



MS4 Program Management PRP and PCM Implementation and Tracking

Southwest Pennsylvania Commission (SPC)
Moon Township Municipal Building
Moon Township, PA 15108
May 7, 2019

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Agenda

Introduction and Background

Nutrients/Sediment Pollutant Reduction Plans (PRPs)

Pollutant Control Measures (PCMs)

Additional Considerations

Questions and Discussion



PRP and PCM Implementation and Tracking

Introduction & Background

Clean Water Act – It's about the streams

Primary purpose of the CWA:

- Protect the beneficial uses of surface waters (recreational, drinking supply, habitat, etc.)

The primary pollution **control** strategy for point sources is the National Pollutant Discharge Elimination System (NPDES)



Primary MS4 Permit Requirement

Authorization to Discharge

- 2018 PAG-13 – Discharges Not Authorized (item 6)

“The discharge is not, or will not, result in compliance with an applicable effluent limitation or water quality standard.”

The operator must, at a minimum, develop, implement, and enforce a SWMP designed to reduce the discharge of pollutants from the MS4:

- to the maximum extent practicable (MEP),
- to protect water quality, and
- to satisfy the appropriate water quality requirements of the Clean Water Act. [40 CFR 122.34(a)]

USEPA Expectations for an MS4 Permit Program

Stormwater Management for Small MS4s...are the following addressed?

- Applicability
- Limitations on Coverage
- Discharges to Water Quality Impaired Waters
- Stormwater Management Program (SWMP)
- Public Education and Outreach (MCM 1)
- Public Involvement/Participation (MCM 2)
- Illicit Discharge Detection & Elimination (MCM 3)
- Construction Site Stormwater Runoff Control (MCM 4)
- Post-Construction Stormwater Management in New Development and Redevelopment (MCM 5)
- Pollution Prevention/Good Housekeeping for Municipal Operations (MCM 6)
- Sharing Responsibility
- Reviewing and Updating SWMPs
- Monitoring
- Recordkeeping
- Reporting



PADEP MS4 Permit

3800-PM-BCW0100d 5/2016
Permit



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

PAG-13
AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR STORMWATER DISCHARGES FROM
SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4s)
APPROVAL OF COVERAGE

NPDES PERMIT NO.

In compliance with the provisions of the Clean Water Act, 33 U.S.C. Section 1251 et seq. ("the Act") and Pennsylvania's Clean Streams Law, as amended, 35 P.S. Section 691.1 et seq.,

is authorized to discharge from a regulated small municipal separate storm sewer system (MS4) located in _____, _____ County to _____ in Watershed(s) _____ in accordance with effluent limitations, monitoring requirements and other conditions set forth herein.

APPROVAL OF COVERAGE TO DISCHARGE UNDER THIS GENERAL NPDES PERMIT IS AUTHORIZED BEGINNING ON _____ . WHEN THE GENERAL PERMIT IS RENEWED, REISSUED OR MODIFIED, THE FACILITY OR ACTIVITY COVERED BY THIS APPROVAL FOR COVERAGE MUST COMPLY WITH THE FINAL RENEWED, REISSUED OR MODIFIED GENERAL PERMIT.

“Additional” PADEP MS4 Permit Requirements

----Stream Impairments----

- Total Maximum Daily Load (TMDL)
 - With applicable WLAs
- Metals and/or pH (AMD) PCMs – Appendix A
- Pathogens PCMs – Appendix B
- Priority Organic Compounds PCMs – Appendix C
- Nutrients and Sediment PRP
 - CBPRP – Appendix D
 - General – Appendix E

Acronyms

-AMD	Abandoned Mine Drainage
-CBPRP	Chesapeake Bay Pollutant Reduction Plan
-PCMs	Pollutant Control Measures
-PRP	Pollutant Reduction Plan
-WLA	Waste Load Allocation

Notes

- Priority Organic Compounds covers a variety of parameters including PCBs and pesticides.
- Nutrients are a general reference to Phosphorus and Nitrogen



PADEP MS4 Permit NOI

Surface Water Information. For each surface water body that receives stormwater discharges from the MS4, list the surface water, the furthest downstream outfall ID number, and the surface water's existing use, impairment and TMDL/WLA information in the table below. See instructions. **NOTE** – If the MS4 discharges to any surface water whose existing use is HQ or EV, the MS4 must apply for an individual permit.

Surface Water Name	Outfall No.	Ch. 93 Existing Use	Impaired?	Approved TMDL?	WLA?
Cocalico Creek	TOF002	WWF, MF	Yes	No	No
UNT Cocalico Creek "Gross Run"	OF053	WWF, MF	Yes	No	No
UNT Cocalico Creek 1385	TOF003	WWF, MF	Yes	No	No

MS4 Requirements. Are requirement(s) specified in DEP's MS4 Requirements Table for the MS4? Yes No

If Yes, summarize the requirements below by checking all boxes that apply:

- Appendix A (AMD Metals and pH)
- Appendix B (Pathogens)
- Appendix C (Priority Organic Compounds)
- Appendix D (Chesapeake Bay Nutrients/Sediment) Pollutant Reduction Plan attached to NOI
- Appendix E (Impaired Waters Nutrients/Sediment) Pollutant Reduction Plan attached to NOI

PADEP MS4 Permit NOI – PRP Attached

Lititz Run TMDL Plan / Lititz Borough and Warwick Township Pollutant Reduction Plan

Lititz, PA

Date: August 29, 2017



Prepared for:
Lititz Borough
7 South Broad Street

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PRP Content/Details – Public Participation

Comment 1

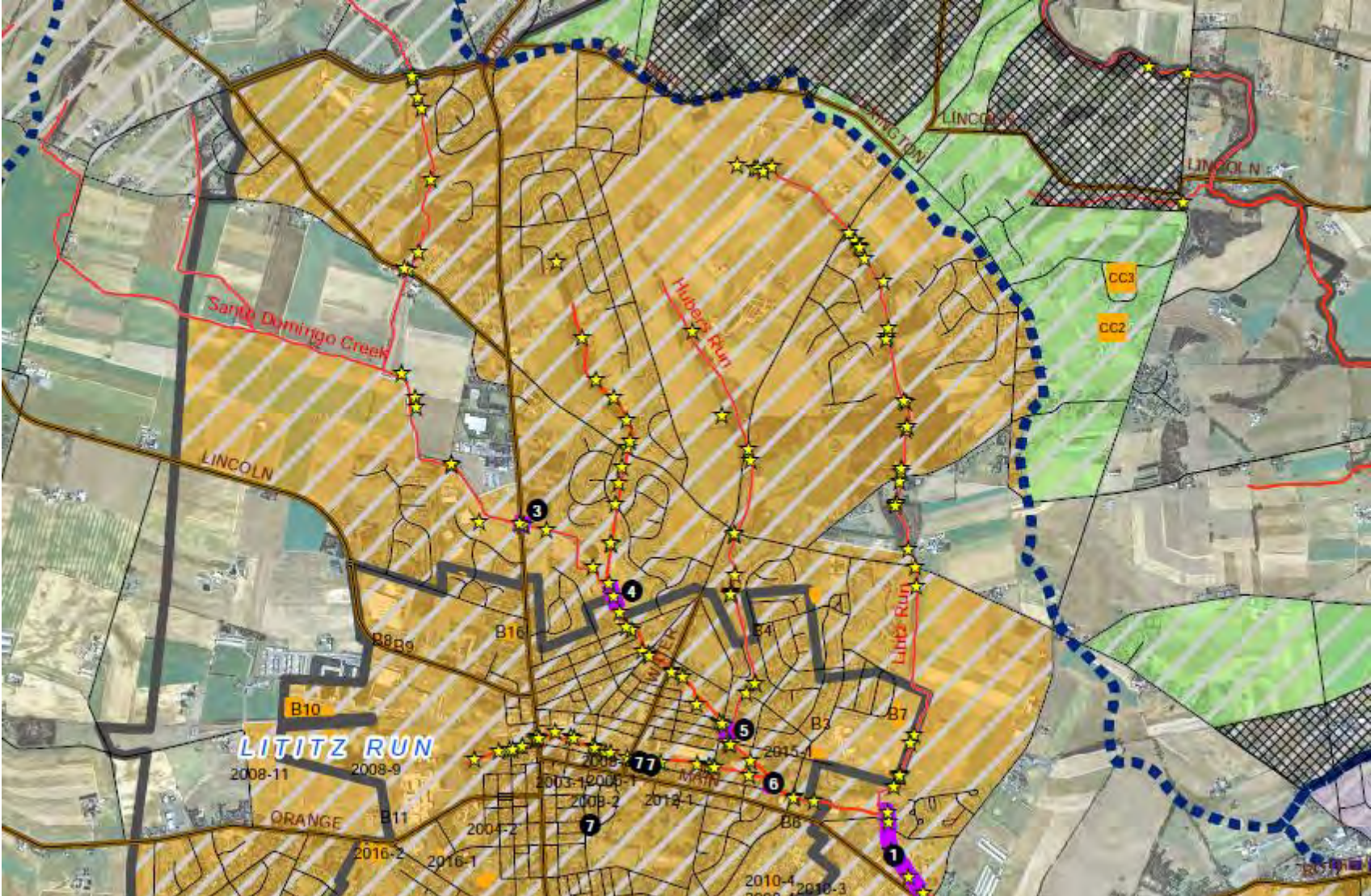
July 31, 2017 – Dan Zimmerman, Township Manager

Dan Zimmerman commented that he would like to apply sediment reductions to their PRP that will result from the implementation of riparian buffers as part of Warwick's Riparian Corridor Ordinance included in their Stormwater Management Standards. The ordinance states that a 35' riparian corridor easement shall be created and recorded as part of any subdivision or land development that encompasses a riparian corridor. The minimum management requirement is to maintain existing native vegetation and wherever practicable plant with native trees and shrubs. The riparian corridor easement shall be enforceable by the Township and shall be recorded in the Lancaster County Recorder of Deeds Office.

Record of Response

This is a viable approach that will result in sediment reductions that can be applied to the PRP. Any amendment to the PRP will include this as a BMP with an estimation of expected reductions based on implementation of previous riparian corridor easements.

PRP Content/Details – Map



PRP Content/Details – Pollutants of Concern

Table 1. Impaired Downstream Waters and Requirements

MS4 Planning Area	Applicable Municipality	Pollutant(s) of Concern
Bachman Run	Warwick Twp.	Appendix B – Pathogens (5)
New Haven Run	Warwick Twp.	Appendix B – Pathogens (5), Appendix E – Nutrients (5)
Little Conestoga Creek	Warwick Twp.	Appendix B – Pathogens (5), Appendix E – Nutrients, Siltation (5)
Lititz Run TMDL	Warwick Twp., Lititz Borough, Manhiem Twp.	TMDL Plan – Siltation, Suspended Solids, Turbidity (4a)
Lititz Run	Warwick Twp., Lititz Borough, Manheim Twp.	Appendix B – Pathogens (5),
Hammer Creek	Warwick Twp.	Appendix E – Nutrients, Siltation (5)
Conestoga River	Warwick Twp., Lititz Borough	Appendix B – Pathogens (5), Appendix E – Organic Enrichment/Low D.O., Siltation (5)
Cocalico Creek	Warwick Twp.	Appendix E – Nutrients, Siltation (5)
Chesapeake Bay Nutrients/Sediment	Warwick Twp., Lititz Borough, Manheim Township	Appendix D-Nutrients, Siltation (4a)

PRP Content/Details – Existing Loadings

TABLE 3. Lititz Run MapShed Base Model Results

Land Use	Acres	Sed.(Lb/ac)	Sed. (T/yr)	TN (lb/ac)	TN (lb/yr)	TP (lb/ac)	TP (lb/yr)
Hay/ Pasture	2,226	62.44	69.5	0.4	876.4	0.09	208.5
Row Crops	3,138	326.83	512.8	2.3	7,317.4	0.21	660.8
Forest	667	11.69	3.9	0.1	84.5	0.01	9.2
Wetland	12	16.67	0.1	0.4	4.3	0.03	0.4
Disturbed/ Transition	12	66.67	0.4	0.2	2.1	0.07	0.8
Turf/ Golf	-	-	-	-	-	0.00	-
Open Space	778	149.61	58.2	-	881.5	0.00	96.3
LD Mixed	395	12.15	2.4	0.3	126.2	0.04	14.0
MD Mixed	670	57.01	19.1	1.1	744.8	0.13	85.1
HD Mixed	605	57.19	17.3	1.1	673.3	0.13	77.0
LD Res	64	12.50	0.4	0.3	20.5	0.04	2.3
MD Res	2,558	57.15	73.1	1.1	2,844.5	0.13	325.1
HD Res	-	-	-	-	-	-	-
Subtotal	11,125		757.2		13,575.5		1,479.5
Farm Animals*			-		96,776.2		27,272.8
Streambank		2,722,000.00	1,361.0		3,198.9		1,417.6
Groundwater					248,388.7		460.6
Point Sources*			-		70,321.2		9,375.8
OLSS			0		4,124.2		47.4
Total	11,125.0	4,236,400.0	2,118.2		436,384.7		40,053.7

PRP Content/Details – Existing Loadings and Reductions

Table 9. Summary of Aggregated Existing Sediment Load and Required Reduction

	Final Existing Sediment Load - Simplified (lb)	Final Existing Load - MapShed (lb)	10% Required Sediment Reduction Simplified (lbs)	10% Required Reduction (MapShed)
Hammer Creek Planning Area - Simplified Method	214,660	n/a	21,466	118,597
Cocalico Creek Planning Area - Simplified Method				
Little Conestoga/Conestoga - Simplified Method	381,775	n/a	38,177	210,925
Lititz Run - MapShed Method	n/a	1,867,659	n/a	186,766
TOTAL				516,288

PRP Content/Details – Required Reductions and BMPs

Table 10. Summary of Proposed BMPs

BMP ID Number	BMP Project	Sediment Load Reduction (lbs)
1	Lititz Run Rd – Stream Restoration and Buffer	195,500
2	Millport Conservancy – Stream Restoration and Buffer	161,000
3	Route 501 Stream Restoration	23,000
4	Warwick Township Linear Park	51,750
5	Locust Street Stream Restoration	28,175
6	Oak Street Wetland Creation	7,188
7	Rain Gardens – Blackberry Lane and North Lane	2,200
8	Lititz Reserve Bioswale	27,331
9	Lititz Bend Riparian Buffer	15,159
10	Snavely's Mill Wetland Creation	8,969
	Total Proposed BMP Sediment Reductions	520,272
	Required BMP Sediment Reductions	516,288

PRP Content/Details – Funding

Table 15. BMP funding Sources

BMP#	Sponsor/Partner/Funding Sources
1	Warwick Township and the Lititz Run Watershed Association will seek funds to design, permit, implement, monitor and maintain the Lititz Run Rd stream restoration project.
2	The Lititz Run Watershed Association and Millport Conservancy will budget funds to design, permit, implement, monitor and maintain the Millport Conservancy stream restoration project.
3	The Route 501 stream restoration will be implemented with PennDOT funds as part of the paving project. Warwick Township will commit budget funds to monitor maintain the restoration.
4	Warwick Township will commit budget funds to design, permit, implement, monitor and maintain the Warwick Township Linear Park stream restoration.
5	Lititz Borough will use funds from Exelon that were distributed via the Lancaster County Conservation District to implement the project. Lititz Borough will monitor and maintain the Locust Street stream restoration project.
6	Lititz Borough has acquired grand funds through PADEP to implement the Oak Street wetland creation project. Budget funds will be committed to monitor and maintain the project.
7	Lititz Borough has acquired grant funding through the Lancaster County Conservation District to implement the rain gardens. Budget funds will be committed to monitoring and maintenance.
8	The Lititz Reserve developer has committed to fund the implementation, monitoring and maintenance of a portion of the bioswale designed for the development site. Monitoring and maintenance will be financed by the developer or community.
9	The Lititz Bend community developer has committed to fund the implementation, monitoring and maintenance of a 35 foot wide riparian buffer through the proposed community.
10	Snaveley's Mill has agreed to fund the design, implementation, monitoring and maintenance of a wetland to capture and treat runoff from the Mill.

