	To be determined	

*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. Avondale Borough Locations of Previously Installed and Candidate
BMPs/Control Measures**

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.*”

Projects listed in Table 3 include BMP/control measures that fall into three categories:

1. Voluntary BMPs/control measures or retrofits, either structural or non-structural, which were not completed as part of a land development project;
2. BMPs/control measures installed as part of (a) land development project(s) approved by the Municipality, which voluntarily exceeded the pollutant removal efficiency required by the NPDES construction permit (i.e., pollutant removal required by NPDES application worksheet of calculations and PA BMP Manual);
3. BMPs/control measures installed as part of (a) land development project(s) approved by the Municipality, which exceeded the pollutant removal efficiency required by the NPDES construction permit, as required by the Municipality’s Stormwater Management Ordinance.

Category 3 BMPs/control measures are considered to be the “Municipal Stormwater Ordinance Control Measure”, which is further discussed in the next subsection. For BMP/control measure categories 2 and 3, above, only the portion of pollutant load removal that is above and beyond the PADEP NPDES permit requirement is included in Table 3. For all BMPs/control measures, permanent protection, inspection, operation and maintenance provisions have been put into place. For each control measure listed in Table 3 justification for pollutant reduction credit, including calculations and information in support of items 1 through 7 above have been provided in Appendix E.*

*** At this time, it is the intent of this submission to make it known that voluntary BMP’s were implemented along the Trout Run, on private properties under the direction of the Chester County Conservation District which focused on improving water quality runoff from mushroom growing operations. Further analysis is necessary to determine the extent of the load reductions being achieved.**

d. Municipal Stormwater Ordinance Control Measure:

The stormwater ordinance adopted by Avondale Borough in January 2014 meets or exceeds the minimum standards required in the “County-wide Act 167 Plan for Chester County”. Avondale Borough’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;

- X Minimum area of proposed impervious surface or proposed or earth disturbance to which ordinance standards apply;
- X Peak Rate reduction of 1-yr, 2-yr, 5-yr, 24-hr storm event, etc

Avondale Borough 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 Avondale Borough(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 Avondale Borough during this 5-year permit cycle. Avondale Borough 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 Avondale Borough's MS4 TMDL Plan – Part II, no later than one year from the effective date of authorization of Avondale Borough'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 Avondale Borough and permanent protection from disturbance or modification except as authorized by Avondale Borough.

**Table 4. List of Candidate BMPs/Control Measures
Avondale Borough – White Clay Creek East Branch/Trout Run**

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	See executive summary	<input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3	Trout Run	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Nitrogen <input type="checkbox"/> Phosphorus <input checked="" type="checkbox"/> Sediment	X% X% X%	N (kg/day) P (kg/day) S (tons/year)
2		<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)
3		<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)
		<i>TOTAL ESTIMATED REDUCTION</i> → Counted towards meeting the TMDL					N (kg/day) P (kg/day) S (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, 3, and 4. (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:

The Borough is not proposing to implement BMPS that would yield a measurable impact on the required load reduction for this permit cycle, as there are not adequate facilities under the Borough’s direct control where measures could be implemented that discharge to or through the MS4. The Borough will attempt to gain the cooperation of the landowners along the Trout Run the discharge runoff directly to the stream to implement control measure.

In accordance with the expectations set forth in the PADEP letter dated March 21, 2012 (Appendix B), *Avondale Borough will be unable 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.*”

As shown, the following milestones will be achieved by Avondale Borough:

- One year from authorization of permit renewal: Proposed BMP/control measure design details will be submitted to PADEP as the Avondale Borough 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, the Avondale Borough'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: Not Included

Avondale Borough 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 – 2012) (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 Avondale Borough 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.

d. Process for Evaluating and Updating MS4 TMDL Plan:

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. Pocopson Township
20. Sadsbury Township
21. South Coatesville
22. Thornbury Township
23. Uwchlan Township
24. Valley Township
25. West Bradford Township
26. West Brandywine Township
27. West Caln Township
28. West Chester Borough
29. West Goshen Township
30. 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:

Rachel Carson State Office Building | P.O. Box 8774 | Harrisburg, PA 17105-8774

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.

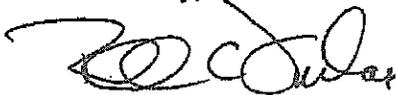
DEP's concurrence in the C-TIP concept is conditioned such that any municipality that seeks credits for pollutant load reductions undertaken outside the UA may do so only if they satisfy all of the above factors to DEP's satisfaction.

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)	White Clay Creek	W04, W06, W07 - W08*
2)		*No assigned land area or TMDL's for Avondale

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)
White Clay Creek East Branch -un-named trib. W04 Not Impaired	78.02	312.08
White Clay Creek East Branch - W06 Not Impaired	117.03	
Trout Run W07	117.03	

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:

Urbanized Area as TMDL Storm Sewershed Area (Total Area)

TMDL subbasin	MS4 Total	Total (Watershed)
White Clay Creek East Branch -un-named trib. W04 Not Impaired	0.00	117.03
White Clay Creek East Branch - W06 Not Impaired	0.00	
Trout Run W07	117.03	

3 LAND USE ADJUSTMENT RATIOS:

Divide the TMDL Storm Sewershed area from Section 2 by the corresponding land use area from Section 1

