PA Municipal Separate Storm Sewer System (MS4) TMDL Plan

Instructor: Bryan Seipp, *Watershed Manager- CWP*

Lee Epstein, *Director, Lands Program- CBF*

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- Advocacy at the local, state and federal level, and help for communities
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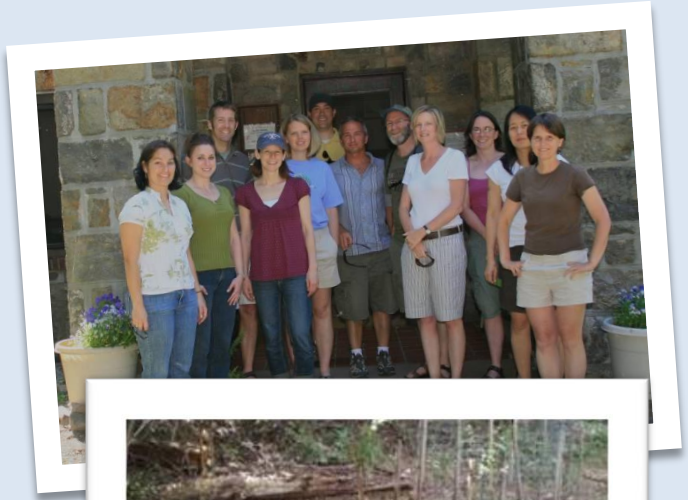

- Stormwater and watershed guidance documents
- National MS4 Expertise
- Hands-on technical assistance
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- Overview
  - Key Definitions
  - Plan Requirements
  - Getting Started
  - TMDL Evaluation
  - TMDL Design Criteria
  - Questions

• TMDL Plan Background

– Definitions

- ***Total Maximum Daily Load (TMDL)*** - "A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that load among the various sources of that pollutant. Pollutant sources are characterized as either point sources that receive a wasteload allocation (WLA), or nonpoint sources that receive a load allocation (LA)." - U.S. Environmental Protection Agency, 2011

- ***Waste Load Allocation (WLA)*** - "Amount of pollutant from existing point sources (e.g., sewage treatment plant; industrial facility; **stormwater**)." - U.S. Environmental Protection Agency, 2010

- ***Load Allocation (LA)*** - "Amount of pollutant from existing nonpoint sources and natural background (e.g., farm runoff; atmospheric mercury)." - U.S. Environmental Protection Agency, 2010

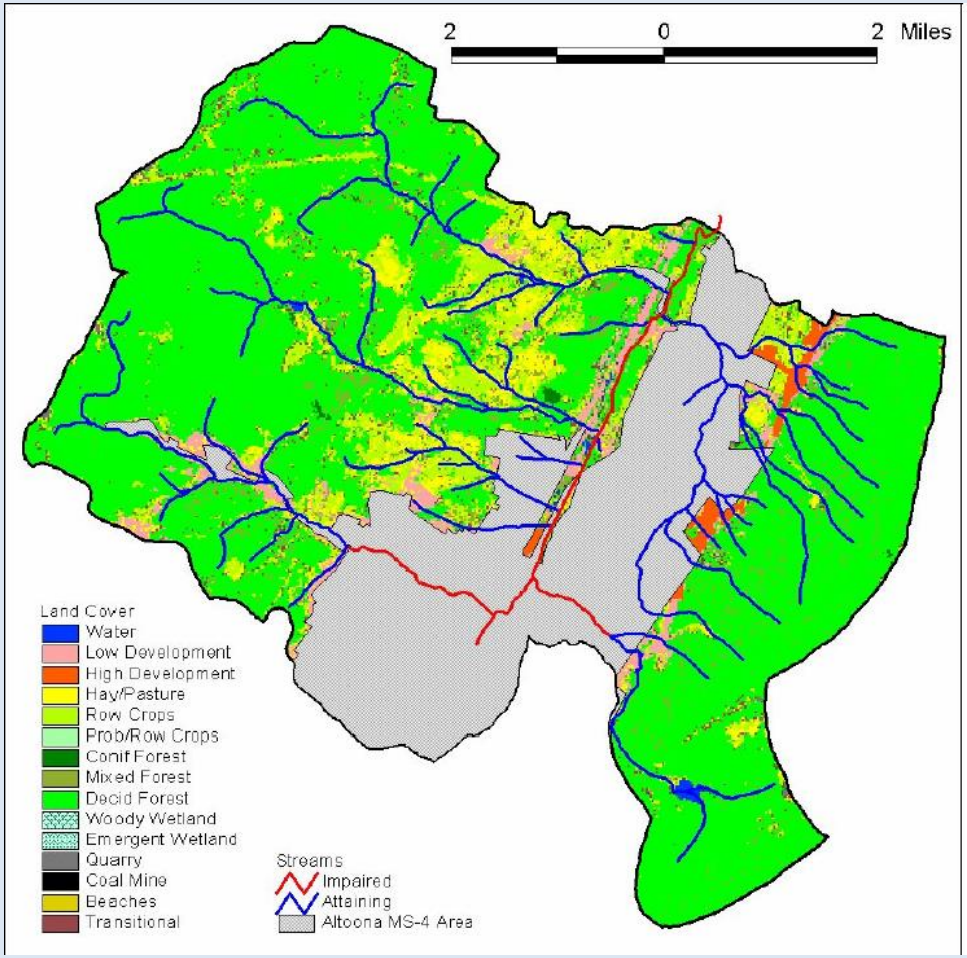
- ***Margin of Safety (MOS)*** - "Part of TMDL allocated to uncertainty in analysis." - U.S. Environmental Protection Agency, 2010