PRP Content/Details – Long-term O&M

Table 16. BMP O&M Activities

BMP #	Parties Responsible for O&M	O&M Activities	Frequency for O&M Activities
1, 3, 4	Warwick Township	Monitored for stability and plant establishment and according to permit requirements	Biannual inspections for first three years and annual inspections thereafter. Additional inspections following large storm events
2	Millport Conservancy and Lititz Run Watershed Association	Monitored for stability and plant establishment and according to permit requirements	Biannual inspections for first three years and annual inspections thereafter. Additional inspections following large storm events
5-6	Lititz Borough	Monitored for stability and plant establishment and according to permit requirements	Biannual inspections for first three years and annual inspections thereafter. Additional inspections following large storm events
7	Lititz Borough	Inspection, mowing and weeding, trash cleanout	Biannual inspections for first three years and annual inspections thereafter.

Permit Issued

Re: Final NPDES Permit – MS4
Warwick Lititz Joint MS4
NPDES Permit No. PAI133547
Authorization ID No. 1216090
Lancaster County

Dear Mr. Clauser:

Your NPDES permit is enclosed. Please read the permit carefully. The permit expires on the date identified on page 1 of the permit. A renewal application must be submitted to this office 180 days prior to the permit expiration date.

The submission of Annual MS4 Status Reports is required by the permit. You must submit annual reports to the DEP office that issued the permit by September 30th of each year to describe activities conducted under the permit during the period of July 1 – June 30. You must also submit an annual fee to DEP's Bureau of Clean Water by the anniversary of the effective date of the permit.

You are required to comply with the Pollutant Control Measures (PCMs) contained in Appendix(ces) B for the surface waters identified in DEP's MS4 Requirements Table (see www.dep.pa.gov/MS4). You are required to submit to DEP the following: 1) a storm sewershed map for outfalls that discharge to the impaired surface waters; 2) an inventory of all suspected and known sources of the pollutant(s) of concern within the storm sewershed(s); and 3) a report documenting an investigation of each suspected source. Deadlines for submission of this

PRP Review Letters

DEP has reviewed your PRP/TMDL Plan(s). DEP offers the following comments and recommendations based on the review, which will be evaluated by DEP during the permit term:

1. Please ensure that drainage areas to BMPs that were used to calculate load reductions are not parsed. Loading generated in parsed areas should not be included in BMP calculations. Revise calculations accordingly.
2. The plan proposes to construct a bioswale with a 130.8-acre drainage area. While design details are not required at this time, please ensure that the final design adheres to the guidelines in the Stormwater BMP Manual (or similar resource).
3. Your plan proposes stream restoration BMPs. Please be advised that the final designs for stream restoration BMPs should be in general accordance with DEP's "Considerations of Stream Restoration Projects" document, available at www.dep.pa.gov/ms4.
4. The plan is proposing to install a riparian buffer as a part of the Lititz Bend community land development. Please be advised that if the buffer is constructed under a Chapter 102 permit, the buffer can only take credit for the excess reduction above and beyond regulatory requirements.
5. In accordance with current Chesapeake Bay Program guidelines, riparian buffers generally may treat a maximum area equal to twice the proposed buffer area (i.e., twice the length multiplied by buffer width) for sediment. A site-specific evaluation may justify the treatment of a larger drainage area.

During the permit term, DEP will evaluate your progress in implementing the PRP/TMDL Plan(s).

PRP Review Letters (another example)

DEP has reviewed your Pollutant Reduction Plan(s) (PRP(s)). Your PRP(s) are hereby approved. The following elements of your PRP(s) will be evaluated by DEP during the permit term:

- There is no PRP Planning Area shown on the map which is outside of the Urbanized Area, nor is there any discussion of such Planning Area in the text. The PRP Planning Area can include areas outside the Urbanized Area which drain into the MS4. Please address this issue and make any needed changes to the map and loading calculations.
- Existing and proposed BMPs were used as credit to reduce the baseline load. Please confirm that the drainage areas being treated by the existing BMPs are included in the existing load calculations. Any areas that are not included in the existing load calculations can't be used to reduce the baseline load.
- The plan states that there were pockets of medium-density residential land that does not drain to any type of MS4 infrastructure, but drain as incidental dispersion into surrounding lands. These areas were parsed out of the Planning Area. Any stormwater that enters the UA and is upstream of MS4 infrastructure is assumed to discharge to a surface water at some point. Therefore, areas of incidental dispersion may not be parsed. Please make any needed changes to the map and loading calculations.
- The PRP is proposing a riparian buffer project, to meet the reduction requirements. Please be advised that in accordance with current Chesapeake Bay Program guidelines, a buffer may treat a maximum area equal to twice the proposed buffer area (i.e. twice the length multiplied by buffer width). However, a site-specific evaluation may justify the treatment of a larger drainage area. If necessary, please revise the calculations to reduce the treated area, and/or provide a site-specific evaluation.
- Your plan proposes a stream restoration BMP. Please be advised that the final designs for stream restoration BMPs should be in general accordance with DEP's "Considerations of Stream Restoration Projects" document, available at www.dep.pa.gov/ms4.

PRP and PCM Implementation and Tracking

Pollutant Reduction Plans (PRPs)

Acceptable Nutrients/Sediment Reduction BMPs



Facility/BMP selection

- Basin retrofits
- Infiltration basins/trenches
- Filter strips
- Rain gardens
- Bioswales
- Permeable pavement
- Vegetated channels
- Street sweeping
- Hydrodynamic structures
- Flow-through facilities (filter strip/vegetated channel hybrid)
- Stream/floodplain restoration
- ...and so on



Locust Street "Bump-Outs", Lititz, PA

Planning Reductions

3800-PM-BCW0100m 5/2016
 BMP Effectiveness Values

BMP Name	BMP Effectiveness Values			BMP Description
	TN	TP	Sediment	
Permeable Pavement w/ Sand or Veg. (A/B Soils w/o underdrain)	80%	80%	85%	Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has no underdrain, has sand and/or vegetation and is in A or B soil.
Permeable Pavement w/ Sand or Veg. (C/D Soils w/ underdrain)	20%	20%	55%	Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. This BMP has an underdrain, has sand and/or vegetation and is in C or D soil.
★ Stream Restoration	0.075 lbs/ft/yr	0.068 lbs/ft/yr	44.88 lbs/ft/yr	An annual mass nutrient and sediment reduction credit for qualifying stream restoration practices that prevent channel or bank erosion that otherwise would be delivered downstream from an actively enlarging or incising urban stream. Applies to 0 to 3rd order streams that are not tidally influenced. If one of the protocols is cited and pounds are reported, then the mass reduction is received for the protocol.
Forest Buffers	25%	50%	50%	An area of trees at least 35 feet wide on one side of a stream, usually accompanied by trees, shrubs and other vegetation that is adjacent to a body of water. The riparian area is managed to maintain the integrity of stream channels and shorelines, to reduce the impacts of upland sources of pollution by trapping, filtering, and converting sediments, nutrients, and other chemicals. (Note – the values represent pollutant load reductions from stormwater draining through buffers).

The BMP effectiveness values for tree planting are estimated by DEP DEP

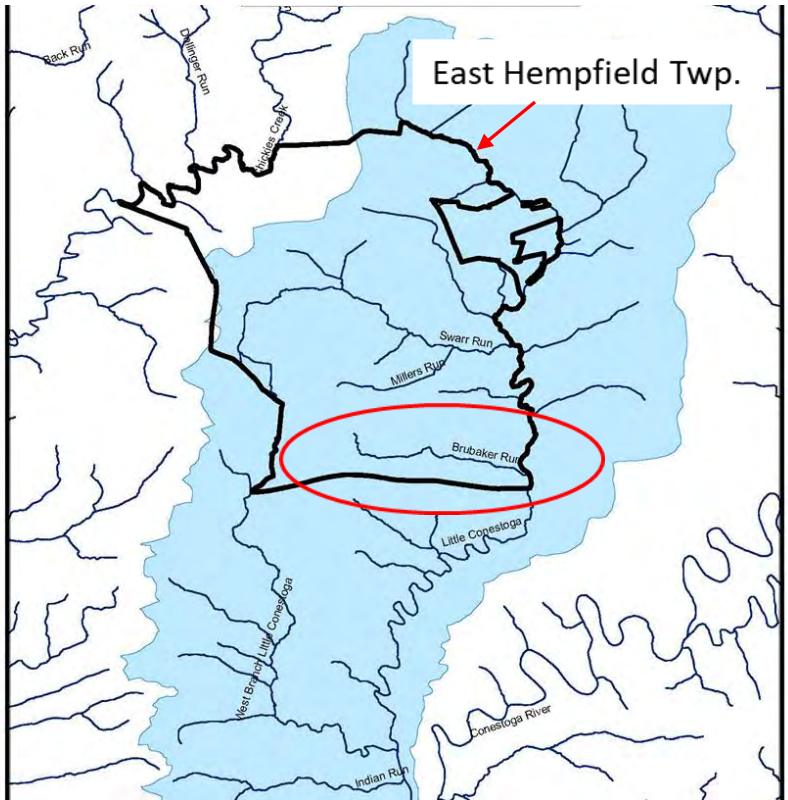


Sediment reduction (MapShed): 115 lbs/ft/yr

Shifting Gears...



Stream/Floodplain Restoration Example: Brubaker Run



Stream/Floodplain Restoration Example: Brubaker Run

	Default Rate Calculations	Sediment (lb/yr)
Brubaker Run Floodplain Restoration Base Sediment Reduction	4,350 ft. restored x 115 lb/ft* =	500,250
Sediment Load Anticipated from Lime Spring Square Development	98.16 ac** x 65.2 lb/ac*** =	6,400
Net Brubaker Run Sediment Reduction	500,250 lb/yr – 6,400 lb/yr =	493,850

*Default load reduction rate for stream restoration projects

**Total acreage of Lime Spring Square project (includes restored floodplain)

***Per-acre loading for medium density mixed land use based on MapShed output

NOTE: required township planning reduction is 708,386 lbs/yr (sediment)

But remember...

From PRP review letter:

- Your plan proposes a stream restoration BMP. Please be advised that the final designs for stream restoration BMPs should be in general accordance with DEP's "Considerations of Stream Restoration Projects" document, available at www.dep.pa.gov/ms4.

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

- Protocol 1: Bank Erosion Reduction
- Protocol 2: Nitrogen Processing
- Protocol 3: Treatment of Upstream Runoff

Protocol 1

- Estimate of Existing Bank Erosion Rates
 - BANCS Assessment
 - Monitoring
 - Bank Pins
 - Cross Section Surveys
 - “Alternative Monitoring Approach”
- Estimate Nutrient Loading Based on Sediment Loading Rate
 - 2.28 lb N/ T Sed
 - 1.05 lb P/ T Sed
 - Or use Soil Test Results

- **BANCS** (Bank Assessment for Non-Point Source Consequences of Sediment)
 - BEHI (Bank Erosion Hazard Index) – Susceptibility of the stream bank to erosion
 - NBS (Near Bank Shear Stress) – Erosive forces experienced by the stream bank
 - Bank Erosion Rate = Fxn(BEHI, NBS)

Stream/Floodplain Restoration Example: Brubaker Run



Stream/Floodplain Restoration Example: Brubaker Run



Protocol 2

- Nitrogen Processing in the Hyporheic Zone

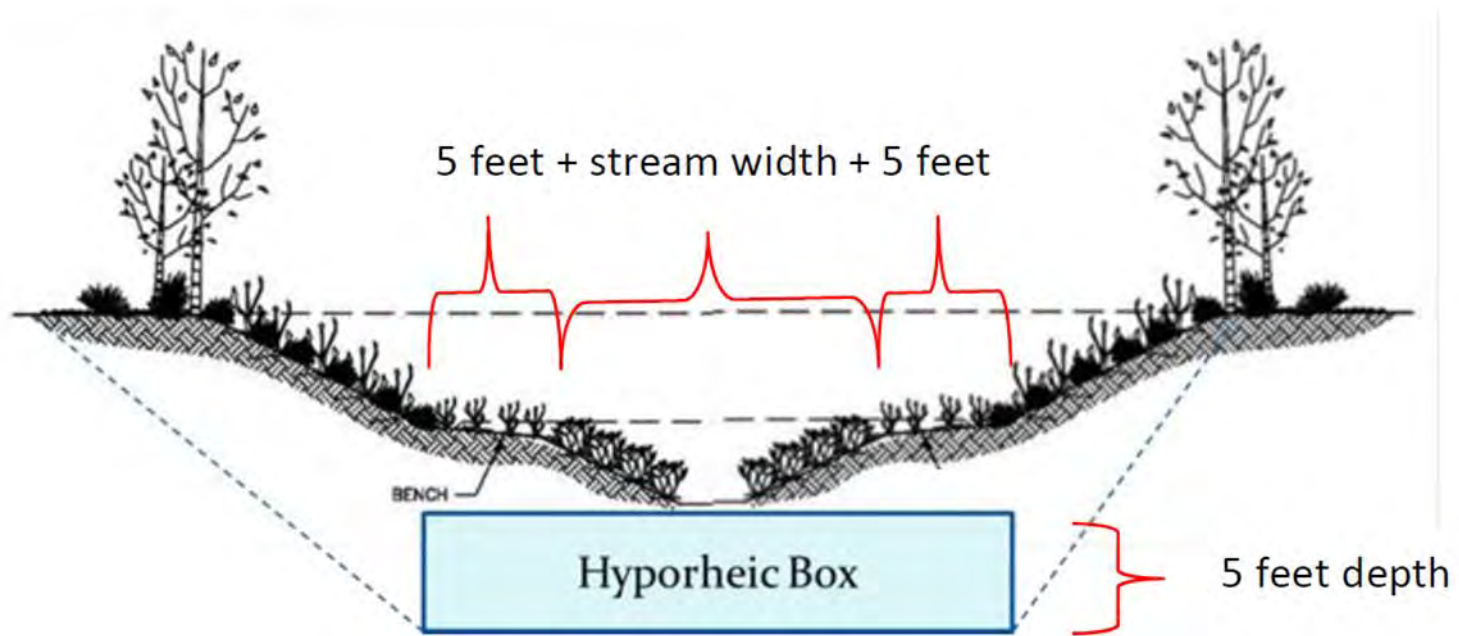


Figure 2. Hyporheic box that extends the length of the restored reach

Protocol 3

- Filtration of upstream runoff
 - Occurs when overbank flow is less than 1' deep
 - Statistical analysis of runoff response of continuous rainfall data set
 - Removal efficiency is derived based on % of annual rainfall treated
 - Limited by area ratio of active floodplain area to watershed area
- Typically represents less than 5% of total sediment reduction