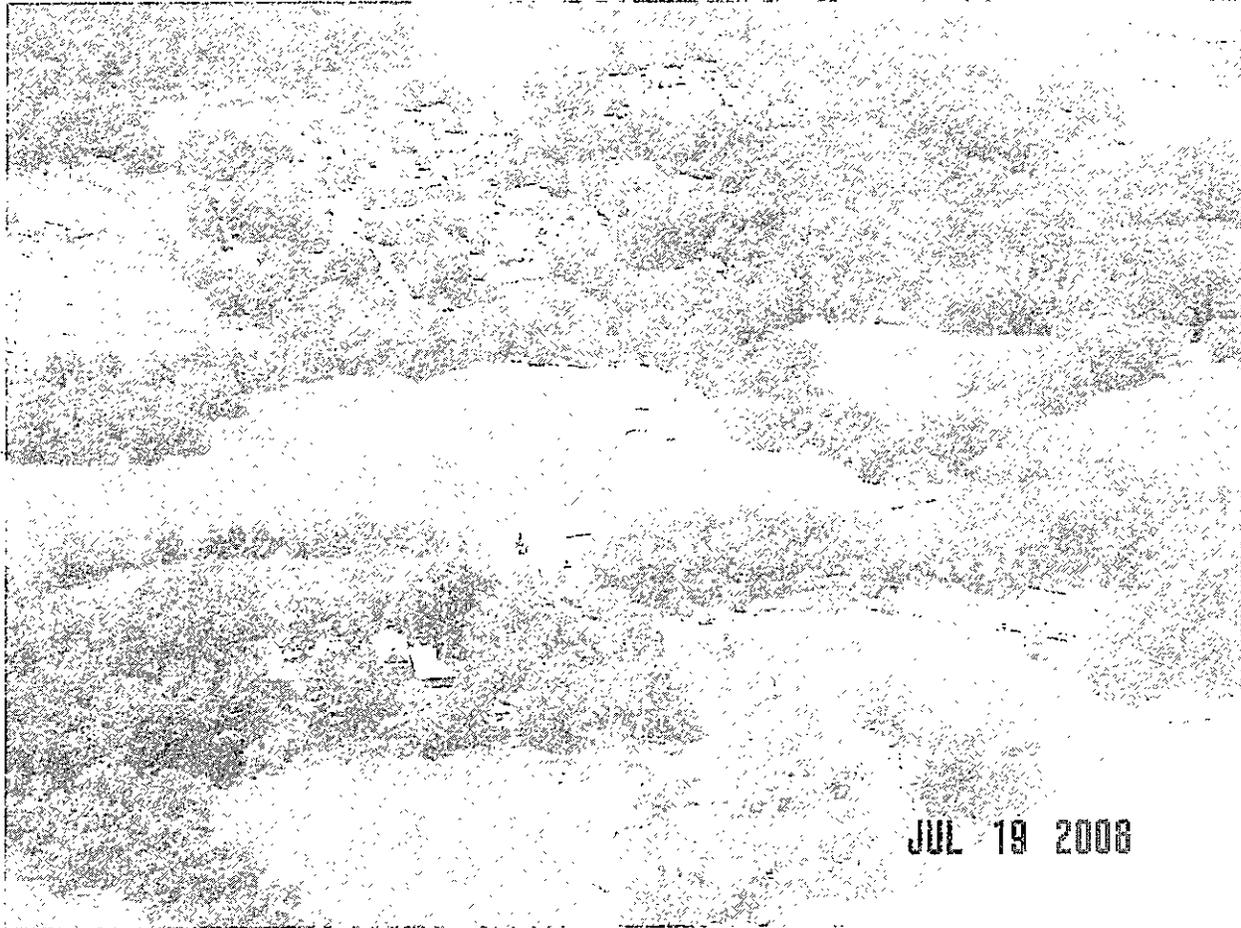
TMDL subbasin	MS4 Total	Total (Watershed)
White Clay Creek East Branch -un-named trib. W04 Not Impaired	0.000	0.38
White Clay Creek East Branch - W06 Not Impaired	0.000	
Trout Run W07	1.000	

4 MS4 BASELINE LOADS AND MS4 ALLOCATIONS:			
Total nitrogen MS4 baseline loads (kg/day):			
Copied from TMDL Report Appendix C, Table(s): C-9a			
TMDL Subbasin	Subtotal	Total (Watershed)	
White Clay Creek East Branch -un-named trib. W04 Not Impaired	1.64	9.17	
White Clay Creek East Branch - W06 Not Impaired	3.60		
Trout Run W07	3.93		
Total nitrogen MS4 allocations (kg/day):			
Copied from TMDL Report Appendix C, Table(s): C-9b			
TMDL Subbasin	Subtotal	Total (Watershed)	
White Clay Creek East Branch -un-named trib. W04 Not Impaired	0.82	4.58	
White Clay Creek East Branch - W06 Not Impaired	1.80		
Trout Run W07	1.96		
Total phosphorus MS4 baseline loads (kg/day):			
Copied from TMDL Report Appendix C, Table(s): C-10a			
TMDL Subbasin	Subtotal	Total (Watershed)	
White Clay Creek East Branch -un-named trib. W04 Not Impaired	0.023	0.322	
White Clay Creek East Branch - W06 Not Impaired	0.047		
Trout Run W07	0.252		
Total phosphorus MS4 allocations (kg/day):			
Copied from TMDL Report Appendix C, Table(s): C-10b			
TMDL Subbasin	Subtotal	Total (Watershed)	
White Clay Creek East Branch -un-named trib. W04 Not Impaired	0.010	0.135	
White Clay Creek East Branch - W06 Not Impaired	0.012		
Trout Run W07	0.113		
Sediment baseline MS4 loads (tons/year):			
Copied from TMDL Report Appendix C, Table(s): C-7b			
TMDL Subbasin	Subtotal	Total (Watershed)	
White Clay Creek East Branch -un-named trib. W04 Not Impaired	118.81	463.64	
White Clay Creek East Branch - W06 Not Impaired	52.16		
Trout Run W07	292.67		
Sediment MS4 WLAs (tons/year):			
Copied from TMDL Report Appendix C, Table(s): C-7a			
TMDL Subbasin	Subtotal	Total (Watershed)	
White Clay Creek East Branch -un-named trib. W04 Not Impaired	35.88	140.02	
White Clay Creek East Branch - W06 Not Impaired	15.75		
Trout Run W07	88.39		

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)	
White Clay Creek East Branch -un-named trib. W04 Not Impaired	0.000	3.930	
White Clay Creek East Branch - W06 Not Impaired	0.000		
Trout Run W07	3.93		
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)	
White Clay Creek East Branch -un-named trib. W04 Not Impaired	0.000	1.960	
White Clay Creek East Branch - W06 Not Impaired	0.000		
Trout Run W07	1.96		
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)	
White Clay Creek East Branch -un-named trib. W04 Not Impaired	0.000	0.252	
White Clay Creek East Branch - W06 Not Impaired	0.000		
Trout Run W07	0.25		
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)	
White Clay Creek East Branch -un-named trib. W04 Not Impaired	0.000	0.113	
White Clay Creek East Branch - W06 Not Impaired	0.000		
Trout Run W07	0.11		
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)	
White Clay Creek East Branch -un-named trib. W04 Not Impaired	0.00	292.67	
White Clay Creek East Branch - W06 Not Impaired	0.00		
Trout Run W07	292.67		
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)	
White Clay Creek East Branch -un-named trib. W04 Not Impaired	0.00	88.39	
White Clay Creek East Branch - W06 Not Impaired	0.00		
Trout Run W07	88.39		