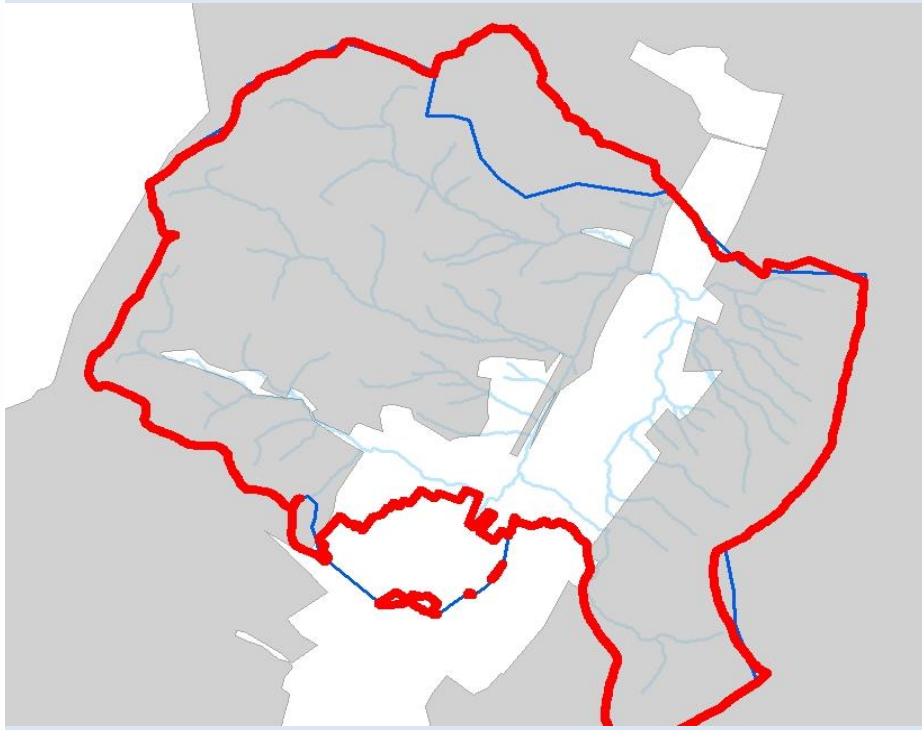
The MS4 is responsible for the quantity and quality of the water that drains INTO the MS4

- DEP TMDL Plan Requirements
  - Outlined in PA DEP "Municipal Separate Storm Sewer System (MS4) TMDL / Chesapeake Bay Pollution Reduction Plan (3800-FM-BPNPSM0493 8/20/2013)
    - Section A
      1. Summary of TMDL strategy in permit application
      2. ID surface waters that receive storm water discharges from MS4 UA
      3. ID discharge points from MS4
      4. List applicable TMDL(s)
      5. ID watershed 8 digit HUC
      6. List all municipalities subject to TMDL
      7. List pollutant(s) and WLA(s)
      8. Estimate current load and percent reduction required
      9. Explain how loads were determined
      10. List control measures

- Getting Started
  - Background information
    - TMDL Document
    - Relevant GIS data
      - Watershed
      - Streams
      - Impaired boundary
      - Impaired streams
      - Impervious Surface
      - UA boundary
      - Municipal boundary
      - Topo
      - Roads
      - Public land
      - Storm sewer data
    - Watershed Plans, Stream Assessments, etc.

- TMDL Evaluation
  - Read the TMDL document very carefully
    - What is the WLA?
    - How much area is in the impaired watershed?
    - How much is in the UA?
    - Are there any CSOs in the impaired watershed?
    - Look at pollutant loading data including; stream discharge amounts, pollutant concentrations, pollutant loads, etc.
  - Compare to available local data
    - GIS, Monitoring data, etc.
  - Where significant problems exist between local data and the TMDL document contact DEP to determine which data source to use.





CSO included in MS4, different impaired watershed boundaries

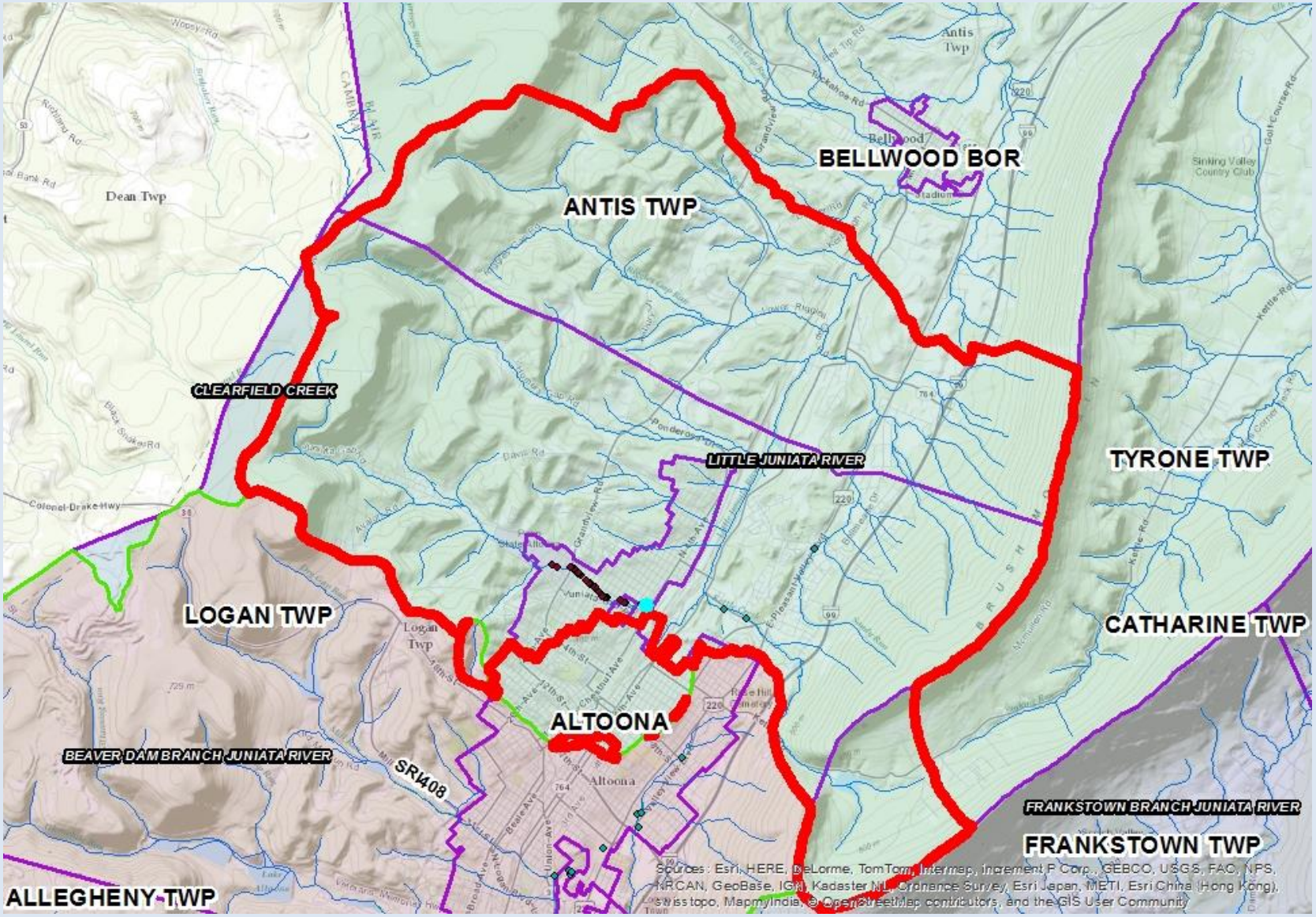
- TMDL DESIGN Detail # 1
  - Summary of TMDL strategy as submitted to DEP with NPDES permit application.
    - Summarize the contents of the TMDL strategy that was submitted to DEP as an attachment to the permit application or NOI.