Stream/Floodplain Restoration Example: Brubaker Run

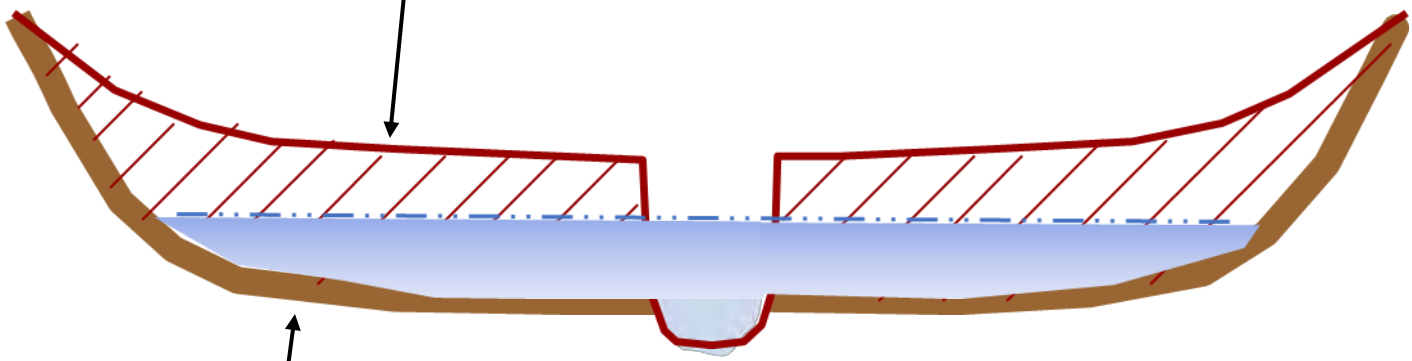
Expert Panel Report Load Reduction Protocol	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (lb/yr)
Protocol 1**	2,191	303	1,043,130
Protocol 2	3,479	N/A	N/A
Protocol 3	651	27	14,873
Total	6,320	330	1,058,003

- Planning Est.: 500,250 lbs/yr
- “Reality”: 1.058 million lbs/yr

Protocol 1

What Justifies a higher efficiency?

Existing Floodplain



Restored Floodplain



Hidden gems...



Stream/Floodplain Restoration Example: Brubaker Run

Expert Panel Report Load Reduction Protocol	Nitrogen (lb/yr)	Phosphorus (lb/yr)	Sediment (lb/yr)
Protocol 1*	1,643	227	782,348
Protocol 2	3,479	N/A	N/A
Protocol 3	651	27	14,873
Total	5,773	254	797,221

*Includes "75% efficiency"

Stream/Floodplain Restoration Example: Brubaker Run

- East Hempfield Township, Lancaster County
- 98 acre Commercial Development (Lime Spring Square)
- Township-owned parcel at upstream end of project reach
- Public-Private Partnership (Funded by Private Developer)



Stream/Floodplain Restoration Example: Brubaker Run

	Final Calculations	Sediment (lb/yr)
Brubaker Run Floodplain Restoration Base Sediment Reduction	Expert Panel Protocols 1, 3*	797,221
Sediment Load Anticipated from Lime Spring Square Development	98.16 ac** x 65.2 lb/ac*** =	6,400
Net Brubaker Run Sediment Reduction	797,221 lb/yr – 6,400 lb/yr =	790,821

*Based on BANCS assessment (Protocol 1) and treatment of runoff from upstream (Protocol 3)

**Total acreage of Lime Spring Square project (includes restored floodplain)

***Per-acre loading for medium density mixed land use based on MapShed output

Brubaker Run Summary

- Township required sediment reduction: 708,386 lbs/yr
- Planning estimate for Brubaker Run sediment reductions: 493,850 lbs/yr
- “Actual” sediment reductions for Brubaker Run: 790,821 lbs/yr
- Appropriate project implementation process has led the township from needing multiple projects to achieve required reductions to ONE project.



Urban/Suburban

- Define Removal Rates for Disconnecting Runoff from Impervious Areas onto Amended Soils or Treatment in the Stormwater Conveyance System
- Define BMP Effectiveness for Urban Tree Canopy Expansion
- Define Removal Rates for Street and Storm Drain Cleaning Practices

Agricultural

- Animal Waste Management Systems in the Phase 6 Model
- Define Removal Rates for Nutrient Management Practices
- Define Removal Rates for Conservation Tillage Practices

Other

- Define Removal Rates for Oyster Aquaculture Operations
- Define Removal Rates for Shoreline Management Practices
- Define Removal Rates for Individual Stream Restoration Projects

Another Restoration Example: Herr Mill Bridge

- Stream restoration/streambank stabilization project on private property included in three PRPs (joint project between 2 townships and 1 borough).
- Planning stage estimate:
 - 900 feet of restored stream and stabilized streambanks
 - 900' x 115 lbs/ft = 103,500 lbs sediment (total reduction)
- Original planning estimate for reductions (share of reductions):
 - WLT: 60% of reductions (62,100 lbs, nearly satisfies total reduction required)
 - ELT: 27.5% of reductions (28,463 lbs, satisfies total reduction required)
 - SB: 12.5% of reductions (12,938 lbs, contributes portion of reductions needed)
- Reportable total sediment reductions achieved (**post-Protocols**): 198,000 lbs:
 - WLT: 118,800 lbs
 - ELT: 54,450 lbs
 - SB: 24,750 lbs
- Design/permitting/construction: \$230,000 (\$1.16/lb. reduction)
- Maintenance: first 3 years (ELT), landowner will then assume responsibilities

Another Restoration Example: Herr Mill Bridge



Implemented BMP Example: Oak Street Wetland Pockets



Implemented BMP Example: Oak Street Wetland Pockets

Table 10. Summary of Proposed BMPs

BMP ID Number	BMP Project	Sediment Load Reduction (lbs)
1	Lititz Run Rd – Stream Restoration and Buffer	195,500
2	Millport Conservancy – Stream Restoration and Buffer	161,000
3	Route 501 Stream Restoration	23,000
4	Warwick Township Linear Park	51,750
5	Locust Street Stream Restoration	28,175
6	Oak Street Wetland Creation	7,188
7	Rain Gardens – Blackberry Lane and North Lane	2,200
8	Lititz Reserve Bioswale	27,331
9	Lititz Bend Riparian Buffer	15,159
10	Snaveley's Mill Wetland Creation	8,969
	Total Proposed BMP Sediment Reductions	520,272
	Required BMP Sediment Reductions	516,288

Implemented BMP Example: Oak Street Wetland Pockets

BMP 6: Oak Street Wetland Creation

The Oak Street wetland creation will be implemented adjacent to Lititz Run west of Oak Street in Lititz Borough. A restoration waiver for this project has already been submitted and approved. Bank heights are approximately 3-4' high and vertical through this reach. The purpose of the project is to create floodplain wetlands. A floodplain wetland complex will be excavated on the north side of the stream to relieve the stresses on the banks above the bridge while providing a biologically diverse, high quality wetland which will provide biological treatment of storm flows from Lititz Run. The proposed project site is an accumulation of legacy sediment that has been formed by the dam for S.E. Keller's Carding Mill. The wetland will alleviate stress on approximately 125 feet of streambank. A sediment removal of 57.5 lb./ft of stream bank protected by the wetland (half of the 115 lb/ft value) was applied to this project.



Implemented BMP Example: Oak Street Wetland Pockets



August 31, 2018 (10.5" rain in ~4.0-4.5 hours)



Implemented BMP Example: Oak Street Wetland Pockets



Implemented BMP Example: Oak Street Wetland Pockets

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NEW BMPs FOR PRP/TMDL PLAN IMPLEMENTATION

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

BMP No.	BMP Name	DA (ac)	% Imp.	BMP Extent	Units	Latitude	Longitude	Date Installed or Implemented	Planning Area?	Ch. 102?	Annual Sediment Load Reduction (lbs/yr)
6	Oak Street Wetland Creation			0.78	ac.	40° 9' 21"	76° 17' 35"	Summer 2018	<input checked="" type="checkbox"/>	<input type="checkbox"/>	7,188
						° ' "	° ' "		<input type="checkbox"/>	<input type="checkbox"/>	
						° ' "	° ' "		<input type="checkbox"/>	<input type="checkbox"/>	
						° ' "	° ' "		<input type="checkbox"/>	<input type="checkbox"/>	

BMP INVENTORY FOR PRP/TMDL PLAN IMPLEMENTATION

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

BMP No.	BMP Name	DA (ac)	% Imp.	BMP Extent	Units	Latitude	Longitude	Date Installed	Annual Sediment Load Reduction (lbs/yr)	Date of Latest Inspection	Satisfactory?
						° ' "	° ' "				<input type="checkbox"/>
						° ' "	° ' "				<input type="checkbox"/>
						° ' "	° ' "				<input type="checkbox"/>
						° ' "	° ' "				<input type="checkbox"/>
						° ' "	° ' "				<input type="checkbox"/>

PRP and PCM Implementation and Tracking

Pollutant Control Measures (PCMs)

Pollutant Control Measures (PCMs): Metals and/or pH

APPENDIX A

POLLUTANT CONTROL MEASURES FOR WATERS IMPAIRED BY METALS AND/OR pH ASSOCIATED WITH ABANDONED MINE DRAINAGE (AMD)

The permittee shall implement the following Pollutant Control Measures (PCMs) within the storm sewershed of any outfall that discharges to waters impaired due to metals (Iron, Manganese, Aluminum and others as applicable) and/or acidity (low pH) associated with Abandoned Mine Drainage (AMD), regardless of whether there is an approved TMDL.



Abandoned Mine Drainage (AMD)



Pollutant Control Measures (PCMs): Metals and/or pH

Allegheny County

				Spruce Run	Appendix E-Organic Enrichment/Low D.O., Siltation (5)
BALDWIN BORO	PAG136128	Yes	TMDL Plan	Unnamed Tributaries to Monongahela River	Appendix E-Siltation (5)
				Unnamed Tributaries to Humms Run	Appendix A-Metals (4a), Appendix E-Siltation (5)
				Streets Run	Appendix A-Metals (4a), Appendix E-Siltation (5)
				Sawmill Run Nutrients	TMDL Plan-DO/BOD, Nutrients, Organic Enrichment/Low D.O., Siltation (4a)
				Sawmill Run AMD and Sediment	TMDL Plan-Siltation (4a)
					Appendix A-Metals, pH (4a)
				Peters Creek	Appendix A-Metals (4a), Appendix B-Pathogens (5)
				Ohio River	Appendix C-PCB (4a), Appendix B-Pathogens (5)
				Monongahela River	Appendix C-PCB (4a), Appendix B-Pathogens (5)
				Lick Run	Appendix A-Metals (4a), Appendix B-Pathogens (5)
Glass Run	Appendix A-Metals (4a), Appendix E-Siltation (5)				
BALDWIN TWP	PAG136115	No		Ohio River	Appendix C-PCB (4a), Appendix B-Pathogens (5)
				Sawmill Run	Appendix A-Metals (4a), Appendix E-DO/BOD, Nutrients, Organic Enrichment/Low D.O. (4a)

*Others: Bethel Park Boro, Carnegie, Collier Twp., East McKeesport, Etna Boro, Findlay Twp., Heidelberg, Indiana Twp., Moon Twp., Oakdale Boro, Stowe Twp.

* Not an exhaustive list

Pollutant Control Measures (PCMs): Pathogens

APPENDIX B

POLLUTANT CONTROL MEASURES FOR WATERS IMPAIRED BY PATHOGENS

The permittee shall implement the following Pollutant Control Measures (PCMs) within the storm sewershed of any outfall that discharges to waters impaired due to Pathogens (e.g., Fecal Coliform), regardless of whether there is an approved TMDL:



Pollutant Control Measures (PCMs): Pathogens

Beaver County

MS4 Name	NPDES ID	Individual Permit Required?	Reason	Impaired Downstream Waters or Applicable TMDL Name	Requirement(s)
Beaver County					
ALIQUIPPA CITY	PAG136334	No		Logtown Run (Unt 63764)	Appendix E-Organic Enrichment/Low D.O., Siltation (5)
				Ohio River	Appendix C-PCB (4a), Appendix B-Pathogens (5)
				Unnamed Tributaries to Ohio River	Appendix E-Siltation (5)
				Logtown Run (Unt 63765)	Appendix E-Organic Enrichment/Low D.O., Siltation (5)
				Logtown Run	Appendix E-Organic Enrichment/Low D.O., Siltation (5)
				Logtown Run (Unt 63762)	Appendix E-Organic Enrichment/Low D.O., Siltation (5)
				Logtown Run (Unt 63768)	Appendix E-Organic Enrichment/Low D.O., Siltation (5)
AMBRIDGE BORO	PAG136172	No		Ohio River	Appendix C-PCB (4a), Appendix B-Pathogens (5)
				Unnamed Tributaries to Ohio River	Appendix E-Siltation (5)
BADEN BORO	PAG136304	No		Ohio River	Appendix C-PCB (4a), Appendix B-Pathogens (5)
BEAVER BORO	PAG136171	No		Twomile Run	Appendix E-Siltation (5)
				Ohio River	Appendix C-PCB (4a), Appendix B-Pathogens (5)

*Others: Beaver Falls, Brighton Twp., Conway Boro, Freedom, Independence Twp., New Sewickley Twp., Ohionville, Rochester, White Twp.