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

**APPENDIX E –
BMPs Sponsored by the Chester County Conservation District
2003-2008**



Chester County Conservation District, Kennett Square, PA
Contact: Chotty Sprenkle 610-925-4920 X 103
News Release – 07.18.08

Mushroom Shaped Wetlands in Avondale

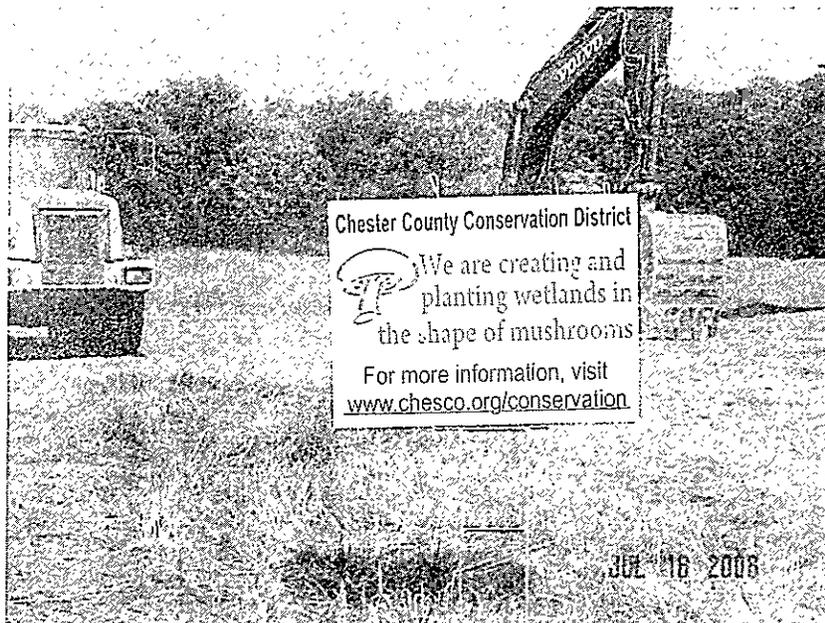
Chester County, the mushroom capital of the world, and the borough of Avondale have a new attraction, but the best way to see it is by air. **The Chester County Conservation District (CCCD)** has created eight mushroom shaped wetlands on the property of William Webb, Ellicott Road, Avondale, PA. The wetlands construction was funded with a PA Department of Environmental Protection Growing Greener Grant (\$100,000), and was constructed to provide non-point source reduction and thermal reduction in Trout Run before it enters the exceptional value waters of the White Clay Creek.

The idea to create the wetlands is not an original, but borrowed from the State of Delaware Department of Natural Resources and Environmental Control, (DENREC) which has created wetlands in the shape of frogs, turtles, and even the mascot Blue Hen. Trout Run in Avondale has received many upstream efforts to reduce residential, highway, and industry runoff and thermal pollution with the creation of forested riparian buffers and constructed wetlands, installation of Filter Soxx, and

other best management practices (BMPs). However, the lower end was without conservation measures, and funding for this project was granted in 2005 to provide the missing link. So, Chotty Sprengle, Watershed Coordinator for the District, thought "what better way to promote water quality in a manner that will draw attention of the public, advertise the mission of the District, and promote the signature agriculture industry of the region?" She also added, "I must admit, everyone was quite surprised when the funding was granted. Some people laughed; others just couldn't believe it was approved."

With the excavation completed, the site will be stabilized with riparian grasses until September. Then, the Conservation District will invite the public and other community groups to join them in planting the wetlands with over 2000 native herbaceous plants, like swamp milkweed, duck potatoes, and soft rush. The plants will utilize the nutrients in the runoff and overflow from Trout Run. The second phase of the project is to construct a BMP that will direct the flow of the water through the wetland expanse to allow for greater NPS and thermal reduction and ground water recharge. Among the many other benefits, it is hoped that with cooler and cleaner water, the trout may just return to Trout Run.

The original design was created by LandStudies, Inc, Lititz, PA; modified and constructed by Rettew, Lancaster, PA; and excavated by Flyway Excavation, Lititz, PA. For additional information and to help plant in September, contact Chotty Sprengle, (610) 925-4920 X103 or email csprengle@chesco.org



Steve Williams, DENREC, can be contacted at swilliams@state.de.us
Mark Metzler, Rettew, can be contacted at (717) 394-3721
William Webb can be contacted at (610) 268-0279
Rebecca Brownback, Borough of Avondale Secretary – contact at (610) 268-8501

eMapPA

Layers Legend

eMapPA Layers

- Complaints
- Federal EPA Sites
- Regulated Facilities and Areas POI - Geological
- Areas POI - Environment
- Areas POI - General
- Boundaries
 - Zip Code Points
 - County Boundaries
 - Municipalities
 - Zip Codes
 - State House Boundar
 - State Senate Bounda
 - Congressional Bound
 - 7.5 Minute Quad Bou
 - Voting Districts
 - Census Tract 2010
 - Urban Areas 2010
 - Urban Areas 2000

Map eFacts Query Advanced Query

ESRI Streets & Imagery Topographic National Geographic

Streets Imagery



0 100 200ft

Imagery Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, SGP, swisstopo, and the GIS User Community; ESRI Streets: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NAVTEQ, Swisstopo, Esri China (Hong Kong), Esri (Thailand), Swisstopo, © OpenStreetMap contributors, and the GIS User Community

Trout Run Mushroom Wetlands
Chester County Conservation District

The Chester County Conservation District is requesting Growing Greener grant funding to relocate the Trout Run stream channel and to create seven passive treatment wetlands adjacent to the watercourse in the shape of mushrooms. Trout Run is a headwater tributary to the White Clay Creek (Exceptional Value) in Avondale, Chester County, PA.

Executive Summary

The existing man-made channel of Trout Run is deeply incised with unstable banks. The north side of Trout Run has been stabilized with the installation of 1800 square feet of riparian buffer. On the south side of Trout Run in the continuing effort to improve water quality in the sub watershed from spent mushroom substrate (SMS) contamination, and to complete three years of mushroom BMP installation, the District would like to finish with a novel but successful water quality improvement. The stream channel as it exists now will be abandoned and allowed to revert naturally and add to the restored riparian buffer. The restoration design proposes diverting the flow of Trout Run through a series of wetlands below banks of the channel redesign. This will allow seepage of the base flow to enter the wetlands and be treated by aquatic vegetation. Additional storm water discharges will be attenuated within the broad wetland flood plain providing additional treatment.