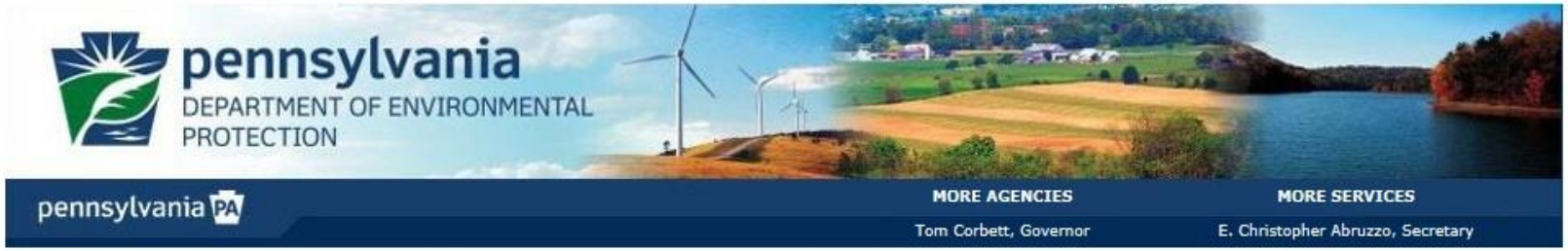
- Example (Summary from Blair County)

"The best opportunities for reaching the reduction goal established by the TMDL occur mainly through changes in current land use practices, including the incorporation of more stormwater "best management practices" (BMPs). The characteristics of the Little Juniata River Watershed are favorable for the application of most sediment reducing stormwater BMPs and retrofits. However, to determine the most appropriate BMPs, where they should be installed, and actually putting them into practice, requires the development and implementation of a comprehensive watershed restoration plan.

Development of the restoration plan will require gathering site-specific information regarding current land uses and existing conservation practices. Successful implementation of the activities necessary to address current use impairments to Little Juniata River will require integration of local citizens and private landowners."

- TMDL DESIGN DETAIL #2
  - Identify names of surface waters that receive stormwater discharges from the MS4 UA that are covered by the EPA approved TMDLs.
    - Best
      - Use GIS system and existing data layers
        - » Also make note of the tributaries to the waters that are covered by the TMDL
          - Hommers Gap Run, Spring Run
    - Good
      - Use DEP website
        - » http://www.ahs.dep.pa.gov/TMDL/


BELLWOOD BOR
ANTIS TWP
CLEARFIELD CREEK
LITTLE JUNIATA RIVER
TYRONE TWP
LOGAN TWP
CATHARINE TWP
ALTOONA
BEAVER DAM BRANCH JUNIATA RIVER
SR1408
FRANKSTOWN BRANCH JUNIATA RIVER
FRANKSTOWN TWP
ALLEGHENY TWP
Dean Twp
Antis Twp
Logan Twp
Altoona
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



Be sure to update your Favorites, Bookmarks, or shortcuts.
This application is now at http://www.ahs.dep.pa.gov/TMDL/.

Total Maximum Daily Loads

Return to Main Page

Select by TMDL Name: Little Juniata River Watershed Go

Search by County: Go

Search by Cause: Go

Search by TMDL Category: Go

Search by Status: Go

Search by HUC: Go

Keyword Search: Go

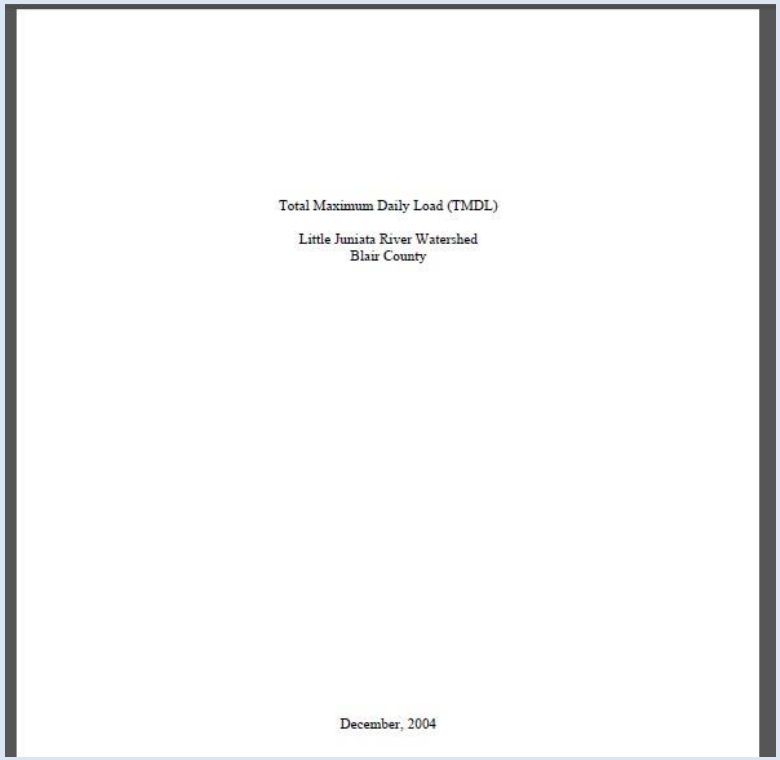
Little Juniata River Watershed		
Information	**Status**	**Links**
County: Blair **Category:** POINT SOURCE, NONPOINT SOURCE **Cause:** Cause Unknown, Organic Enrichment/Low D.O., Siltation **HUC:** 2050302	EPA Approved 4/8/2005	**TMDL:** Little Juniata River Watershed TMDL **Information:** Information Sheet for the Little Juniata River Watershed TMDL **Public Notice:** Public Notice for the Little Juniata River Watershed TMDL