* Not an exhaustive list

Pollutant Control Measures (PCMs): Priority Organic Compounds

APPENDIX C

POLLUTANT CONTROL MEASURES FOR WATERS IMPAIRED BY PRIORITY ORGANIC COMPOUNDS

The permittee shall implement the following Pollutant Control Measures (PCMs) within the storm sewershed of any outfall that discharges to waters impaired due to Priority Organic Compounds, including but not limited to Polychlorinated Biphenyls (PCBs), Pesticides, and any other organic compound listed at 40 CFR Part 423, Appendix A, regardless of whether there is an approved TMDL:



Pollutant Control Measures (PCMs): Priority Organic Compounds

Washington County

MS4 Name	NPDES ID	Individual Permit Required?	Reason	Impaired Downstream Waters or Applicable TMDL Name	Requirement(s)
Washington County					
ALLENPORT BORO	PAG136111*	No		Monongahela River	Appendix C-PCB (4a)
AMWELL TWP	PAG136206*	No		Bane Creek	Appendix E-Siltation (5)
				Little Tenmile Creek	Appendix E-Siltation (5)
				Chartiers Creek	Appendix A-Metals (4a), Appendix C-Pesticides (4a), Appendix B-Pathogens (5), Appendix E-Nutrients, Siltation (5)
BENTLEYVILLE BORO	PAG136337	No		Pigeon Creek	Appendix E-Organic Enrichment/Low D.O., Siltation (5)
BUFFALO TWP		No		Unnamed Tributaries to Buffalo Creek	Appendix E-Nutrients, Siltation (5)
CALIFORNIA BORO		No		Lilly Run	Appendix E-Siltation (5)
				Monongahela River	Appendix C-PCB (4a)

*Others: Canonsburg Boro, Carroll Twp., Donora, Fallowfield Twp., Speers Boro, Stockdale, Union Twp, West Brownsville

* Not an exhaustive list

Monongahela River PCB/Chlordane TMDL

3/7/01

Total Maximum Daily Load

PCB and Chlordane

Monongahela River

Maxwell Lock and Dam to Lock and Dam 4 at Monessen &
Lock and Dam 2 to Mouth

Fayette, Washington and Allegheny Counties



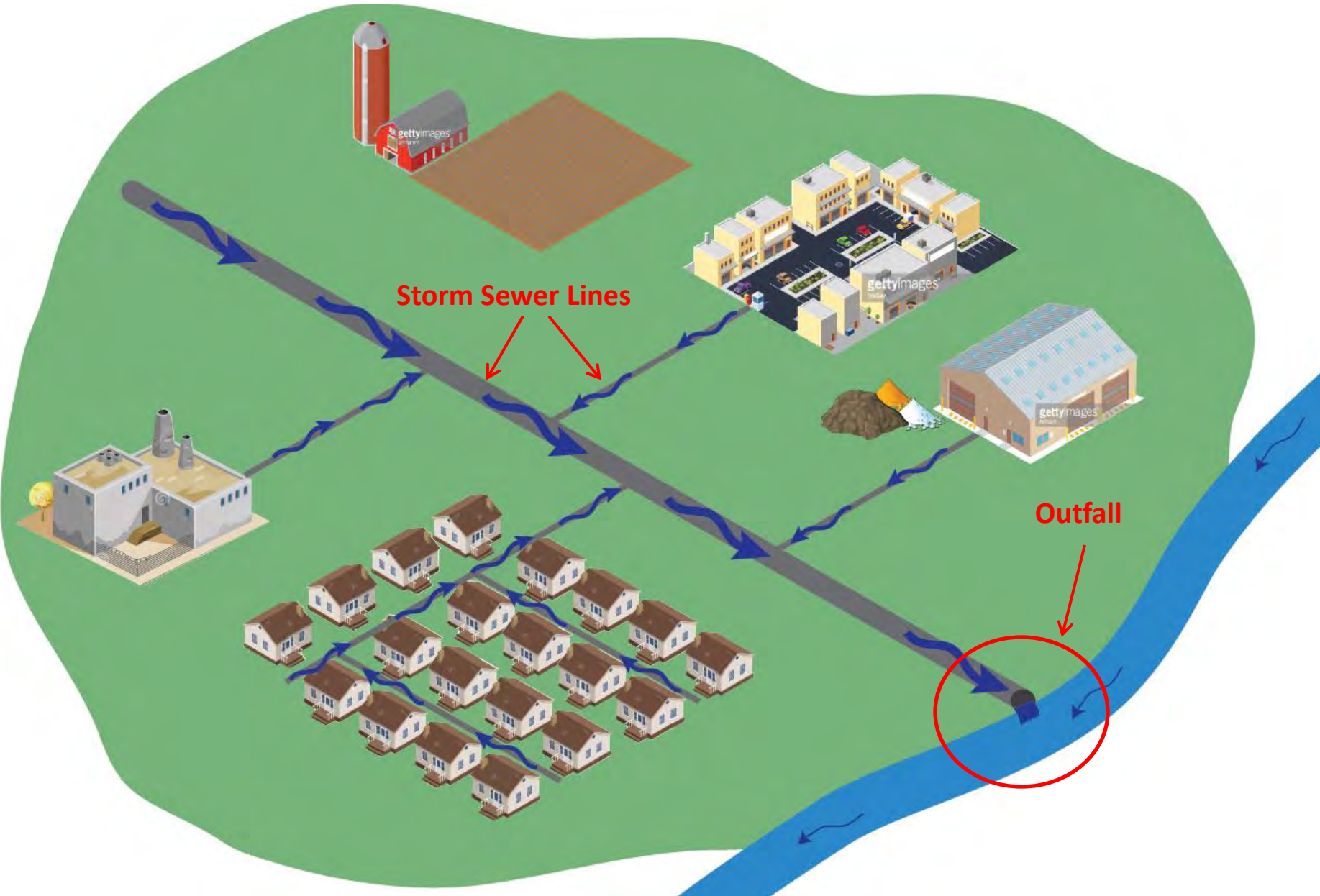
Pollutant Control Measures (PCMs): Metals and/or pH

A. Map and Inventory.

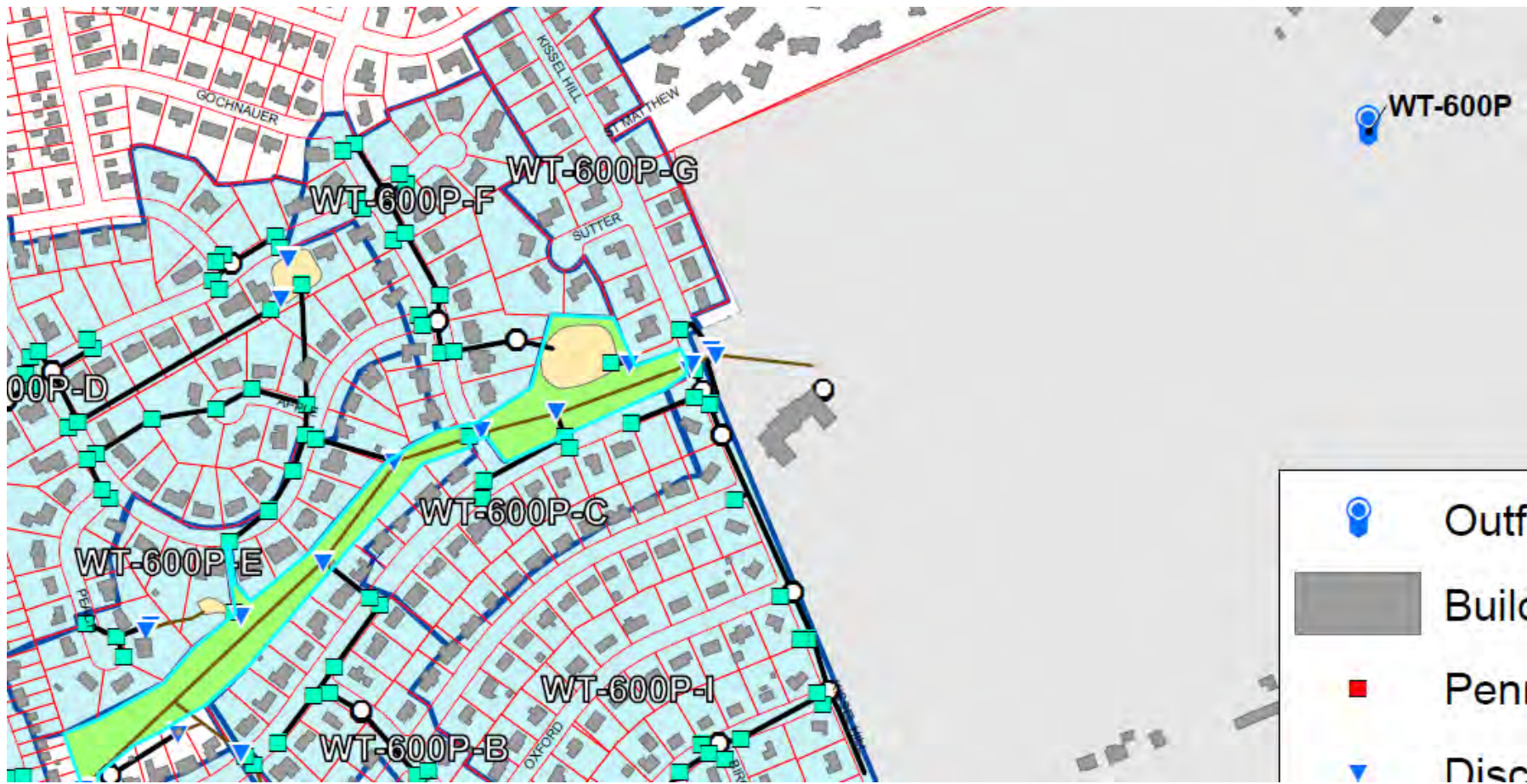
1. The permittee shall develop map(s) of the storm sewershed(s) associated with all outfalls that discharge to surface waters subject to Appendix A. The purpose is to identify the area the permittee is responsible for within its legal boundaries in developing a source inventory. For new permittees, the map(s) shall be submitted to DEP with an Annual MS4 Status Report that is due no later than two years following DEP's written approval of General Permit coverage. For existing permittees, the map(s) shall be submitted to DEP with an Annual MS4 Status Report due no later than September 30, 2019.



“Hometown, USA” – Storm Sewer (or Storm Drain)



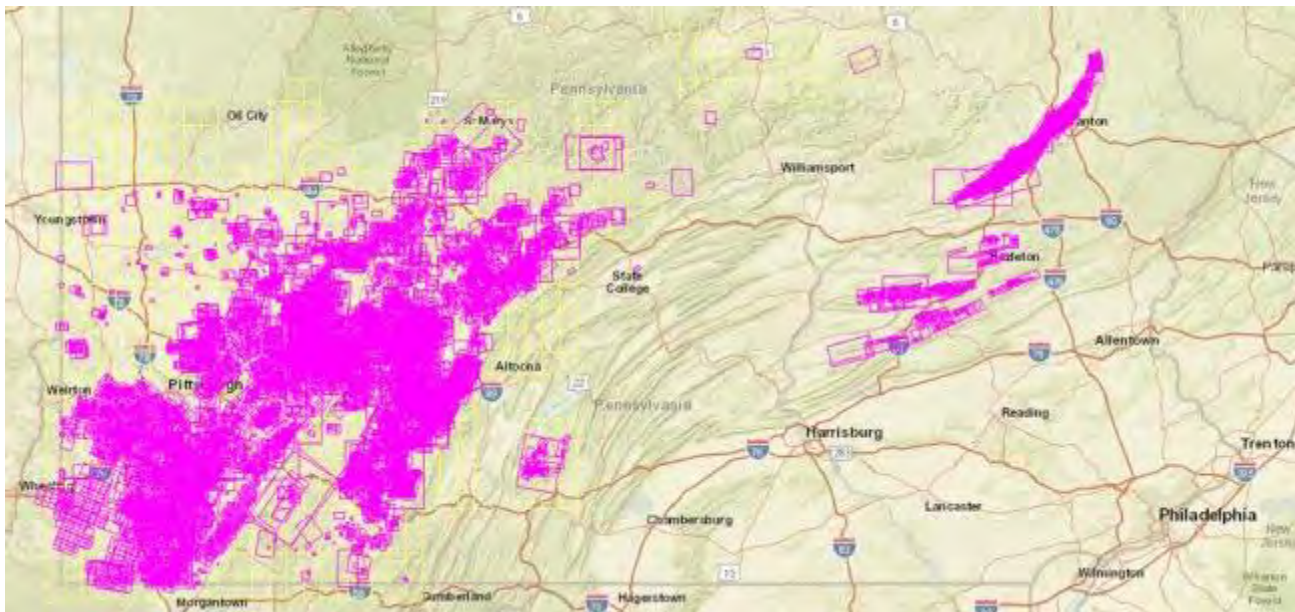
Delineated Sewersheds (MS3s)



Pollutant Control Measures (PCMs): Metals and/or pH

Next Step...

2. The permittee shall develop an inventory of all suspected and known anthropogenic (caused or produced by humans) sources of metals and/or acidity that are associated with AMD and that are located within the storm sewershed of outfalls discharging to surface waters subject to Appendix A. The inventory must identify whether the source is suspected or known, the basis for this determination, the responsible party (if known), and any corrective action the permittee has taken or plans to take for any of these sources. For new permittees, the inventory shall be submitted to DEP with an Annual MS4 Status Report that is due no later than three years following DEP's written approval of General Permit coverage. For existing permittees, the inventory shall be submitted to DEP with an Annual MS4 Status Report due no later than September 30, 2020.



Abandoned Mine Atlas

Pollutant Control Measures (PCMs): Metals and/or pH

www.minemaps.psu.edu

The screenshot displays the Pennsylvania Mine Maps Atlas web application. The browser address bar shows www.minemaps.psu.edu. The page header includes the Pennsylvania Mine Maps Atlas logo and navigation links: [Help](#), [About](#), and [Disclaimer](#). A [Tutorial](#) link is also present.

On the left side, there is a search interface with the following fields and options:

- Search
- County: [dropdown]
- Municipality: [dropdown]
- Street: [text input]
- Zip Code: [text input]
- Zoom to Address: [button]
- Longitude: (decimal degrees) [text input]
- Latitude: (decimal degrees) [text input]
- Zoom: [button]

Below the search interface are links for Mine Map Options, Print Map, and Measure.

The main map area shows a topographic view of Pennsylvania and surrounding regions. A semi-transparent grey rectangle highlights a specific area of interest in the western part of the state, near the Ohio border.

On the right side, there is a layer control panel with the following sections:

- Overlays:**
 - PA Coal Fields
 - Mine Maps Index
 - WPA Mine Maps Index
 - Counties
 - Municipalities
 - Quad Boundaries
 - State Roads
 - Local Roads
- Base Maps:**
 - Terrain
 - Aerial Photos
 - Topo Map
 - Road Map
 - None

At the bottom of the map, there is a small text block: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand).