The constructed wetlands would be excavated to look like mushrooms from an aerial view, because Chester County is the mushroom capital of the world and the New Garden airfield is located a mile away from the project site (property of Mr. William Webb). This is not a new idea. In an effort to draw favorable attention to environmental restoration and improvement projects, the State of Delaware Department of Natural Resources and Environmental Control (DNREC) has created wetlands in the shapes of wetland critters, swine, and raindrops (photos below). They have received positive feedback from the citizens. These shaped wetlands are a curiosity to the public and have allowed DNREC to create, communicate, and promote a strong wetlands education program (per communication with Steve Williams, Ecological Restoration Coordinator, DNREC) and can easily be transferred to Pennsylvania.

These wetlands will be the final water-quality-improvement project completing three years of mushroom resource conservation Best Management Practice (BMP) installation as a result of PA/EPA 319 funds in the subwatershed (see attached Trout Run Accomplishments).

Justification of Funding

Mushroom farming and handling of spent mushroom compost has been identified in numerous studies as one of the major contributing agricultural sources of NPS pollution in the White Clay Creek watershed. The PADEP recognizes the need for agricultural planning and implementation of BMPs for this division of agriculture with the 1999 publication of the Best Practice for Environmental Protection in the Mushroom Farm Community. The PADEP continues to make the mushroom industry a priority with the 2002 Draft of the Environmental

Futures Planning-SERO Watershed Team 21, Indicator 1 – Stream and lake miles meeting their designated use for aquatic life; Objective – reduce impacts to surface and ground waters from the mushroom industry.

Developing and installing BMPs in the Red and White Clay watersheds for remediating NPS pollution are important in several areas:

- Public Health and Safety: Interstate water quality concerns (PA/DE), as the cities of Wilmington, Newark, and New Castle County, Delaware, use these waters as a public drinking water source.
- Economic: Mushroom agriculture is a \$325 million industry in Chester County.
- Federal Government Assistance - USDA Partnerships: assist NRCS staff to implement the funded action plan for the PL566 Red and White Clay Land Treatment Program.
- Compliance with State Environmental Regulations - PADEP Partnership: assist SERO in NPS pollution environmental compliance activities for mushroom farms with Mushroom Farm Environmental Management Plans.
- Implementation of TMDLs for the Christina River.
- Trout Run is a 303d Listed Impaired Water Body (State Water Plan 031)
- Compliance with Local Ordinances: assist townships in water quality protection issues.
- Regional Planning - Local Government and Grassroots Watershed Organizations: assist the Christina Basin Water Resource Management Program in developing TMDL's for NPS pollution.

Trout Run is a headwater tributary to the White Clay Creek. In the past several years, extensive water quality BMPs have been installed on mushroom house operations along Trout Run with funding from a 319 Grant - Trout Run Watershed Restoration (ME#350634), Growing Greener Grant (Round 2), NRCS PL-566 Land Treatment Project (Red and White Clay Creeks), and the State of Delaware 319 Brandywine Christina Program. The Trout Run accomplishments include enlisting seven cooperators (mushroom house operators) and installing: 3 acres of riparian buffer created; 12 wetlands/water quality BMPs (6.5 acres); 1200 wetland planted; 1 acre of grassed filter; and 750 linear feet of *Filter Soxx*. These BMPs have been implemented in the upper reaches and mid-section of the stream. The lower section of Trout Run, before it enters into the White Clay Creek, is still unprotected and could greatly benefit from restoration work through natural stream channel design and construction. With this final report is a conceptual design for the implementation of seven constructed wetlands and stream relocation. Funding is in place or will be secured through existing EPA/PA 319 grants and NRCS programs for implementation (2004 and beyond).

This project continues to have the support of NRCS (Sam High, District Conservationist), PADEP Watershed Protection (Russell Wagner), PADEP SERO (Steve O'Neil, Steve Piller - SERO), Christina Basin Water Resources Management Project, and local mushroom growers. The project will complete comprehensive water quality improvements in the Trout Run.

The Red and White Clay watersheds are located in southern Chester County, PA and Northern New Castle County, DE. The watershed drainage area is 103,000 acres: 60,500 in Chester County and 42,500 acres in New Castle County. The Red and White Clay creeks headwaters originate above Kennett Square and the Avondale/West Grove, PA area. New Castle County's primary water supply source is the Red and White Clay watersheds. The Red and White Clay creeks meet just west of Wilmington, DE. The combined flow from the Red and White Clay creeks travels approximately 2.6 miles before entering the Christina River, a tributary to the Delaware Estuary. The White Clay Creek was designated a Wild and Scenic River in 2002. The upper White Clay Creek is listed as an exceptional value (EV) protected watershed, while the lower section is listed as impaired on the PADEP 303d. List, with 2.7 miles of Trout Run assessed as impaired with nutrients, siltation, and pesticides.

The Trout Run Project would implement Goals 4 and 5 in *Watersheds: An Integrated Water Resources Plan for Chester County, PA and Its Watersheds* (adopted September 2002).

Goal 4 - Improve Water Quality:

The highest priority for improving water quality is to restore streams and watersheds to achieve state water quality standards for their designated use where these standards are currently not being met. The objectives strive to raise the standards and to improve or maintain higher water quality standards in waters supporting "sensitive resources"

and in sources of drinking water supplies. The objectives also strive to eliminate future contaminants from being introduced into streams and ground water. Removing sediments, nutrients, and pollutants from stormwater runoff prior to its release into streams is the most promising and widespread approach needed in Chester County's watersheds. By using effective BMPs to capture the runoff from rainfall events up to the one-inch storm, between 85% and 90% of the total annual average rainfall runoff can be handled through BMPs for pollutant reduction prior to release into streams.