- TMDL DESIGN DETAIL #3
  - Identify discharge points from the MS4
    - The TMDL process looks at the total stormwater discharges from a municipality within a particular watershed and requires the municipality to take certain actions. Therefore the municipality will need to know the location of MS4 stormwater outfalls within their municipal boundaries.
      - Identify the total number of discharges
      - Provide ID #
      - Provide location information
      - Provide pipe information
      - Provide map

Example Township				
Identification Number	Latitude	Longitude	Pipe Material	Pipe Size (in)
12	40˚44'07.08"	78˚30'50.43"	CMP	15
13	40˚44'12.13"	78˚30'44.87"	RCP Eliptical	48
14	40˚43'38.91"	78˚30'23.95"	SLCPP	18
15	40˚45'59.11"	78˚39'12.76"	RCP	36
44	40˚46'29.35"	78˚30'21.54"	SLCPP	18
50	40˚45'38.35"	78˚30'10.94"	CMP	18
53	40˚46'16.52"	78˚29'50.35"	SLCPP	24
54	40˚44'10.39"	78˚30'41.73"	SLCPP	18
55	40˚46'08.12"	78˚30'37.08	CMP	18
56	40˚46'06.88"	78˚30'32.09"	SLCPP	18
57	40˚46'05.11"	78˚30'25.27"	SLCPP	24
58	40˚43'36.27"	78˚30'27.83"	RCP	18
59	40˚43'23.69"	78˚30'20.43"	SLCPP	15
60	40˚43'25.07"	78˚30'36.39"	Unknown (debris covered)	
62	40˚44'36.19"	78˚31'20.62"	CMP	18
63	40˚44'36.10"	78˚31'19.84"	SLCPP	24
64	40˚44'36.65"	78˚31'19.84"	RCP	24
65	40˚43'48.75"	78˚30'20.03"	RCP	18
66	40˚44'09.90"	78˚31'03.33"	Open Channel	

LOGAN TWP
LITTLE JUNIATA RIVER
BEAVER DAM BRANCH JUNIATA RIVER
OT02
OT03
OT14
OT12
OT13
OT11
OT10
OT09
OT08
White Fox Rd
Cogan Rd
Juniata Springs Dr
Franklin Dr
Mauk Dr
Marjorie Rd
Dewberry Ln
Davis Rd
Gwin Rd
Alpine Ln
Juniata Gap Rd
Detrich Dr
Mccloskey Ln
Queens Way
Castle Farm Rd
Windsor Dr
Kerr Dr
Mary Ln
Laurie Ln
Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

- TMDL DESIGN DETAILS #4
  - List the title of the TMDL
    - If you do not have your TMDL document handy go to http://www.ahs.dep.pa.gov/TMDL/



Total Maximum Daily Load (TMDL)

Little Juniata River Watershed
Blair County

December, 2004

- TMDL DESIGN DETAILS #5
  - Identify the Watershed names and the 8-digit Hydrologic Code
    - This information can be found in a variety of place.
    - First
      - Look in the TMDL document, it may have the 8 digit HUC in it.
    - Second
      - If not listed in the TMDL look up the watershed and HUC code here

http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr_009715.pdf

Publicly-Owned Streambeds (*See Note on Page 6*)
by Hydrologic Unit Code 8 (HUC8) Watershed

Watershed Name	HUC8 Code	Stream Name
Bald Eagle. Pennsylvania.	**02050204**	Bald Eagle Creek
		Beech Creek
		Fishing Creek
		Marsh Creek
		Mill Creek
		Sinking Creek
		South Fork Beech Creek
		Spring Creek
Beaver. Pennsylvania.	**05030104**	Connoquenessing Creek
		Mahoning River
Brandywine-Christina. Delaware, Maryland, Pennsylvania.	**02040205**	Chester Creek
Cheat. Pennsylvania, West Virginia.	**05020004**	Cheat River
Clarion. Pennsylvania.	**05010005**	Bear Creek
		Big Mill Creek
		Clarion River
		Elk Creek
		Johnson Run
		Johnson Run
		Kay Fork
		Little Toby Creek
		Maple Creek
		Mill Creek
		Mill Creek
		Millstone Creek
		North Fork Redbank Creek
		Oyster Run
		Rattlesnake Creek
		Spring Creek
		West Branch Clarion River
		West Branch Millstone Creek
		Whetstone Branch
		Wilson Run
Conemaugh. Pennsylvania.	**05010007**	Bakers Run
		Blacklick Creek
		Conemaugh River
		Little Mahoning Creek
		North Branch Blacklick Creek
		North Branch Two Lick Creek
		Repine Run
		Sides Run
		Stonycreek River
		Two Lick Creek
		Two Lick Creek
		Yellow Creek

- TMDL DESIGN DETAILS #6
  - List the names of all municipalities subject to the TMDL within the target watershed
    - If there are multiple municipalities in the watershed subject to the TMDL there will need to be some level of cooperation in order to meet the WLA.

- TMDL DESIGN DETAILS #7
  - List the pollutants and WLA identified in the TMDL
    - Only one WLA may be provided for the pollutants
      - Municipalities will need to divide up the allocation
      - Potential ways
        - » Amount of impervious area
        - » Amount of population
        - » Amount of impaired stream miles
        - » Equal margin percent reduction (EMPR)

Component	Sediment (tons/yr)
TMDL (Total Maximum Daily Load)	9,570
WLA (Wasteload Allocation)	2,036
MOS (Margin of Safety)	957
LA (Load Allocation)	6,577
LNR (Loads Not Reduced)	407
ALA (Adjusted Load Allocation)	6,169

- TMDL DESIGN DETAIL #8
  - What is the estimated current load discharged by the MS4 for the pollutants identified in the TMDL
    - When was the TMDL written?
      - If recent the loads provided in the document may be close enough to use as current loads.
    - How were the loads calculated?
      - Many used the GWLF model (MapSheds)
        - » a GIS-based watershed modeling tool that uses hydrology, land cover, soils, topography, weather, pollutant discharges, and other critical environmental data to model sediment and nutrient transport within a watershed.
      - If based on monitoring data, follow up monitoring may need to be done if you suspect the load has changed significantly. (Blair County-Beaverdam Branch-metals TMDL).