Pollutant Control Measures (PCMs): Metals and/or pH

www.minemaps.psu.edu

pennsylvania
MINE MAP ATLAS

Mine Subsidence Insurance Homepage
Pennsylvania Historic Underground Mine Map Database

Help | About | Disclaimer

Hide Layers

Left mouse click on the area of interest to view a list of available mine maps

Tutorial

County: ALLEGHENY
Municipality: MOON TWP
Zoom

Street:
Zip Code:
Zoom to Address X

Longitude: (decimal degrees)
Latitude: (decimal degrees)
Zoom X

Mine Map Options
Turn Mine Map Off
Mine Map Transparency

Print Map
Measure

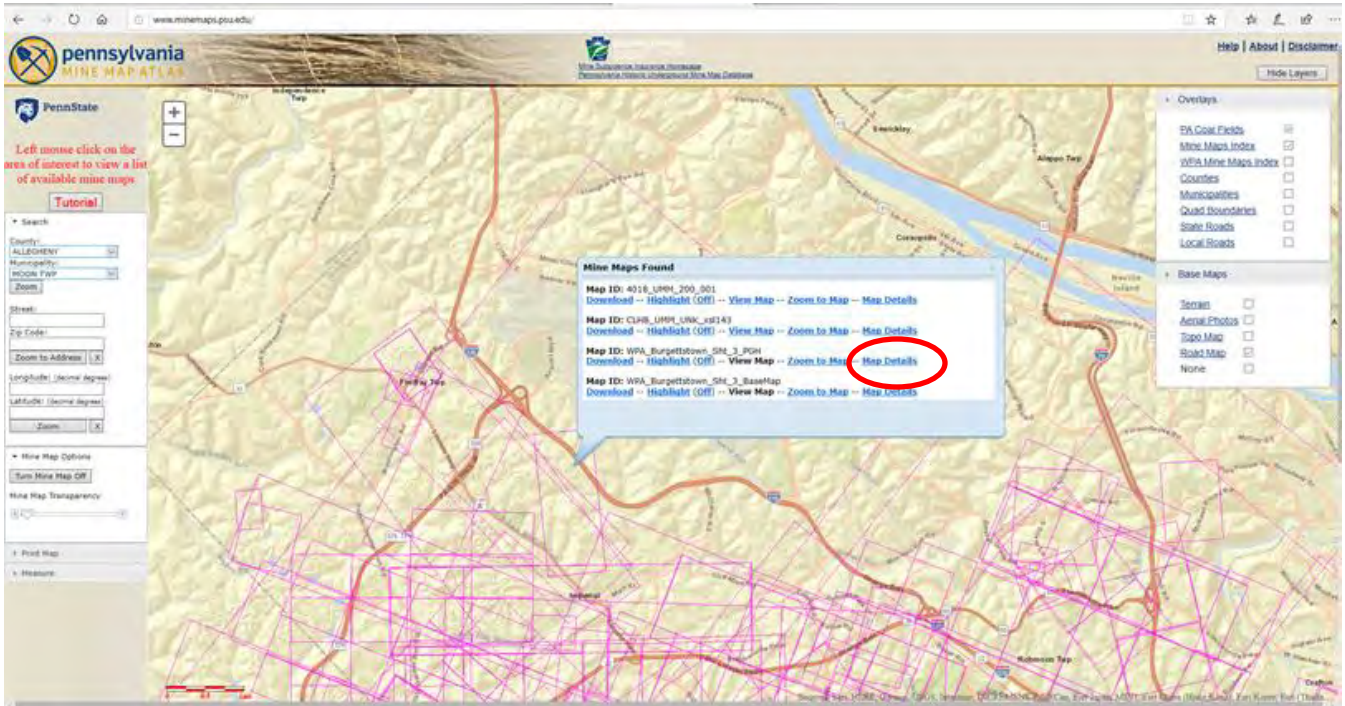
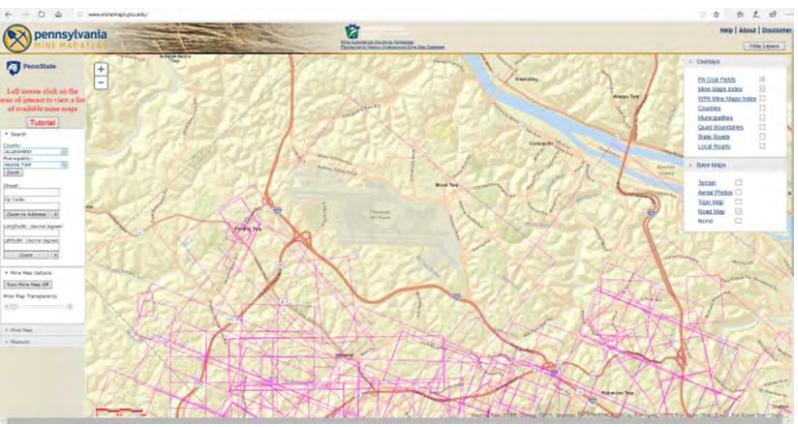
Overlays

- PA Coal Fields
- Mine Maps Index
- PA Mine Maps Index
- Counties
- Municipalities
- Quad Boundaries
- State Roads
- Local Roads

Base Maps

- Terrain
- Aerial Photos
- Topo Map
- Road Map
- None

Pollutant Control Measures (PCMs): Metals and/or pH



Pollutant Control Measures (PCMs): Metals and/or pH

Sheet Search

Textbox searches can make use of % for wildcards.

Mine Name: Folio/CDO/Collection ID: County:

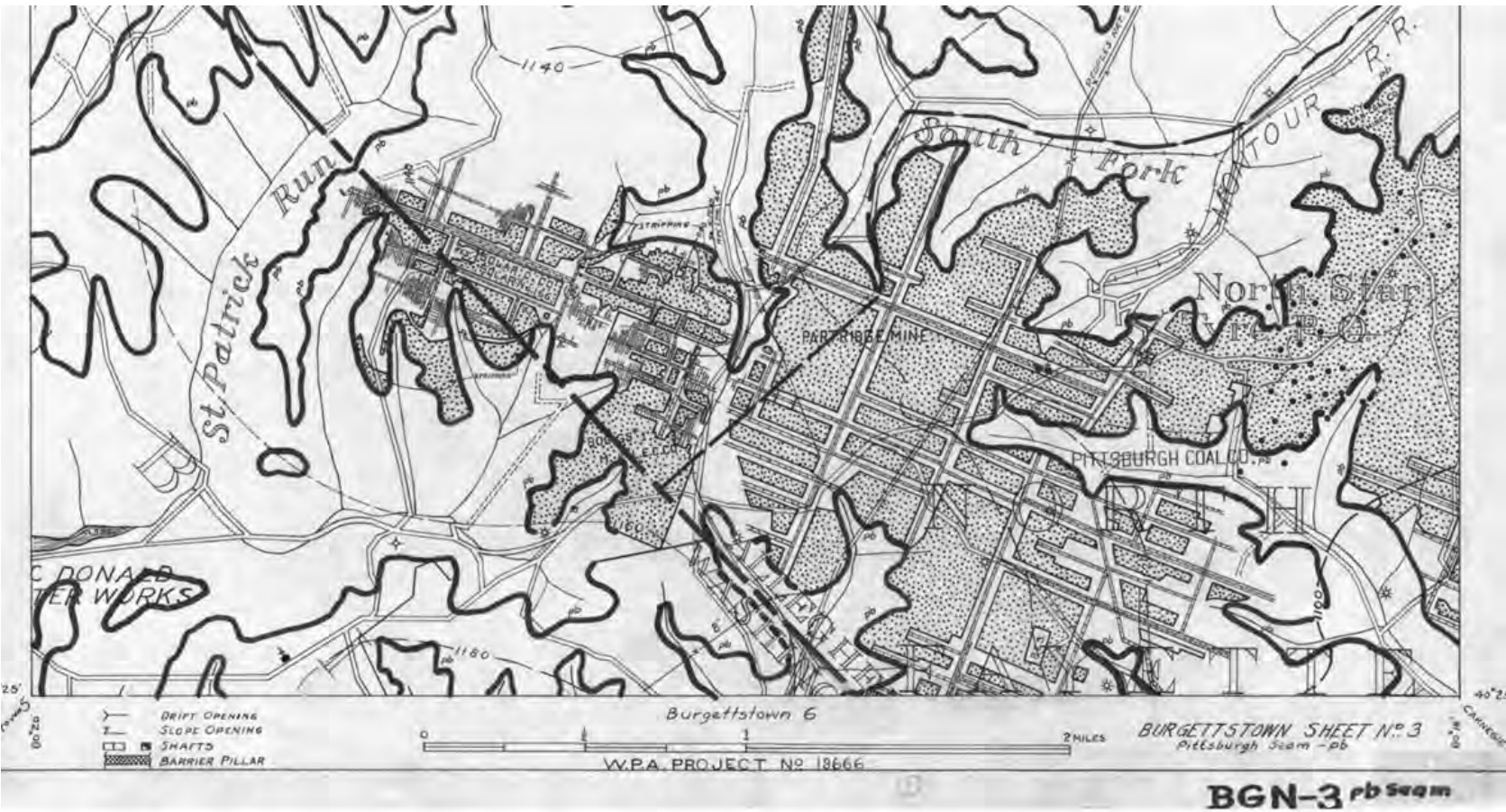
Company Name: Local Sheet ID: WPA_Burgettstown_Sht_3_PGH Municipality:

Advanced Search

Total Results Found: 12

Sheet Name ↑	Local Sheet ID	Map Type	Mine Name	Company Name	
Burgettstown 3 Pittsburgh	WPA_Burgettstown_Sht_3_PGH	WPA Coal Seam Map	A. Schlegel		<input type="button" value="View"/>
Burgettstown 3 Pittsburgh	WPA_Burgettstown_Sht_3_PGH	WPA Coal Seam Map	Boggs #1		<input type="button" value="View"/>
Burgettstown 3 Pittsburgh	WPA_Burgettstown_Sht_3_PGH	WPA Coal Seam Map	Boyle coal co.		<input type="button" value="View"/>
Burgettstown 3 Pittsburgh	WPA_Burgettstown_Sht_3_PGH	WPA Coal Seam Map	Clinton No. 1		<input type="button" value="View"/>
Burgettstown 3 Pittsburgh	WPA_Burgettstown_Sht_3_PGH	WPA Coal Seam Map	Craig mine		<input type="button" value="View"/>
Burgettstown 3 Pittsburgh	WPA_Burgettstown_Sht_3_PGH	WPA Coal Seam Map	Partridge mine cont on S quad		<input type="button" value="View"/>
Burgettstown 3 Pittsburgh	WPA_Burgettstown_Sht_3_PGH	WPA Coal Seam Map	Eureka Coal co.		<input type="button" value="View"/>
Burgettstown 3 Pittsburgh	WPA_Burgettstown_Sht_3_PGH	WPA Coal Seam Map	J.W. Byers cont on E quad		<input type="button" value="View"/>
Burgettstown 3 Pittsburgh	WPA_Burgettstown_Sht_3_PGH	WPA Coal Seam Map	Lebanon mine		<input type="button" value="View"/>
Burgettstown 3 Pittsburgh	WPA_Burgettstown_Sht_3_PGH	WPA Coal Seam Map	Mc Cartney Bros. Mine cont on N quad		<input type="button" value="View"/>
Burgettstown 3 Pittsburgh	WPA_Burgettstown_Sht_3_PGH	WPA Coal Seam Map	Mike no. 2		<input type="button" value="View"/>
Burgettstown 3 Pittsburgh	WPA_Burgettstown_Sht_3_PGH	WPA Coal Seam Map	Emily mine cont on N quad		<input type="button" value="View"/>

Pollutant Control Measures (PCMs): Metals and/or pH



Pollutant Control Measures (PCMs): Metals and/or pH

3800-FM-BCW0491 9/2017
Annual MS4 Status Report



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

ANNUAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) STATUS REPORT

POLLUTANT CONTROL MEASURES (PCMs)

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

Task	Date Completed	Attached	Anticipated Completion Date
Storm Sewershed Map(s)		<input type="checkbox"/>	August 2018
Source Inventory		<input type="checkbox"/>	June 2019
Investigation of Suspected Sources		<input type="checkbox"/>	November 2019
Ordinance/SOP for Controlling Animal Wastes	12/30/03	<input checked="" type="checkbox"/>	

PCM Comments:


Pathogens PCMs-source inventory and investigations began in 2016; See Attachment #7 for ordinance controlling animal wastes

Pollutant Control Measures (PCMs): Metals and/or pH

3800-PM-BCW0100d 5/2016
Permit

APPENDIX A

POLLUTANT CONTROL MEASURES FOR WATERS IMPAIRED BY METALS AND/OR pH ASSOCIATED WITH ABANDONED MINE DRAINAGE (AMD)

- B. The permittee shall complete an investigation of each suspected source. This investigation must include stormwater sampling if the investigation is required as part of implementing the IDD&E program under MCM #3 of the General Permit, and otherwise is voluntary. For new permittees, the results of the investigation shall be submitted to DEP with an Annual MS4 Status Report that is due no later than five years following DEP's written approval of General Permit coverage. For existing permittees, the results of the investigation shall be submitted to DEP with an Annual MS4 Status Report due no later than September 30, 2022.
-  C. Where it is determined that sources of metals and/or acidity are being discharged in stormwater from industrial sites into the permittee's MS4, the permittee shall notify DEP in writing within 90 days of the permittee's findings. DEP may require the owner or operator of the industrial site to submit an application for NPDES permit coverage and/or implement BMPs to reduce pollutant loadings. This written notification is required only once per industrial site.
- D. The permittee shall document the progress of its investigations, source control efforts and BMPs to control sources of metals and/or acidity in its Annual MS4 Status Reports.

Primary MS4 Permit Requirement

Authorization to Discharge

- “2013 PAG-13” – Limitations on Coverage (part 2.j)
- “2018 PAG-13 (draft)” – Discharges Not Authorized (item 6)

“The discharge is not, or will not, result in compliance with an applicable effluent limitation or water quality standard.”