Goal 5 – Reduce Stormwater Runoff and Flooding

Watersheds address storm water in a more comprehensive manner than does traditional storm water management. To be effective, stormwater management must address the "10 principles": reducing the volume of stormwater generated, maintaining "open-meadow" runoff and infiltration conditions, protecting ground water recharge, removing pollutants prior to the release of stormwater into streams, re-establishing stable geomorphology and stream channel processes, reducing flood peak runoff rates and volumes, ensuring long-term operation and maintenance of stormwater facilities, protecting adjacent lands from direct stormwater discharges, establishing forested riparian corridor networks, and protecting wetlands and floodplains.

Watersheds outlines Priority Management Objectives for 21 Individual Watersheds. In the target area these watershed priorities are highlighted:

White Clay Creek

1. Reduce stormwater runoff.
2. Restore water quality of "impaired" streams.
3. Protect vegetated riparian corridors.
4. Increase public access and recreational use of streams.
5. Undertake integrated water resources planning for growth areas.
6. Implement other source water protection measures for water supply intakes and wells.
7. Protect/enhance historic, cultural areas.

Christina River

1. Restore water quality of "impaired" streams.
2. Reduce storm water runoff.
3. Protect vegetated riparian corridors.
4. Protect/enhance water-based recreation and public access.

The dominant agricultural crop in these two watersheds is mushrooms. Mushroom growers produce nearly 200 million pounds annually at a value of \$250 million. Pollution from mushroom farms (composting, growing, and spent compost handling) has the potential to introduce contaminants into surface or ground water. Pollution sources include leaching and runoff from mushroom substrate piles, spent substrate, storage piles, and substrate residues. Soil erosion and sedimentation can result from runoff that drains off concrete wharfs, roofs, or parking areas. In addition, water used in mushroom house washdown or irrigation sometimes reaches nearby streams. Sometimes pesticides, though currently limited in use, are spilled or used improperly or excessively. The production of mushroom substrate also produces strong odors that become airborne and travel to surrounding communities.

The major pollution sources from Chester County mushroom production now include more than 900 individual mushroom houses operated by 125 entities with 85 owners. Annually these operations produce an estimated 55.5 million gallons of contaminated runoff. The contaminated runoff includes over 27.5 million gallons from washdown and cleaning procedures, 6 million gallons from loading and unloading of the buildings, and 22 million gallons from spent mushroom substrate in holding areas waiting processing.

Spent compost is produced at a rate of 593,000 tons/year with a nutrient value of 9,360,000 pounds of nitrogen and 390,000 pounds of phosphorus. Of this amount, 40% has been identified as being improperly disposed either by misapplication to land surfaces or improper storage prior to being bioconverted to some other product. Mushroom operations contribute an estimated 56% of the nitrogen and 25% of the phosphorus reaching the stream from agricultural sources.

Funding for integrated BMPs is needed and justified in the Trout Run and White Clay Creek watersheds to address the many NPS and water quality issues presented by the mushroom industry.

Scope of Work

- **600 Linear Foot Riparian Buffer Installed** – November 2003 LandStudies, Inc. (LSI) (Photos attached)
- **Design Completed** – 2003 (LSI) (funding provided by GG/319 program)
- **Permitting**
 - PHMC Review and Approval Completed – 2003 Chester County Conservation District (CCCD)
 - This site is significant because it contains prehistoric Native American Artifacts within three continuous encampments. Site work and design approved by Dr. Noel Strattan, PHMC
 - PNDI Review and Approval Completed – 2003 (CCCD)
 - Bog Turtle Migration Route – Technical assistance required during wetlands construction to guide construction equipment. (CCCD)
 - Acquired Wetland Delineations from Penn DOT – November 2003 (LSI, CCCD)
 - Acquire required permit from PADEP – July 2004 (CCCD)
- **Wetland Creation** – July 2004 – November 2005 (weather conditions considered for construction)
- **Education and Promotion** – July 2004 – November 2004 (CCCD) Contact local media to promote wetland construction in the shape of critters and completed project on Trout Run with PADEP and EPA funding. Create and distribute literature water quality improvement/enhancement efforts.
- **Pre-construction water quality monitoring** – collect baseline chemical and macro invertebrate data on Trout Run with on site sampling, May, 2004 (CCCD)
- **As-builts, monitoring, riparian buffer maintenance** – November 2005 (LSI, CCCD)
- **Maintenance** – November 2005 and beyond (William Webb, property owner)
- **Post-construction water quality monitoring** – collect chemical and macro invertebrate data in Trout Run with on-site sampling. Compare to data collected in 2004. (CCCD)

Equipment Disposition

A brush mower purchased with grant funds will become the property of William Webb, property owner of the project site, who will use the equipment to maintain the riparian buffer and wetlands perimeter as needed for invasive species management.

Operation, Maintenance, and Replacement

William Webb, owner of the project site will be responsible for maintaining the buffer. The Chester County Conservation District (CCCD) will monitor for BMP effectiveness, water quality, and replacement of plant materials as needed, in addition to maintenance oversight.

Partnerships

USDA NRCS
PADEP
State of Delaware/ New Castle County
Mushroom House Operators
Local Mushroom Growers Community Awareness Committee
New Garden Township
Christina Basin Water Resource Management Committee
White Clay Watershed Association
William Webb, Property Owner of Site

Project Outcomes

Seven passive treatment wetlands (.75 acres) created in the shape of mushrooms.

Justification for Contractor

The Chester County Conservation District would like to continue and complete the project with the services of LandStudies, Inc. LandStudies was chosen and approved for all work that was completed under the Trout Run 319 Grant. Efficient project management and cooperation of mushroom farmers allowed a saving of the original watershed restoration funds sufficient to cover the design cost for this project. They have assisted us in the design and construction and planting of water quality improvements for well over ten mushroom sites. It was their original suggestion of water quality improvement ponds (constructed wetlands) and design, which helped us to enlist the participation of the mushroom cooperators. They have completed the design for this last installment on Mr. Webb's property and Dr. Noel Strattan, PHMC, has approved it. LandStudies also installed the riparian buffer along the north side of the proposed restoration site and have established a good working relationship with Mr. Webb the landowner.