Dissolved Runoff Coefficients (mg/L)

Rural Runoff	Dissolved N	Dissolved P
Hay/Pasture	0.75	0.15056
Cropland	2.9	0.15056
Forest	0.19	0.01
Wetland	0.19	0.01
Disturbed	0.02	0.01
Turf/Golf	0	0
Open Land	0	0
Bare Rock	0	0
Sandy Areas	0	0
Unpaved Rd	0	0

	N	P	Sed
Groundwater (mg/L)	0.65	0.02	
Tile Drain (mg/L)	15	0.1	50
Soil Conc (mg/Kg)	2000	380	
% Bank Frac (0-1)	0.25	0.25	

Nitrogen and Phosphorus Loads from Point Sources and Septic Systems

Point Source Loads/Discharge

Month	Kg N	Kg P	MGD
Jan	0.0	0.0	0.0
Feb	0.0	0.0	0.0
Mar	0.0	0.0	0.0
Apr	0.0	0.0	0.0
May	0.0	0.0	0.0
Jun	0.0	0.0	0.0
Jul	0.0	0.0	0.0
Aug	0.0	0.0	0.0
Sep	0.0	0.0	0.0
Oct	0.0	0.0	0.0
Nov	0.0	0.0	0.0
Dec	0.0	0.0	0.0

Septic System Populations

Normal	Pond	Short Cir	Direct
1530	0	60	0
1530	0	60	0
1530	0	60	0
1530	0	60	0
1530	0	60	0
1530	0	60	0
1530	0	60	0
1530	0	60	0
1530	0	60	0
1530	0	60	0
1530	0	60	0
153			

Growing season uptake (g/d)

N 1.6 P 0.4

Per C

N

Urban Buildup (kg/Ha/day)

	Area (Ha)
LD Mixed	4
MD Mixed	121
HD Mixed	531
LD Residential	403
MD Residential	993
HD Residential	212

Nitrogen

Acc Imp	Acc Perv	Dis Fract
0.095	0.015	0.33
0.105	0.015	0.33
0.11	0.015	0.33
0.095	0.015	0.28
0.1	0.015	0.28
0.105	0.015	0.28

Phosphorus

Acc Imp	Acc Perv	Dis F
0.0095	0.0021	0.4
0.0105	0.0021	0.4
0.0115	0.0021	0.4
0.0095	0.0019	0.3
0.0115	0.0039	0.3
0.012	0.0078	0.3

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Urban Land	Area (Ha)	%Imp	CNI	CNP
LD Mixed	4	0.15	92	74
MD Mixed	121	0.52	98	79
HD Mixed	531	0.87	98	79
LD Residential	403	0.15	92	74
MD Residential	993	0.52	92	74
HD Residential	212	0.87	92	74

Rural Land	Area (ha)	CN	K	LS	C	P
Hay/Pasture	1020	75	0.22	2.897	0.03	0.52
Cropland	461	82	0.227	2.328	0.42	0.52
Forest	6628	73	0.212	3.435	0.002	0.52
Wetland	27	80	0.229	0.302	0.01	0.1
Disturbed	88	89	0.231	1.518	0.08	0.1
Turf/Golf	0	0	0.0	0.0	0.0	0.0
Open Land	0	0	0.0	0.0	0.0	0.0
Bare Rock	0	0	0.0	0.0	0.0	0.0
Sandy Areas	0	0	0.0	0.0	0.0	0.0
Unpaved Road	0	0	0.0	0.0	0.0	0.0

Month	Ket	Adjust %ET	Day Hours	Grow Seas	Eros Coef	Stream Extract	Ground Extract
Jan	0.63	1.0	9.4	0	0.117	0.0	0.0
Feb	0.68	1.0	10.4	0	0.117	0.0	0.0
Mar	0.71	1.0	11.8	0	0.117	0.0	0.0
Apr	0.72	1.0	13.2	0	0.297	0.0	0.0
May	0.85	1.0	14.4	1	0.297	0.0	0.0
Jun	0.93	1.0	14.9	1	0.297	0.0	0.0
Jul	0.97	1.0	14.6	1	0.297	0.0	0.0
Aug	1.0	1.0	13.6	1	0.297	0.0	0.0
Sep	1.01	1.0	12.2	1	0.117	0.0	0.0
Oct	0.9	1.0	10.8	0	0.117	0.0	0.0
Nov	0.84	1.0	9.6	0	0.117	0.0	0.0
Dec	0.8	1.0	9.1	0	0.117	0.0	0.0

Sediment A Factor	1.1498E-03	GW Recess Coeff	0.1
Sed A Adjustment	1.0	GW Seepage Coeff	0.0
Avail Water Cap (cm)	12.22	% Tile Drained (Ag)	0.0
Sed Delivery Ratio	0.113		

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- Calculating current loads
  - Impaired watershed boundary should match the impaired watershed boundary in the TMDL document.
  - If possible use GIS adjust land-use figures
  - If possible update BMP information in Model
    - » Need fairly detailed BMP data
      - Basin volume, surface area, wet storage volume, dead storage volume
      - Amount of runoff retention, fraction of area treated
  - Make sure to include voluntary BMPs (stream restoration project, buffer plantings, etc.)

Urban Scenario BMP Editor

Detention Basins

Detention basin volume (m^3)	0
Basin dead storage (m^3)	0
Basin surface area (m^2)	0
Basin days to drain	0
Basin cleaning month	0

Stream Protection

Vegetative buffer strip width (m)	0
Fraction of streams treated (0-1)	0.0
Total streams in urban areas (km)	24.3
Streams w/bank stabilization (km)	0.0