Discharges cannot cause and/or contribute to an impairment

Pollutant Control Measures (PCMs): Pathogens

A. Map and Inventory.

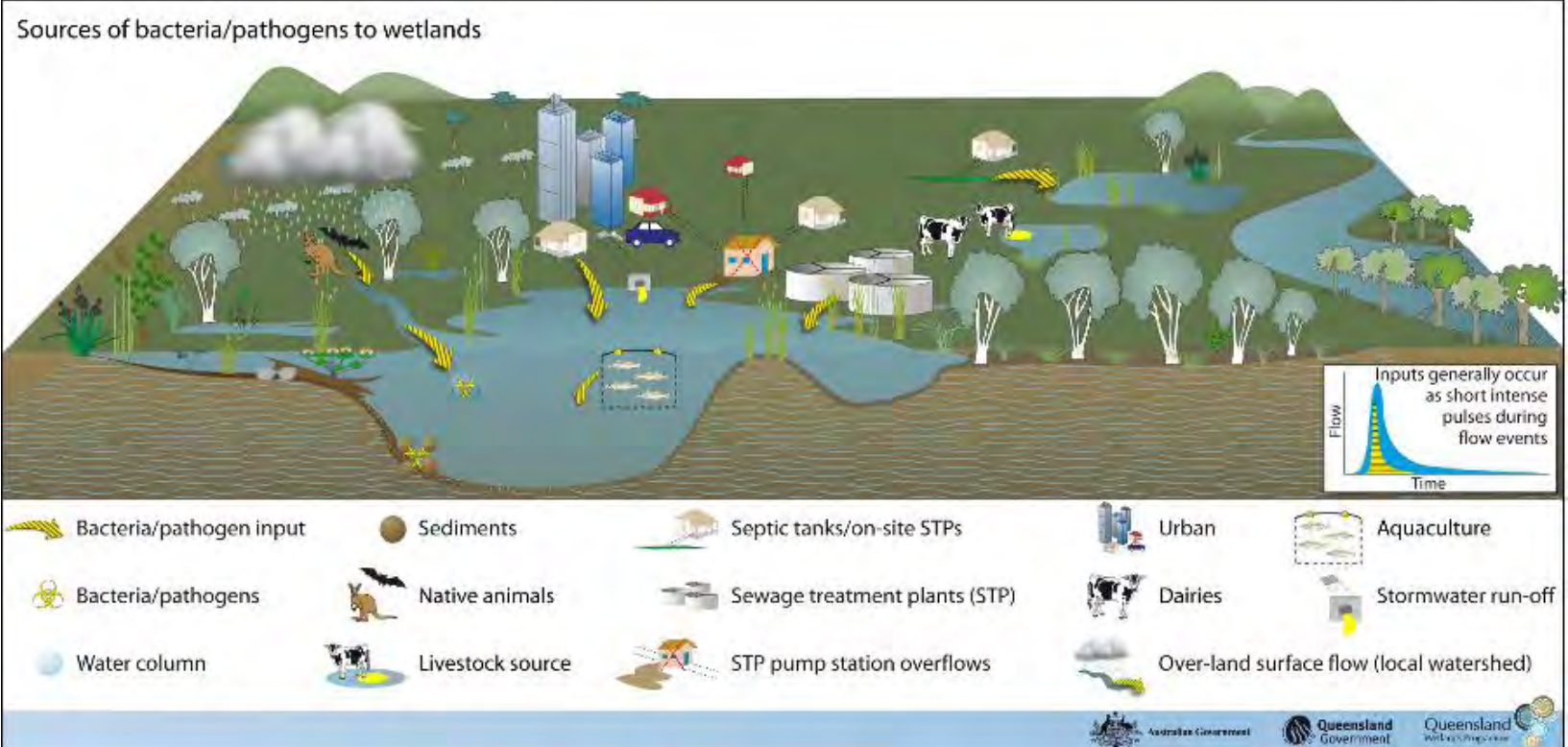
1. The permittee shall develop map(s) of the storm sewershed(s) associated with all outfalls that discharge to surface waters subject to Appendix B. The purpose is to identify the area the permittee is responsible for within its legal boundaries in developing a source inventory. For new permittees, the map(s) shall be submitted to DEP with an Annual MS4 Status Report that is due no later than two years following DEP's written approval of General Permit coverage. For existing permittees, the map(s) shall be submitted to DEP with an Annual MS4 Status Report due no later than September 30, 2019.



Pollutant Control Measures (PCMs): Pathogens

Next Step...

- 2. The permittee shall develop an inventory of all suspected and known sources of bacteria in stormwater within the storm sewershed, at a minimum, that discharge to impaired waters. The inventory must identify whether the source is suspected or known, the basis for this determination, the responsible party (if known), and any corrective action the permittee has taken or plans to take for any of these sources. For new permittees, the inventory shall be submitted to DEP with an Annual MS4 Status Report is due no later than three years following DEP's written approval of General Permit coverage. For existing permittees, the inventory shall be submitted to DEP with an Annual MS4 Status Report due no later than September 30, 2020.



Bacteria thresholds (waterbody-based...not end of pipe)

(Fecal coliforms/ 100 ml)—During the swimming season (May 1 through September 30), the maximum fecal coliform level shall be a geometric mean of 200 per 100 milliliters (ml) based on a minimum of five consecutive samples each sample collected on different days during a 30-day period. No more than 10% of the total samples taken during a 30-day period may exceed 400 per 100 ml. For the remainder of the year, the maximum fecal coliform level shall be a geometric mean of 2,000 per 100 milliliters (ml) based on a minimum of five consecutive samples collected on different days during a 30-day period.

(Coliforms/100 ml)—Maximum of 5,000/100 ml as a monthly average value, no more than this number in more than 20 of the samples collected during a month, nor more than 20,000/100 ml in more than 5% of the samples.

Pollutant Control Measures (PCMs): Pathogens

https://19january2017snapshot.epa.gov/sites/production/files/2015-09/documents/npdes-water-quality-based-permit-limits-for-recreational-water-quality-criteria-faq_0.pdf

FAQ: NPDES Water-Quality Based Permit Limits for Recreational Water Quality Criteria

April 2, 2015

What is the purpose of this *Frequently Asked Questions* document?

This set of *Frequently Asked Questions* (FAQ) provides an overview of NPDES permitting applicable to continuous dischargers (such as POTWs) based on water quality standards for pathogens and pathogen indicators associated with fecal contamination in primary contact recreational waters. This FAQ answers questions to help EPA, state, tribal and territorial NPDES permit writers understand implications of changes to state water quality standards based on the 2012 Recreational Water Quality Criteria (RWQC), published November 29, 2012.

The 2012 RWQC recommendations are for two bacterial indicators of fecal contamination, enterococci and *E. coli*. Section 304(a)(9) of the Clean Water Act directed EPA to publish new or revised water quality criteria recommendations for pathogens and pathogen indicators for the purpose of protecting human health. A pathogen indicator, as defined in section 502(23) of the CWA, is “a substance that indicates the potential for human infectious disease.” Most strains of enterococci and *E. coli* do not cause human illness (that is, they are not human pathogens); rather, they indicate the presence of fecal contamination.

Waters impaired by Pathogens

Soooo many possible sources:

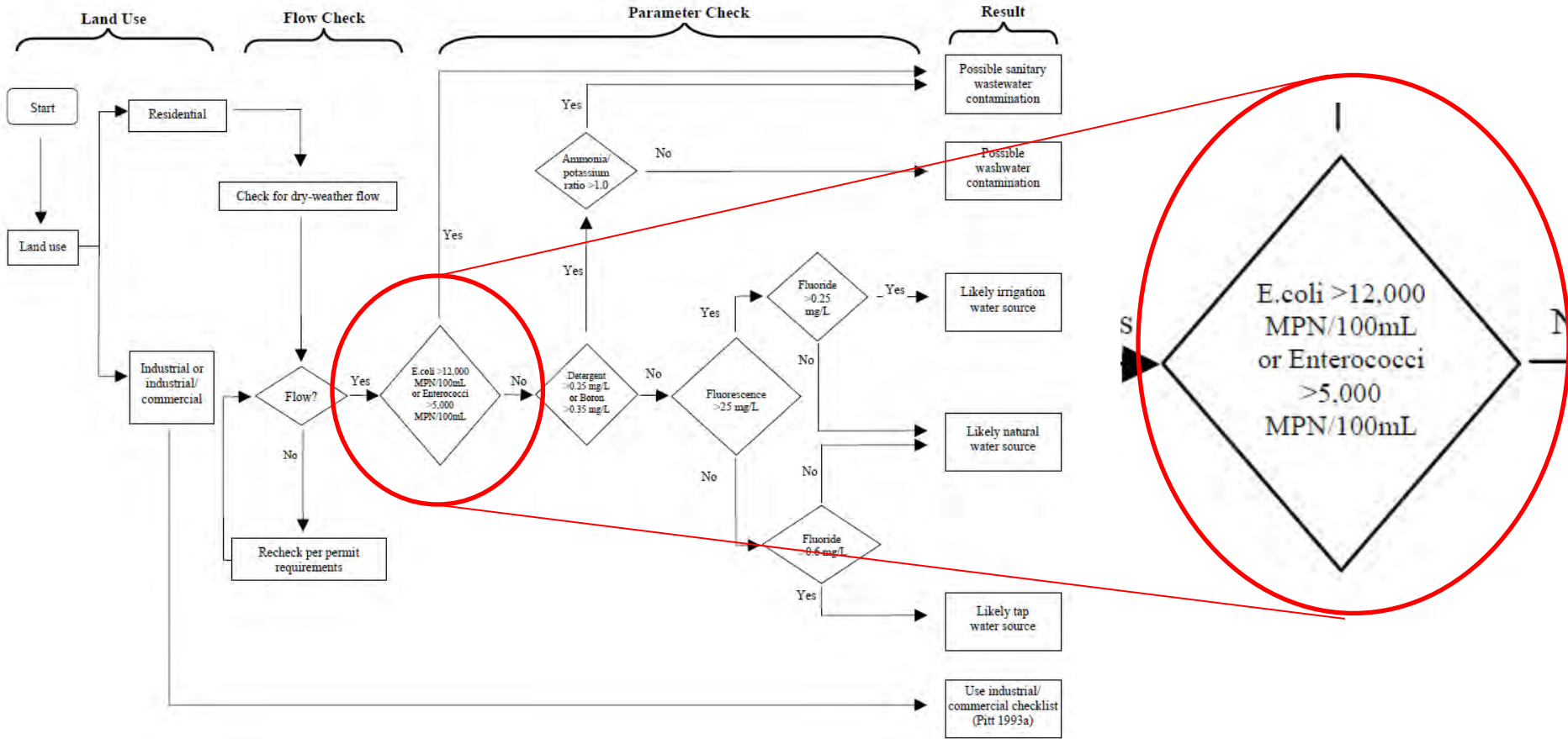
- Raw sewage/septic systems
- Water (condensation) drip from air vents above cooking facilities
- Runoff from rain interaction with dumpsters (or similar containers) with rotting food
- Washwater bins/buckets
- Temporary sanitary facilities
- Rotting landscape waste
- “Natural” sources
- And on...and on....and on

Sources of Pathogens



Pollutant Control Measures (PCMs): Pathogens

IDD&E consideration...



Revised Pitt Flowchart

Pollutant Control Measures (PCMs): Pathogens

3800-PM-BCW0100d 5/2016
Permit

APPENDIX B

POLLUTANT CONTROL MEASURES FOR WATERS IMPAIRED BY PATHOGENS

- B. The permittee shall complete an investigation of each suspected source. This investigation must include stormwater sampling if the investigation is required as part of implementing the IDD&E program under MCM #3 of the General Permit, and otherwise is voluntary. For new permittees, the results of the investigation shall be submitted to DEP with an Annual MS4 Status Report that is due no later than five years following DEP's written approval of General Permit coverage. For existing permittees, the results of the investigation shall be submitted to DEP with an Annual MS4 Status Report due no later than September 30, 2022.
- C. The permittee shall enforce ordinances that prohibit illicit and illegal connections and discharges of sewage to the MS4. Anytime an illicit and illegal connection or discharge of sewage into the MS4 is discovered by the permittee, the permittee shall report the finding in the subsequent Annual MS4 Status Report along with a description of corrective action by the permittee.
- D. If not already established in its Stormwater Management Ordinance (municipal permittees) or SOP (non-municipal permittees), the permittee shall enact an ordinance or develop and adopt an SOP that requires proper management of animal wastes on property owned by the permittee. If an ordinance or SOP already exists that controls animal wastes, it must be attached to the first Annual MS4 Status Report due following the first year of coverage for new permittees and no later than September 30, 2018 for existing permittees (unless the ordinance or SOP was attached to the NOI for General Permit coverage). If a new ordinance or SOP is enacted or adopted, the new ordinance or SOP must be attached to the first Annual MS4 Status Report due following enactment or adoption, but no later than September 30, 2022.



Model Ordinance - Pet Waste

Ordinance # [] - Pet Waste

SECTION I. Purpose:

An ordinance to establish requirements for the proper disposal of pet solid waste in **[insert name of municipality]**, so as to protect public health, safety and welfare, and to prescribe penalties for failure to comply.

SECTION II. Definitions:

For the purpose of this ordinance, the following terms, phrases, words and their derivations shall have the meanings stated herein unless their use in the text of this Chapter clearly demonstrates a different meaning. When not inconsistent with the context, words used in the present tense include the future, words used in the plural number include the singular number, and words used in the singular number include the plural number. The word "shall" is always mandatory and not merely directory.

- a. Immediate – shall mean that the pet solid waste is removed at once, without delay.
- b. Owner/Keeper – any person who shall possess, maintain, house or harbor any pet or otherwise have custody of any pet, whether or not the owner of such pet.
- c. Person – any individual, corporation, company, partnership, firm, association, or political subdivision of this State subject to municipal jurisdiction.
- d. Pet - a domesticated animal (other than a disability assistance animal) kept for amusement or companionship.

Pollutant Control Measures (PCMs): Pathogens

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Annual MS4 Status Report



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

ANNUAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) STATUS REPORT

POLLUTANT CONTROL MEASURES (PCMs)

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

Task	Date Completed	Attached	Anticipated Completion Date
Storm Sewershed Map(s)		<input type="checkbox"/>	August 2018
Source Inventory		<input type="checkbox"/>	June 2019
Investigation of Suspected Sources		<input type="checkbox"/>	November 2019
Ordinance/SOP for Controlling Animal Wastes	12/30/03	<input checked="" type="checkbox"/>	

PCM Comments:

Pathogens PCMs-source inventory and investigations began in 2016; See Attachment #7 for ordinance controlling animal wastes

Pollutant Control Measures (PCMs): Priority Organic Compounds

A. Map and Inventory.

1. The permittee shall develop map(s) of the storm sewershed(s) associated with all outfalls that discharge to surface waters subject to Appendix C. The purpose is to identify the area the permittee is responsible for within its legal boundaries in developing a source inventory. For new permittees, the map(s) shall be submitted to DEP with an Annual MS4 Status Report that is due no later than two years following DEP's written approval of General Permit coverage. For existing permittees, the map(s) shall be submitted to DEP with an Annual MS4 Status Report due no later than September 30, 2019.