PLANT INSTALLATION AND STABILIZATION

Temporarily disturbed and created wetlands will be seeded with a wetland seed mix and planted with a total of approximately 4,100 wet tolerant herbaceous plugs (*see attached Native Plant List*). These plugs will include a variety of sedges and rushes such as soft rush, wool grass, lurid sedge, dark green bulrush, etc. and a few flowering species including swamp milkweed, boneset, cardinal flower, and blue vervain selected from the herbaceous plant list shown on the following pages. The specific species will be determined by availability. A total of 1,900 soft rush plugs will be planted in a four-foot wide perimeter along the outline of each wetland area at a spacing of two feet on-center to define the mushroom shape of each wetland. The remaining 2,200 herbaceous plugs will be planted along with the wetland seed mix within and surrounding the defined perimeter of each mushroom-shaped wetland pocket at the appropriate spacing indicated on the attached native plant list. A total of 800 flowering herbaceous plugs consisting of four different species will be dispersed at a spacing of five feet on-center among the remaining 1,400 plugs consisting of mostly sedges and rushes selected from the attached native plant list (two to four feet on-center spacing). The proposed planting scheme is shown on the "Planting Plan", which is attached to this narrative.

Graded stream banks will be stabilized with transplanted sod to a distance of eight feet from the new and existing channel. The existing seed bank and adjacent wetlands will provide the seed source for regeneration of appropriate herbaceous wetland species along these stabilized stream banks. All other disturbed areas will be seeded with 100% annual rye for immediate stabilization.

Approximately 300 native shrubs that are adapted to wet conditions will be installed along the banks of the new stream channel to provide additional bank stabilization, shade, and habitat close to the water. The riparian vegetation will consist of a minimum of five shrub species chosen from the attached plant list. The plants will be installed at a spacing shown on the attached plant list. Shrubs were chosen for the planting plan rather than trees (other than black willow) because the project aims to create mostly emergent and scrub-shrub wetlands, not a forested wetland habitat. The abandoned channel will be forested because existing riparian vegetation along the old channel will remain largely intact.

MAINTENANCE AND MONITORING

Post-construction maintenance responsibilities will be minimal. The landowner, Mr. William Webb, is aware that mowing will not be necessary or advised. The project area will be left as constructed to allow for the establishment of planted vegetation. When the vegetation is established, routine inspection of the project site will be performed by the landowner and/or a representative of the Chester County Conservation District or LandStudies, Inc. to determine if any undesirable or invasive species are present. If necessary, control measures will be discussed and implemented. Post-construction field inspections will also be performed by the Chester County Conservation District,

LandStudies, Inc., and/or the landowner after significant rain events to observe the functionality of the relocated channel, restored floodplain, and created wetlands and to determine if any damages have occurred as a result of flood damage and if corrective measures will be necessary.

Upon completion of the project, the Chester County Conservation District will be responsible for producing a final report that will include an as-built survey with permanent monitoring cross-sections provided by LandStudies, Inc. LandStudies, Inc. and/or the Chester County Conservation District will conduct the necessary monitoring requirements, which will be described in the special conditions of the permit issued by state and federal agencies. Annual monitoring reports are typically required for a period of three to five years and may include:

- a.) A summary of channel stability, wetland and riparian buffer establishment, and any corrective measures needed or taken regarding the post-construction conditions or planting schedule
- b.) Color photographs of the site with a map indicating photo location and direction
- c.) A list of any undesirable or invasive species encountered and a proposed means of control for this species; and
- d.) Survival rate of planted stock. If additional plantings will be necessary to achieve the required survival rate, the monitoring report shall indicate the species, number, and locations of the plantings.

Post-construction monitoring results will be compared with physical, biologic and chemical baseline data that were observed by the Chester County Conservation District prior to construction.

REVISED (4-6-06)
Trout Run Mushroom Wetlands Project
 Avondale Borough, Chester County, PA

NATIVE PLANT LIST

SHRUB LIST

Scientific Name	Common Name	Size	Spacing	Hydrology
SHRUBS				
<i>Aronia arbutifolia</i>	Red chokeberry	cont. seed.	4' o.c.	Moist /Saturated
<i>Cephalanthus occidentalis</i>	Buttonbush	cont. seed.	4' o.c.	Moist /Saturated
<i>Cornus amomum</i>	Silky dogwood	cont. seed.	4' o.c.	Moist /Saturated
<i>Ilex verticillata</i>	Winterberry	cont. seed.	4' o.c.	Moist /Saturated
<i>Salix nigra</i> (tree)	Black willow (tree)	cont. seed.	4' o.c.	Moist /Saturated
<i>Sambucus canadensis</i>	Elderberry	cont. seed.	4' o.c.	Moist /Saturated
<i>Viburnum dentatum</i>	Arrowwood	cont. seed.	4' o.c.	Moist /Saturated

cont. seed. = container seedlings

o.c. = on center

HERBACEOUS LIST

Scientific Name	Common Name	Size	Spacing	Hydrology
<i>Asclepias incarnata</i>	Swamp milkweed	2" plugs	5' o.c.	Saturated
<i>Carex crinita</i>	Fringed sedge	2" plugs	3' o.c.	0-2"
<i>Carex stricta</i>	Tussock sedge	2" plugs	3' o.c.	0-2"
<i>Eupatorium perfoliatum</i>	Boneset	2" plugs	5' o.c.	Saturated
<i>Iris versicolor</i>	Blue flag	2" plugs	2' o.c.	0-3"
<i>Juncus effuses</i>	Soft rush	2" plugs	2' o.c.	0-6"
<i>Lobelia cardinalis</i>	Cardinal flower	2" plugs	5' o.c.	0-2"
<i>Peltandra virginica</i>	Arrow arum	2" plugs	3' o.c.	1-6"
<i>Sagittaria latifolia</i>	Duck potato	2" plugs	3' o.c.	3-6"
<i>Scirpus atrovirens</i>	Dark green bulrush	2" plugs	3' o.c.	0-2"
<i>Scirpus cyperinus</i>	Woolgrass	2" plugs	3' o.c.	3-6"
<i>Scirpus tabermontanii</i>	Soft stem bulrush	2" plugs	4' o.c.	3-6"
<i>Sparganium americanum</i>	Burreed	2" plugs	4' o.c.	3-6"
<i>Verbena hastate</i>	Blue Vervain	2" plugs	5' o.c.	Saturated

o.c. = on center

WETLAND SEED MIX

Composition	Scientific Name	Common Name
20%	<i>Agrostis alba</i>	Red Top
20%	<i>Carex vulpinoidea</i>	Fox Sedge
20%	<i>Lolium multiflorum</i>	Annual Rye
20%	<i>Elymus virginicus</i>	Virginia Wild Rye
10%	<i>Bidens cernua</i>	Nodding Bur Marigold
5%	<i>Panicum virgatum</i>	Switch Grass
2.5%	<i>Carex lurida</i>	Lurid Sedge
2.5%	<i>Carex comosa</i>	Cosmos Sedge

Notes:

- Plant a minimum of five different shrub species at designated spacing and hydrology as noted in the above shrub list.
- Shrubs may be installed along edges of sod mats.
- Black willows are actually trees that are spaced as shrubs.
- Herbaceous species will be determined by availability and planted at designated spacing and hydrology as noted in the above herbaceous list in combination with wetland seed mix. The spacing of herbaceous plugs is deemed appropriate because these plantings will be combined with the spreading of the proposed wetland seed mix.
- Install plants in existing soil in areas indicated by design engineer.