Infiltration/Bioretention

Amount of runoff retention (cm)	0
Fraction of area treated (0-1)	0

Constructed Wetlands

Total area urban land (Ha)	2264
Fraction of area treated (0-1)	0.0

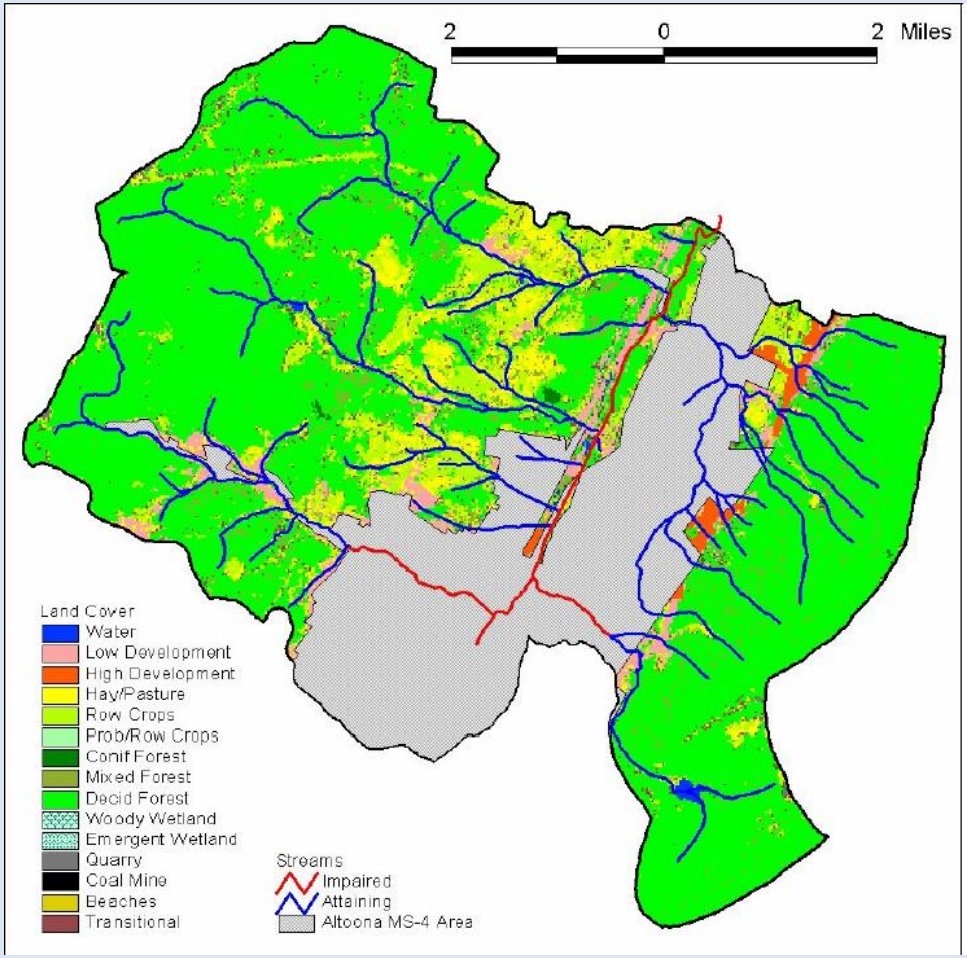
Street Sweeping

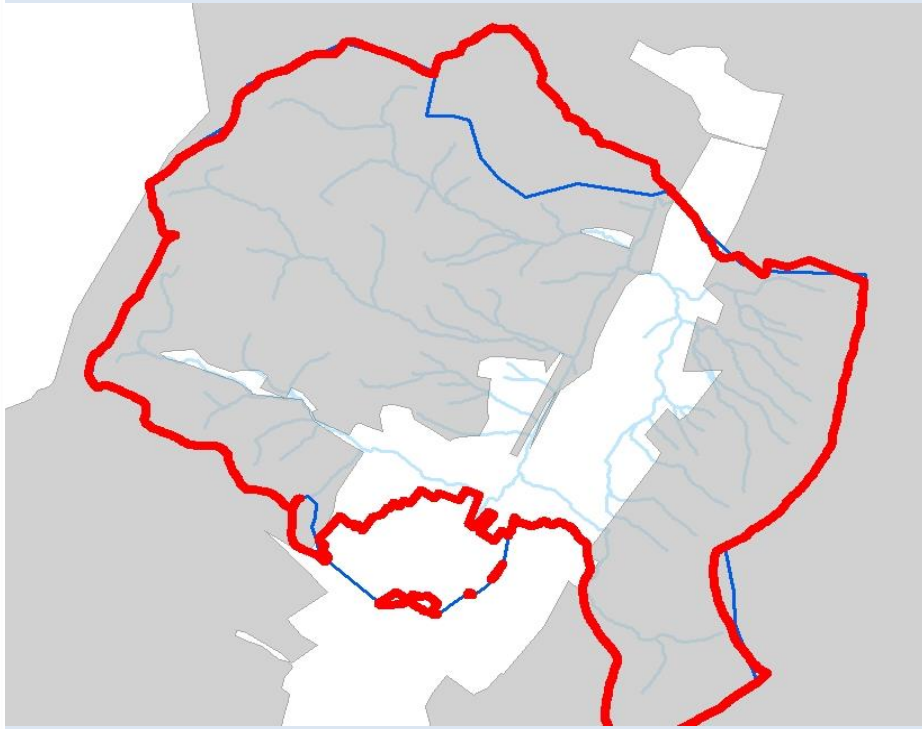
	Times/month		Times/month
January	0	July	0
February	0	August	0
March	0	September	0
April	0	October	0
May	0	November	0
June	0	December	0

Impervious Surface Reduction

	% Red	% Area		% Red	% Area
LD Mixed	0	0	LD Residential	0	0
MD Mixed	0	0	MD Residential	0	0
HD Mixed	0	0	HD Residential	0	0

Rural BMP Editor | BMP Efficiency Editor | Save File | Export to JPEG | Close


2
0
2 Miles
Land Cover
Water
Low Development
High Development
Hay/Pasture
Row Crops
Prob/Row Crops
Conif Forest
Mixed Forest
Decid Forest
Woody Wetland
Emergent Wetland
Quarry
Coal Mine
Beaches
Transitional
Streams
Impaired
Attaining
Altoona MS-4 Area



- TMDL DESIGN DETAIL #9
  - Explain how current loads were estimated
    - Take notes on assumptions you used and provide narrative and/or tables to explain
      - Existing BMP data
      - Stream restoration information
      - Changes in land-use
        - » Impervious Surface Removal
      - Monitoring procedures, dates, data, etc.
    - Easiest to use the same model to develop the TMDL to estimate current loads
      - GWLF

TMDL Load	Current Load	Reduction to achieve WLA
X lbs/yr	Y lbs/yr	Z lbs/yr

- TMDL DESIGN DETAIL #10
  - List all control measures
  - Location
  - Timeline
  - How pollutant is reduced
  - Estimate of Pollutant Load Entering BMP
  - Reduction in pollutants
  - Rational for selecting BMP
  - Description of inspection, operation, and maintenance