Priority Organic Compounds (POC's)

Appendix A to Part 423—126 Priority Pollutants

- 001 Acenaphthene
- 002 Acrolein
- 003 Acrylonitrile
- 004 Benzene
- 005 Benzidine
- 006 Carbon tetrachloride (tetrachloromethane)
- 007 Chlorobenzene
- 008 1,2,4-trichlorobenzene
- 009 Hexachlorobenzene
- 010 1,2-dichloroethane
- 011 1,2-dichlorobenzene
- 012 Hexachlorocyclopentadiene
- 013 1,1-dichloroethane
- 014 1,1,2-trichloroethane
- 015 1,1,2-trichloroethene
- 016 Chloroethane
- 017 1,1-dichloroethene
- 018 1,1,2-trichloroethene
- 019 1,1,2-trichloroethane
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- 021 1,1,2-trichloroethane
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- 124 1,1,2-trichloroethane
- 125 1,1,2-trichloroethane
- 126 1,1,2-trichloroethane

Appendix A to Part 423—126 Priority Pollutants

- 001 Acenaphthene
- 002 Acrolein
- 003 Acrylonitrile
- 004 Benzene
- 005 Benzidine
- 006 Carbon tetrachloride (tetrachloromethane)
- 007 Chlorobenzene
- 008 1,2,4-trichlorobenzene
- 009 Hexachlorobenzene
- 010 1,2-dichloroethane

Priority Organic Compounds (POC's)



Priority Organic Compounds (POC's)

Polychlorinated biphenyl (PCB)

A polychlorinated biphenyl is an organic chlorine compound with the formula $C_{12}H_{10-x}Cl_x$. Polychlorinated biphenyls were once widely deployed as dielectric and coolant fluids in electrical apparatus, carbonless copy paper and in heat transfer fluids.

Other "common" POC's:

- Benzene(s)
 - 1,2-dichlorobenzene
 - Ethylbenzene
 - 1,12-benzoperylene
- Phenol(s)
 - 2,4-dichlorophenoxyacetic acid (2-4-D)
 - 4-nitrophenol
- Methyl compounds
 - Methyl bromide

...and on and on and on



Pollutant Control Measures (PCMs): Priority Organic Compounds

Next step...

2. The permittee shall develop an inventory of all suspected and known anthropogenic (caused or produced by humans) sources of Priority Organic Compounds in stormwater within the drainage area of outfalls discharging to impaired waters. The inventory must identify whether the source is suspected or known, the basis for this determination, the responsible party (if known), and any corrective action the permittee has taken or plans to take for any of these sources. For new permittees, the inventory shall be submitted to DEP with an Annual MS4 Status Report that is due no later than three years following DEP's written approval of General Permit coverage. For existing permittees, the inventory shall be submitted to DEP with an Annual MS4 Status Report due no later than September 30, 2020.



Sources of PCBs

Current Authorized Uses of PCBs

Use	Comments
Transformers	Authorized use at any concentration though restrictions and regulatory requirements increase with higher PCB concentration thresholds.
Railroad Transformers	Transformers used in locomotives and self-propelled railcars. Authorized use at < 1,000 ppm; < 50 ppm if transformer coil is removed at any time.
Heat transfer systems, hydraulic systems, mining equipment	Authorized use at < 50 ppm
Natural gas pipelines	Authorized at < 50 ppm, or at > 50 ppm with additional requirements. PCBs may be present in natural gas compressors, scrubbers, filters, and in condensate.
Research & Development	Authorized primarily for purposes relating to environmental analysis, management, and disposal of PCBs. R&D for PCB products is prohibited.
Scientific Instruments	Examples include oscillatory flow birefringence & viscoelasticity instruments for the study of the physical properties of polymers, microscopy mounting fluids, microscopy immersion oil, and optical liquids.
Carbonless copy paper	Use of existing carbonless copy paper is permitted; manufacturing of new carbonless copy paper is not authorized.
Electromagnets, switches, voltage regulators, circuit breakers, reclosers, cable	No restrictions on existing use; restrictions on PCB concentrations if serviced and oil is removed or replaced.
Porous surfaces	EPA considers building materials, such as concrete, porous with respect to PCB leaks and spills. Porous building materials may be left in place following spills provided various conditions are met. Older industrial machinery often was designed to slowly leak (PCB-containing) hydraulic oil as a lubricant.

Usage breakdown:

- Closed system and heat transfer fluids (transformers, capacitors, fluorescent light ballasts, etc.): 60%
- Plasticizers: 25%
- Hydraulic fluids and lubricants: 10%
- Miscellaneous uses: 5%



Sources of PCBs cont'd

Other applications of PCBs	
Dust control (dedusting agents)	Present in dust control formulations, and used oil historically used for dust suppression.
Pesticides	As an extender to extend the life of pesticides.
Fire retardants	Coatings on ceiling tiles, and textiles including ironing boards and yarn.
Paints, coatings	As plasticizers in paint, corrosion resistant paints for various applications including military/navy ships, corrosion resistant epoxy resins on metal surfaces, film casting solutions for electrical coatings, varnish, lacquers, and waterproofing coatings for various applications.
Carbonless copy paper	Used as an ink pigment carrier (microencapsulation of dye); when the top sheet was pressed down, ink and PCB oil were transferred to the copy.
Printing inks	Ink for newsprint and as a dye carrier; also used as a solvent for deinking newsprint for recycling.
Investment casting waxes	Used as wax extenders.
Wood treatment	May be present as an impurity in pentachlorophenol (Warrington, 1996).

Sources of PCBs cont'd

PCB Sources In Waste Materials And Recycling Operations	
Material or Operation	Comments
Scrap metal recycling	Transformer shell salvaging; heat transfer and hydraulic equipment; and fluff (shredder waste from cars and appliances including upholstery, padding and insulation). Also present in non-ferrous metal salvaging as parts from PCB-containing electrical equipment, and oil & grease insulated electrical cable.
Auto salvage yards, auto crushing	Hydraulic fluid, brake fluid, recycled oil, capacitors, and oil-filled electrical equipment such as some ignition coils.
Repair activities	Shipyards (electrical equipment, hydraulic oil, paint, etc.), locomotive repair, heavy equipment repair facilities, auto repair, repair of manufacturing equipment, etc.
Used oil	May be present in used oil from various sources including auto salvage yards, automotive and heavy equipment repair shops, hydraulic equipment repair, industrial machinery repair, etc. Because some PCBs have been mixed with used oil, some recycled oils currently in circulation may contain PCBs at concentrations generally < 50 ppm. PCBs may also be present where used oil has been used for dust suppression/road oiling, weed control, and energy recovery.
Recycled paper	Paper may contain PCBs where carbonless copy paper has been used in recycling. However, PCB concentrations have decreased over time as the volume of unrecycled carbonless copy paper is reduced. Recycled paper containing PCBs has historically been used for food packaging (CWC, 1997). PCB concentrations in food packaging are restricted to 10 ppm unless an impermeable barrier is present between the packaging and food product (FDA, 2003).
Effluent	PCBs may be in wastewaters from manufacturing facilities and equipment such as chemical and pesticide facilities, pulp and paper mills, cooling waters from vacuum pumps and electric power generation facilities where leaks have occurred, and condensate from vacuum pumps and natural gas pipelines. Significant cleanup activities have been performed at natural gas pipeline compressor stations from discharges of condensate to ground and storm drainage systems (DOJ, 2002).

Sources of PCBs cont'd

PCB Sources In Waste Materials And Recycling Operations	
Material or Operation	Comments
Building demolition	Electrical equipment, joint caulking, oil & grease insulated cable, surface coatings as flame retardant and waterproofing.
Dredge spoils	From areas where contaminated sediments are present.
Landfills	Municipal and industrial solid waste; virtually all potential sources could be present, including waste materials and soils from remediation sites.
Wastewater treatment plant sludge	Derived from atmospheric deposition and stormwater, water supply systems, leaks and spills, leaching from coatings and plastics containing PCBs, PCBs in food and human waste.



Pollutant Control Measures (PCMs): Priority Organic Compounds

From Monongahela TMDL...

Recommendations

The use of both PCB and chlordane has been banned in the United States, so there should be no new point sources to which controls can be applied. There are no known current sources of PCB and Chlordane to these Monongahela River segments. PCB and chlordane present in the main stem of the Monongahela River are believed to reside primarily in the sediment due to historical use and improper disposal practices. Generally, the levels of PCB and chlordane are expected to decline over time due to the bans on use through natural attenuation. Examples of processes in natural attenuation are covering of contaminated sediments with newer, less contaminated materials, and flushing of sediments during periods of high stream flow.

For the Monongahela River segments outlined above, long-term natural attenuation is the best alternative and provides reasonable assurance that the TMDL will be implemented.

Discharges cannot cause and/or contribute to an impairment

Pollutant Control Measures (PCMs): Priority Organic Compounds

3800-FM-BCW0491 9/2017
Annual MS4 Status Report



COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

ANNUAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) STATUS REPORT

- B. The permittee shall complete an investigation of each suspected source. This investigation must include stormwater sampling if the investigation is required as part of implementing the IDD&E program under MCM #3 of the General Permit, and otherwise is voluntary. For new permittees, the results of the investigation shall be submitted to DEP with an Annual MS4 Status Report that is due no later than five years following DEP's written approval of General Permit coverage. For existing permittees, the results of the investigation shall be submitted to DEP with an Annual MS4 Status Report due no later than September 30, 2022.
- C. Where it is determined that sources of Priority Organic Compounds are being discharged in stormwater from industrial sites into the permittee's MS4, the permittee shall notify DEP in writing within 90 days of the permittee's findings. DEP may require the owner or operator of the industrial site to submit an application for NPDES permit coverage and/or implement BMPs to reduce pollutant loadings. This written notification is required only once per industrial site.
- D. The permittee shall document the progress of its investigations, source control efforts and BMPs to control sources of Priority Organic Compounds in its Annual MS4 Status Reports.

Pollutant Control Measures (PCMs): Priority Organic Compounds

3800-FM-BCW0491 9/2017
Annual MS4 Status Report



COMMONWEALTH OF PENNSYLVANIA
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ANNUAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) STATUS REPORT

POLLUTANT CONTROL MEASURES (PCMs)

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

Task	Date Completed	Attached	Anticipated Completion Date
Storm Sewershed Map(s)		<input type="checkbox"/>	August 2018
Source Inventory		<input type="checkbox"/>	June 2019
Investigation of Suspected Sources		<input type="checkbox"/>	November 2019
Ordinance/SOP for Controlling Animal Wastes	12/30/03	<input checked="" type="checkbox"/>	

PCM Comments:

Pathogens PCMs-source inventory and investigations began in 2016; See Attachment #7 for ordinance controlling animal wastes

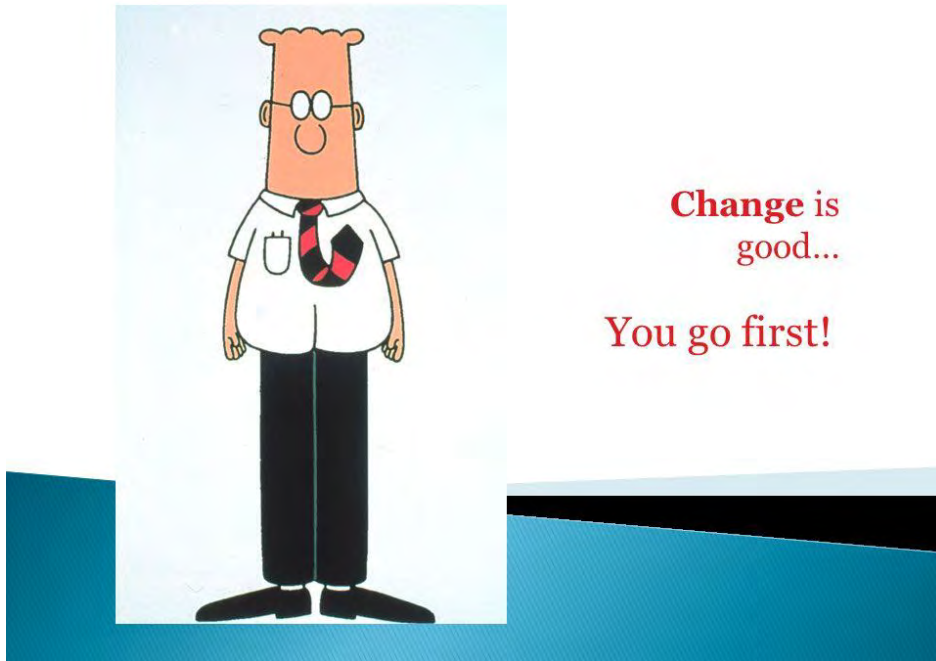
Long story short...

**September
2019**

PRP and PCM Implementation and Tracking

Additional Considerations

Changes to PRPs

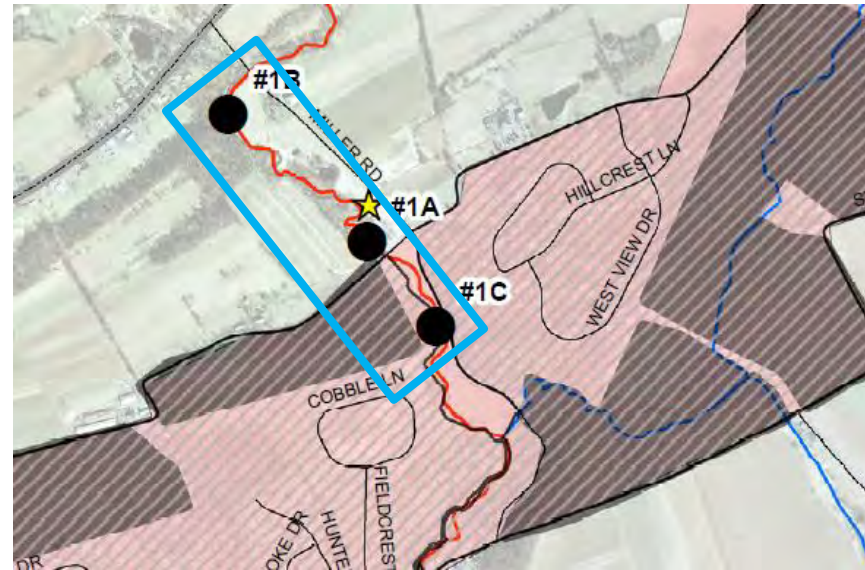


A PRP only needs to be advertised and a public comment period conducted if a project(s) that will achieve reported reductions was not in the original PRP.