Maintenance:

- Keep plants moist at all times during installation.
- Monitor for deer browse and rodent damage.
- Remove invasive plants such as multiflora rose, purple loosestrife, phragmites, and cattails.

Wetlands

Existing Site Conditions

Are wetlands present on the site? Yes No

Are any water course(s) affected by the project? Yes No

If present, what are the types and acreages:

Type:	Size:
<input checked="" type="checkbox"/> PEM (palustrine emergent)	1 ac.
<input type="checkbox"/> PSS (palustrine scrub/shrub)	_____
<input type="checkbox"/> PFO (palustrine forested)	_____
<input type="checkbox"/> POW (palustrine open water)	_____
Total Size: _____	

If affected, what are the Ch. 93 Classification(s):

WWF (Warm Water Fishery)
 CWF (Cold Water Fishery)
 TSF (Trout Stocks)
 HQ (High Quality)
 EV (Exceptional Value)

What is the contributing drainage area to the wetland project (in acres)?
 _____ acres

What is the predominant land use in the contributing drainage area?
 Commercial, agricultural

Are prior Converted Wetlands Areas Present? Yes No

Wetland Protection/Restoration/Creation Projects

Hydrogeomorphic Classification of Wetland
 (stream areas are considered riverine):

Existing Wetland Acreage Impacted (0.0):		Acreage Restored or created (0.0):	
Type	Size	Type	Size
<input checked="" type="checkbox"/> PEM	4 ac.	<input checked="" type="checkbox"/> PEM	4 ac.
<input type="checkbox"/> PSS	_____	<input type="checkbox"/> PSS	_____
<input type="checkbox"/> PFO	_____	<input type="checkbox"/> PFO	_____
<input type="checkbox"/> POW	_____	<input type="checkbox"/> POW	_____

Enhancement/Functional Gain Projects

Hydrogeomorphic Classification of Wetland
 (stream areas are considered riverine):

Enhancement Activity Type	Size of area affected (0.0)
<input type="checkbox"/> Streambank Fencing	_____
<input type="checkbox"/> Wetland Fencing	_____
<input type="checkbox"/> Exotic/Invasive Sp. Cont	_____
<input type="checkbox"/> Hydrologic Manipulation	_____
<input checked="" type="checkbox"/> Other	_____
Other Desc.: <u>Planted 3400 herbaceous wetland plant plugs (see attached list)</u>	

Latitude 394914.7 Longitude 754656.1
 Latitude 394914.7 Longitude 754656.1

Latitude 394914.7 Longitude 754656.1 Latitude _____

Please describe activities to date:

7
Created ~~8~~ mushroom shaped wetlands and planted with 3400 herbaceous wetland plant plugs. Completed construction July 2008 and planting in November 2008.

Streams

Name of Project: Trout Run Mushroom Wetlands 303D Listed Yes No

Chapter 93 Designation
 WWF CWF TSF
 HQ EV

Riparian buffers installed 1 length (ft) 600
avg width (ft) 35 trees and shrubs type (trees, shrubs, grasses)
(Report both sides of stream if appropriate)

Latitude 39 49' 14.7" Longitude 75 46"56.1"

Prior land use where established Open field type

7 wetlands created

Filter Strips installed _____ length (ft) _____ avg width (ft)

Land use where established Agricultural type

Stream bank protection with fencing _____ length (ft) _____ avg. width (FT)

Stream bank protection without fencing _____ length (ft) _____ avg. width (FT)

Barerooted plantings _____ type/species (trees, shrubs, grasses)

Container grown plants _____ type/species (trees, shrubs, grasses)

Protected root stock _____ type/species (trees, shrubs, grasses)

Weed control _____ type/species (trees, shrubs, grasses)

Invasive species removed _____ type/species (trees, shrubs, grasses)

Dams removed _____ number _____ length (ft) _____ height (ft)

Fluvial Geomorphology (FGM) _____ (ft)

Stream channel restoration _____ length (ft)

Fish structures _____ number _____ type

Rootwads _____ length

J-hook vanes _____ number

Trash removed _____ tons _____ number of sites

Protection Measures Implemented (describe below)

Please describe activities to date: (include sources of technical assistance)

Grass and hay production, no livestock

Sheet F

Name of Project: Trout Run Mushroom Wetlands

Non-Point Other



Latitude N 39 49' 14.7" Longitude W 75 46' 56.1"

Measures on separate pages

Extended dry detention basin	_____	number	_____	drainage area	Sediment Ponds	_____	number
Wet detention pond	_____	number	_____	drainage area	Septic Pumping	_____	number
Conversion of dry retention to wet	_____	number	_____	drainage area	Home Septic	_____	.
Pond-wetland system	<u>8</u>	number	<u>1.7 sq.mi.</u>	drainage area	Denitrification installed	_____	number
Stormwater wetland	_____	number	_____	drainage area	Septic systems connected	_____	
Sand Filter	_____	number	_____	drainage area	to WWTP POTW	_____	number
Infiltration Swale	_____	number	_____	drainage area	Nutrient Management	_____	acres
Porous Pavement	_____	number	_____	drainage area	Dirt/Gravel Road Maintenance	_____	feet
Roof Water Management	_____	number	_____	drainage area	Road Bank Stabilized	_____	ft ²

Operation & Maintenance (describe below)

Other (describe below)

Describe your implementation activities to date: (Advise if your improvements are new construction, replacements, or changes to existing systems)

Construction completed July 19, 2008. Plantings were concluded for the season October 2008. Additional plants will be added over time with funding and plants from Tree Vitalize with monitoring for deer damage, die-off, excessive rainfall.