- TMDL Control measures

1. **Establish and Protect Riparian Forest Buffers** – restore vegetated buffer areas
2. **Disconnection Program** – Disconnect impervious areas from your regulated small MS4 system
3. **Tree Planting** – Plant trees within the area that drains to the regulated small MS4.
4. **Construct Recharge / Infiltration Facilities**
5. **Stormwater Basin Retrofits** – Naturalize or modify for extended detention, and/or modify basins for increased infiltration
6. **Restore Stream banks** – Restore and/or stabilize degraded and eroded stream banks
7. **Establish Green Infrastructure at Facilities** that are owned by the municipality and that drain to the regulated small MS4
8. **Develop and implement additional provisions to address TMDLs or a separate MS4 TMDL Stormwater Management Ordinance**
9. **Participate in an approved Trading and Offset Program**

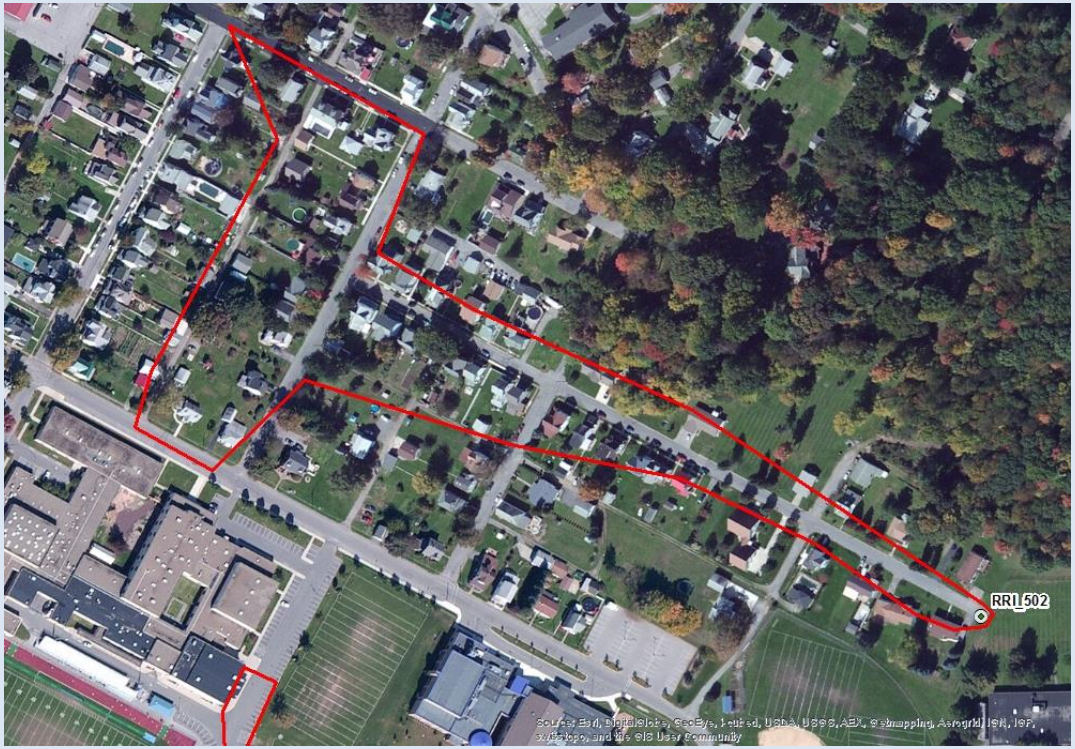
- Identification of control measure
  - Pollutant of concern
    - Examine effectiveness of BMPs for that pollutant and choose accordingly
      - Many municipalities will need to do a CB PRP as well and will need to look for practices that get TN, TP, and TSS credit as well.
  - Desktop and field reconnaissance
    - Pollution Hotspots
    - Public properties (Municipal buildings, schools, parks, etc.)
    - Right-of-ways
    - Existing stormwater basins (especially older basins and dry ponds)
    - Stream restoration opportunities
    - Institutional lands
    - Private Property
      - Disconnection Program

Targeting BMPs

- **Bioswale** – Are there any existing road or tax ditches that could be converted to bioswales?
- **Retrofits of existing practices** – Are there any existing ponds that could be retrofitted to improve performance?
- Are there any existing areas of **impervious cover** that could be converted to pervious (tree planting, landscaping, etc.) or converted to permeable pavement?
- Are there any existing **outfalls** that are in need of repair and would benefit from regenerative stormwater conveyance (RSC)?
- How many feet of stream within the town could benefit from **stream restoration** projects? The chosen stream restoration projects should be done in conjunction with upland retrofits.
- How many miles of stream or shoreline are lacking a **riparian buffer** and how many miles are feasible to plant?

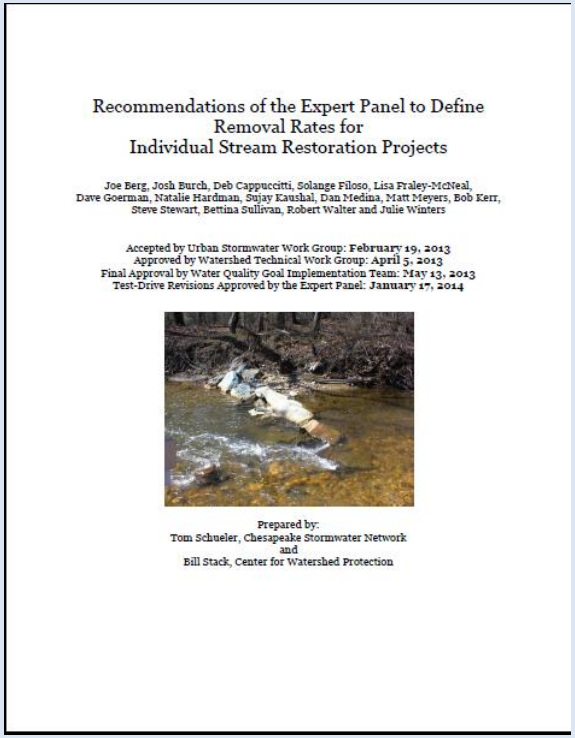
- Control measure location and pollutant load
  - Take GPS point or get lat/long coordinates from GIS or Google Earth
  - Estimate drainage area to the BMP location to calculate pollutant load to the BMP.
    - Fair- acres
    - Good- acres and % impervious
    - Best- Acres, % impervious, land use

- Calculate load into the BMP by multiplying the amount of each land-use (acres) by the land-use loading rate found in the TMDL document or in the model used for the TMDL (lbs/ac) to get pounds of pollutant into the BMP.