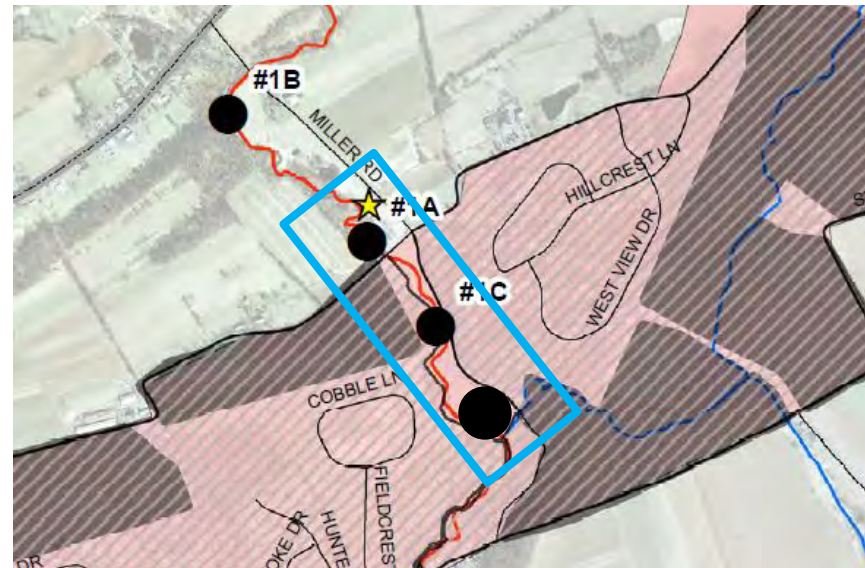
Changes to PRPs – example (revised PRP?)

Original PRP...

**Stream
restoration
project**



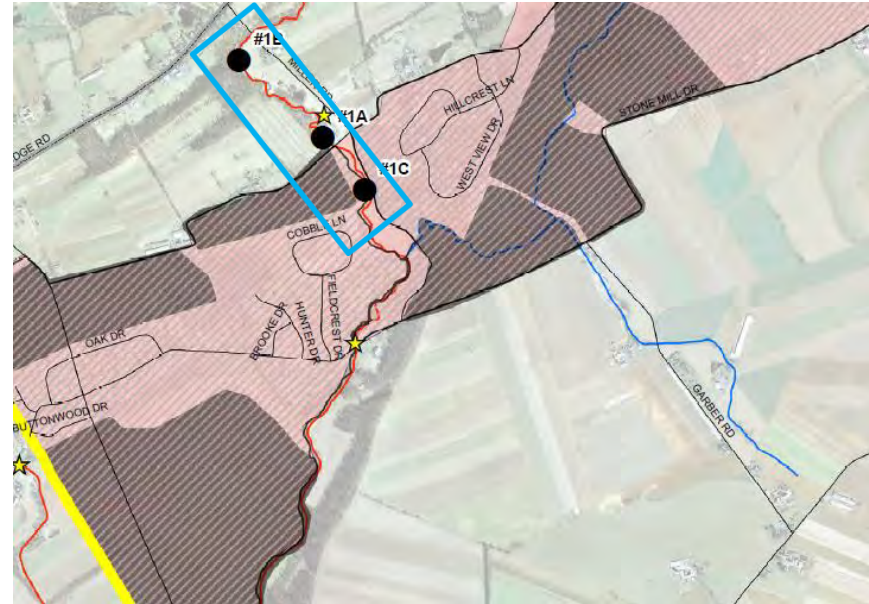
How projects
have unfolded...



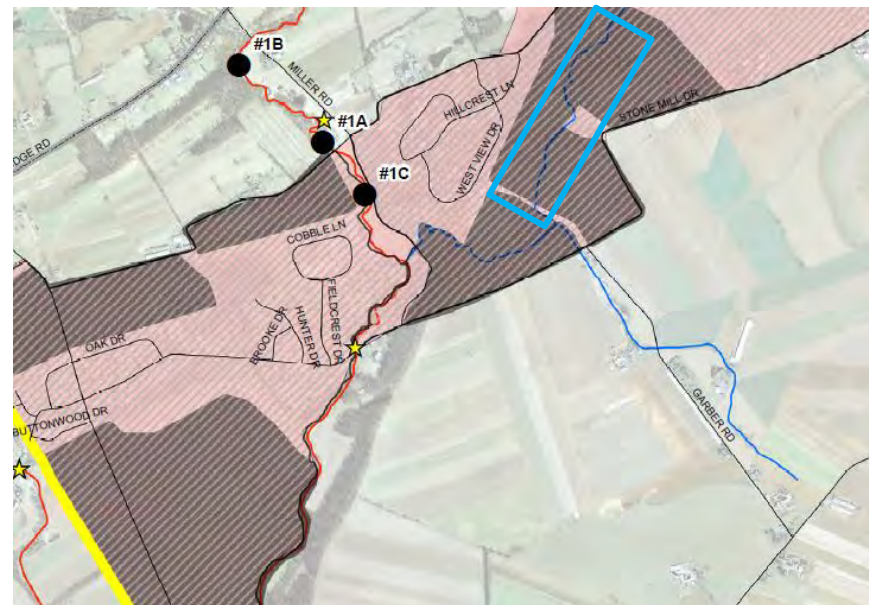
Changes to PRPs – example (revised PRP?)

Original PRP...

**Stream
restoration
project**

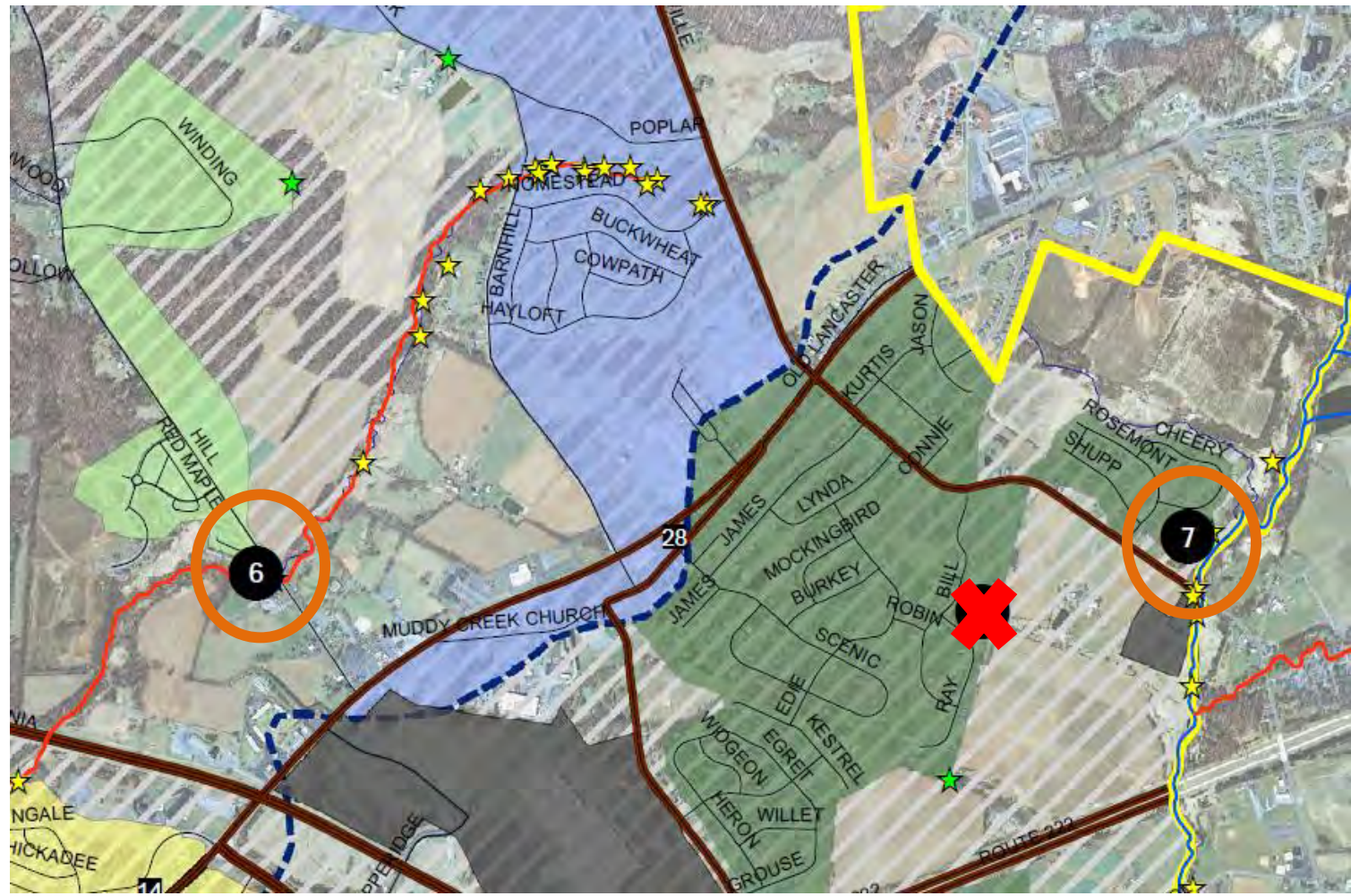


How projects
have unfolded...



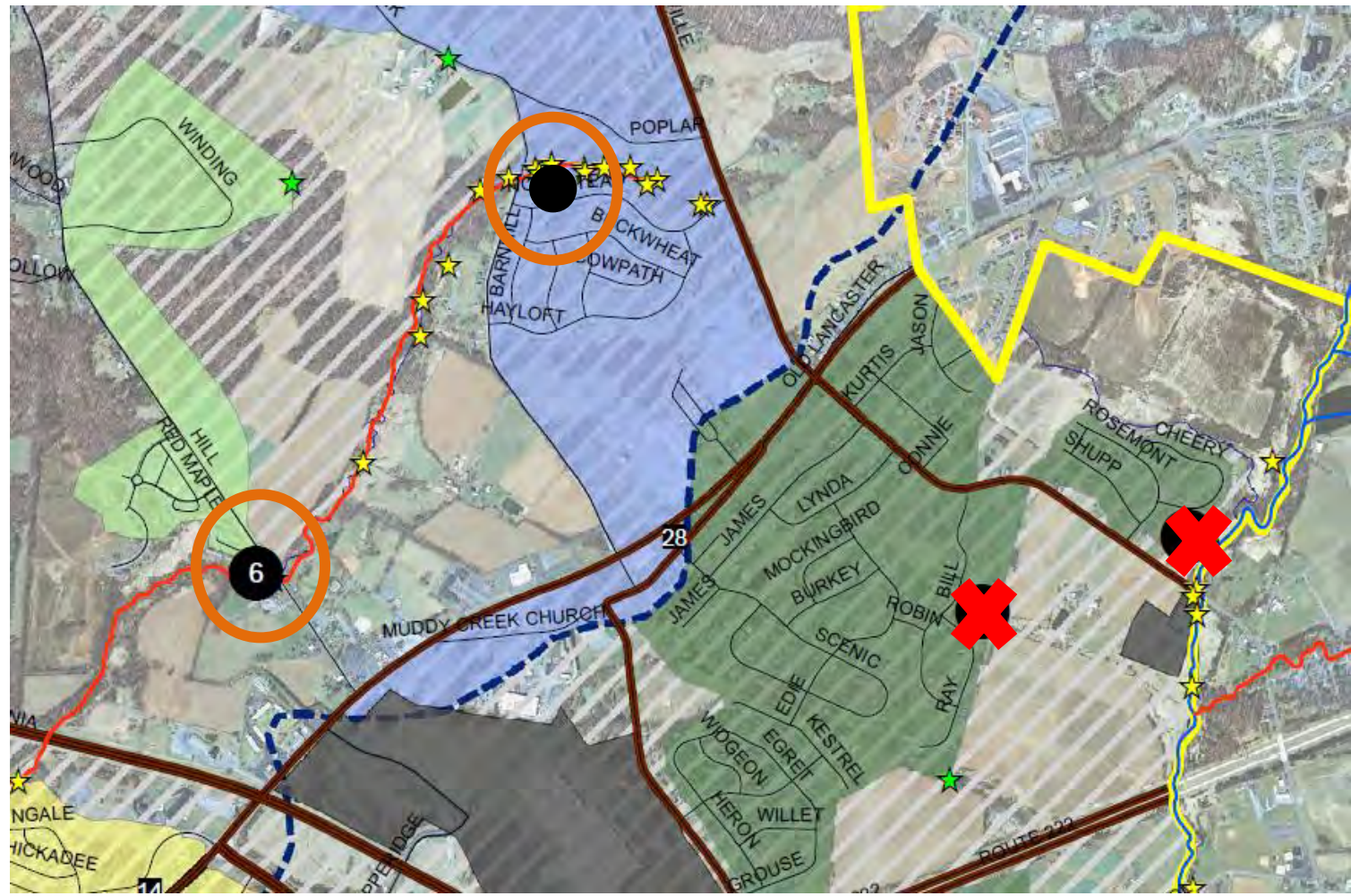
Changes to PRPs – example (revised PRP?)

“ala carte” projects



Changes to PRPs – example (revised PRP?)

“ala carte” projects



TMDL Plan – Combine PRP and TMDL Plans

Combining TMDL Plans and PRPs: MS4s with multiple TMDL Plan development obligations may develop one TMDL Plan for submission to DEP, if desired. If this is done, MS4s may elect to address each TMDL water separately or in combination. If done in combination, the MS4 has flexibility when locating BMPs between the TMDL Planning Areas. If the MS4 elects to meet the percent reduction requirements (10% sediment or 5% TP) in lieu of meeting the WLA(s) within the first permit term, it may elect to reduce pollutants by a greater percentage in one TMDL Planning Area over another, as long as the overall reduction for the planning effort achieves the percent reduction requirements.



"Well, maybe we could eliminate one of our
Departments of Redundancy."

General Guidelines for MS4 Collaborative Efforts

- Written agreement (Intergovernmental Cooperation Agreement)
- Scope of agreement
 - Complete PRP implementation or individual BMP implementation)
- Roles and responsibilities
 - Project selection process, contracting and/or consultant selection processes, long-term O&M, adaptive management, etc.
- Allocations of cost and pollutant reductions
 - Methodologies described
- Schedule (timeline(s) for implementation)
- Other ICL agreement requirements

As long as BMPs are implemented in MS4 planning area(s) and address the pollutant(s) of concern, the pollutant reductions afforded by the BMPs may be shared between collaborating MS4s.

Joint Approach – share of costs & reductions

Say you have a \$200,000 project in a HUC-10 watershed that provides a reduction of 30,000 pounds of sediment, and three municipalities will jointly plan and implement the joint project. The following table shows how they are assigning “credits,” and it is directly proportional to the amount of money thrown into the pot by an individual municipality:

	Cost Contribution	Sediment Reduction “Credits”
TOTAL	\$200,000	30,000 lbs/yr
Municipality A	\$100,000 (50% of total)	15,000 lbs (50% of total)
Municipality B	\$40,000 (20%)	6,000 lbs (20%)
Municipality C	\$60,000 (30%)	9,000 lbs (30%)

Final Thoughts and Questions?

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