Stream ReLeaf

Contact Information:

Name: Charlotte D. Sprenkle
Organization: Chester County CD
Address: 688 Unionville Road, Suite 200
City: Kennett Square
State: PA
Zip: 19348
Telephone: 610-925-4920
Email: csprengle@chesco.org

Project Identification:

Project Start Date: 3/1/2008
Project End Date: 10/31/2010
Landowner/Project: William Webb
County: Chester
Municipality: Avondale
Land Ownership Type: Private
Buffer Perm Protected: Yes
Protection Agreement: Yes
Stream Name: Trout Run
Watershed: White Clay Creek - Delaware
Latitude: 39° 49' 13"
Longitude: -75° 46' 55"
Associated Waterbody: Stream
Adjacent Land Use: Pasture

Buffer Characteristics:

Buffer Type: Trees/Shrubs
Length First Side: 300
Avg Width First Side: 35
Length Second Side: 300
Avg Width Second Side: 35
Source of Tech. Assistance: PHMC, DEP
Sources of Funding:
Growing Greener
Additional Comments: 3000 Herbaceous Plants planted as well in and around 8 created wetlands in the shape of mushrooms. Native wildflowers, rush, sedges, grasses

**APPENDIX F –
Executive Summary**

EXECUTIVE SUMMARY
AVONDALE BOROUGH
Strategy to Address TMDL's in the Christina Watershed

The focus of this submission is on the Trout Run Watershed, as it is the only one identified as impaired in the Borough in the September 2006 "Revisions to Total Maximum Daily Loads for Nutrient and Low Dissolved Oxygen Under High-flow Conditions, Christina River Basin, Pennsylvania, Delaware and Maryland", as prepared by the US EPA, Region 3. The stream section through the Borough is the lower 0.5 mile reach of the 2.8 mile stream and contains the confluence with the East Branch of the White Clay Creek just a few hundred feet north of the Borough boundary. The land area contributing to Trout Run in the Borough is approximately 73 acres, based on the topography (Note: the data in the report indicates the drainage is 117 acres). This represents less than 10% of the overall contributing drainage area in the watershed.

There has been very little new development in this area of the Borough since the study was performed. A new fire station was constructed in 2004 on the north side of Rte 41, in the far southeastern corner of the Borough. However, the building is actually in New Garden Township, with only its entrance and the stormwater management facility located within the Borough that drains to an unnamed tributary of the Trout Run. This area of the Borough contains a small number of residential dwellings, which for the most part are situated on large parcels. The land uses in this area of the Borough are primarily commercial and industrial, including the East Penn Railroad yard, with some agricultural uses centered around the mushroom growing and packaging industry.

The majority of the storm sewer system exists to provide drainage for Gap Newport Pike, (Rte. 41) and Baltimore Pike, which are designated as State Highways. That system has discharge points to Trout Run near the intersection of Ellicott Road and Gap Newport Pike. Accordingly, any proposed modifications to the inlets towards the improvement of water quality runoff would have to be coordinated and approved by PennDOT. It is noted that the lands contributing to that storm sewer system represent less than 10% of the drainage area and are mostly impervious. Thus, the potential to implement BMPs that would have a significant impact on reducing the pollutant loads from runoff to contributing to the MS4 would be limited.

However, since the entire Borough is designated as Urbanized, any measures implemented in the watershed that will have a benefit on improving water quality should be considered acceptable. Accordingly, the Borough is now proposing that the installation of the voluntary BMPs sponsored by the Chester County Conservation District starting back in 2003 through 2008, as detailed in the attached report be considered for acceptance by PADEP. A detailed analysis will be performed to determine the achieved load reductions from those BMP's once the parameters have been determined.

At this point it is noted that the Borough is slated to receive dedication of a 4.5 acre parcel situated in the southeastern corner of the Borough adjacent to the un-named tributary of Trout Run, which contains a pond. Dedication is subject to the owner completing the processing of the Land Development Plan for Carillon, Phase 2. This would provide an opportunity for the Borough to evaluate benefits that could be achieved by the control of runoff through the pond.

**APPENDIX F –
PUBLIC NOTICE**

610-356-9550
FAX 610-356-5032

Herbert E. MacCombie, Jr., P.E.

CONSULTING ENGINEERS & SURVEYORS, INC.
1000 PALMERS MILL ROAD
MEDIA, PA 19063

REPLY TO:
P.O. BOX 118
BROOMALL, PA 19008-0118

James W. MacCombie, P.E., P.L.S.
Herbert E. MacCombie, III, Technician

November 16, 2015

Ms. Beverly Wolfe
Classified Department
Daily Local News
Bradford Avenue and Strasburg Roads
West Chester, PA 19380

Re: Avondale Borough
TMDL Strategy Notice

Dear Ms. Wolfe:

Kindly publish the attached Public Notice for Avondale Borough in the editions of your newspaper on the following date:

Wednesday November 18, 2015

Please send two (2) copies of the Proof of Publication along with the invoice for the above to:

Rebecca Brownback, Secretary
Avondale Borough
110 Pomeroy Avenue
P.O. Box 247
Avondale, PA 19311

Please contact our office if you have any questions.

Very Truly Yours,



James W. MacCombie, P.E., P.L.S.
Borough Engineer

Copy: Rebecca brownback, Secretary

AVONDALE BOROUGH
PUBLIC NOTICE
Strategy to Address TMDL's in the Christina Watershed

Avondale Borough, Chester County has made application to PADEP for a National Pollution Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) General Permit for Stormwater Discharges from small MS4s. The Notice of Intent (NOI) contains the Total Maximum Daily Load (TMDL) Strategy for the Christina Watershed, which describes proposed measures to be taken to address impaired surface waters within the designated Urbanized Area for the Borough. The Borough is proposing stream bank stabilization, the voluntary use of rain gardens on residential lots, tree planting and to work with the agricultural industry to implement measures to improve water quality runoff to the streams. Trout Run is the impaired stream being addressed during this permit cycle. The Borough will also continue to promote Public Education and Public Participation towards the improvement of water quality.

The Strategy is available for public review at Borough Hall, 110 Pomeroy Avenue, Avondale, PA 19311 during regular business hours. Written comments from the public will be accepted for a period of 30 days from the date of this public notice. The Strategy will also be presented during the regularly scheduled Council on Tuesday December 15, 2015 at 6 p.m. at Borough Hall at which time verbal or written comments from any interested member of the public will also be accepted.