Pollutant Source	Area (ac)	Mean Annual Sediment Loading (tons/yr)	Mean Annual Sediment Loading Rate (tons/acre/yr)
Hay/Pasture	1576.5	178.45	0.113
Cropland	2594.6	3657.9	1.410
Coniferous Forest	59.3	0.41	0.007
Mixed Forest	899.5	11.67	0.013
Deciduous Forest	14161.6	418.04	0.030
Unpaved Roads	2.5	8.79	3.516
Quarry	29.7	39.7	1.336
Transitional Land	476.9	2782.9	5.835
Low Intensity Developed	2851.6	157.0	0.055
High Intensity Developed	1453	34.73	0.024
Stream Bank Erosion		8195.1	
Total	24105.2	15484.6	0.642

- How pollutant is reduced and reduction
  - Most BMPs have an approved efficiencies for the most common pollutants (Sediment, Nitrogen and Phosphorus).
    - PA BMP manual
      - Currently being updated
    - Chesapeake Bay Model Documentation
    - Chesapeake Bay Expert Panel Reports
    - Peer reviewed studies



Recommendations of the Expert Panel to Define Removal Rates for Individual Stream Restoration Projects

Joe Berg, Josh Burch, Deb Cappuccitti, Solange Filoso, Lisa Fraley-McNeal, Dave Goerman, Natalie Hardman, Sujay Kaushal, Dan Medina, Matt Meyers, Bob Kerr, Steve Stewart, Bettina Sullivan, Robert Walter and Julie Winters

Accepted by Urban Stormwater Work Group: February 19, 2013
Approved by Watershed Technical Work Group: April 5, 2013
Final Approval by Water Quality Goal Implementation Team: May 13, 2013
Test-Drive Revisions Approved by the Expert Panel: January 17, 2014

Prepared by:
Tom Schueler, Chesapeake Stormwater Network
and
Bill Stack, Center for Watershed Protection

- Example: Bioretention at High School Parking lot
  - Bioretention on C soils w/ underdrain
    - TSS efficiency= 55%
  - Drainage area
    - .75 acres
    - 100% impervious
    - Land use loading rate
      - » 1,814 lbs./ac./yr. – Urban impervious
    - .75 ac X 1,814 lbs./ac./yr.= **1361 lbs./yr. TSS to BMP**
  - **1361 lbs./yr. X (.55)= 749 lbs./yr.**
  - **TSS reduction credit= 749 lbs./yr.**

Rural BMP Load Reduction Efficiency Editor

BMP Type	N	P	Sed	Path
BMP 1	0.29	0.50	0.35	
BMP 2	0.08	0.22	0.30	
BMP 3	0.07	0.10	0.17	
BMP 4	0.05	0.10	0.16	
BMP 5	0.00	0.00	0.00	
BMP 6	0.29	0.44		
BMP 7	0.30	0.30	0.38	
BMP 8	0.95	0.95	0.95	
Vegetated Buffer Strips	0.41	0.40	0.53	0.70
Streambank Fencing	0.56	0.78	0.76	1.00
Streambank Stabilization	0.95	0.95	0.95	
Unpaved Road (Kg/meter)	0.03	0.0052	3.79	
AWMS (Livestock)	0.75	0.75		0.75
AWMS (Poultry)	0.14	0.14		0.14
Runoff Control	0.15	0.15		0.15
Phytase in Feed		0.21		

Urban BMP Load Reduction Efficiency

BMP Type	N	P	Sed	Path
Constructed Wetlands	0.20	0.45	0.60	0.71
Bioretention Areas	0.28	0.44	0.63	0.82
Detention Basins	0.25	0.35	0.55	0.71

Urban BMP Editor | Reset Defaults | Export to JPEG

Save File | Close

- Other BMPs to consider
  - Street sweeping
    - Can get you TSS credit
    - If your SS program has been in existence since before the TMDL you will have to INCREASE the amount of sweeping to get credit over what you were doing before the TMDL was written
      - Pre TMDL swept 400,000 lbs/yr
      - Post TMDL swept 500,000 lbs/yr
      - Only get credit for 100,000 lbs/yr
      - Only get credit for nutrient reduction if you sweep the same street 25 X per year or 2X per month

- Urban Nutrient Management
  - Managing fertilizer applications to turf
  - Not fully developed yet
  - Requires
    - Reductions in applications especially P
    - Soil tests
  - Focus on high risk areas
    - Steep slopes
    - Sandy soils
    - Buffer areas
    - Intensive use (athletic fields, golf courses, etc.)

- Develop spreadsheet or data base that provides the required information and totals the reductions.
  - Include
    - Project name
    - Location (address and/or Lat. & Long.)
    - Project measures (acres treated, feet of stream bank restoration, acres of buffer, etc.)
    - Estimated Load Reduction
    - Schedule of implementation

Project	Location	Lat/Long	Measure	Unit	Load Reduction (TSS lbs/yr)	Schedule
Bioretention	Crosstown High	40˚15’56”/ 76˚15’56”	1.22	Acres treated	533	2015
Impervious Cover Removal	Old Mall Parking lot	40˚32’25”/ 76˚12’78”	0.5	Acres	200	2014
Stream Restoration	Old County Road and Valley Rd	40˚24’88”/ 76˚17’42”	1200	feet	372,000	2018

- Appendix
  - Description of Inspection, Operation, and Maintenance of BMPs.
    - For most standard BMPs this information can easily be found in state stormwater manuals.
    - Proprietary BMPs should have information from vendor.
  - If needed include additional information on rationale for selecting BMP especially if not one of the TMDL control measures or experimental.

Questions?

bts@cwp.org

CHESAPEAKE BAY FOUNDATION
Saving a National Treasure

CENTER FOR WATERSHED PROTECTION

Mark your Calendars

Part II of the Webcast

Chesapeake Bay Pollution Reduction Plans for MS4s

June 10th at 12:00