

Ferguson Township Municipal Separate Storm Sewer System (MS4) Permit

Pollution Reduction Plan (PRP) Projects Work Session

Outline and Goals

January 11th, 2023 Board of Supervisors Work Session



NPDES - Phase II MS4 Permit

National
Pollution
Discharge
Elimination
System

Municipal
Separate
Storm
Sewer
System

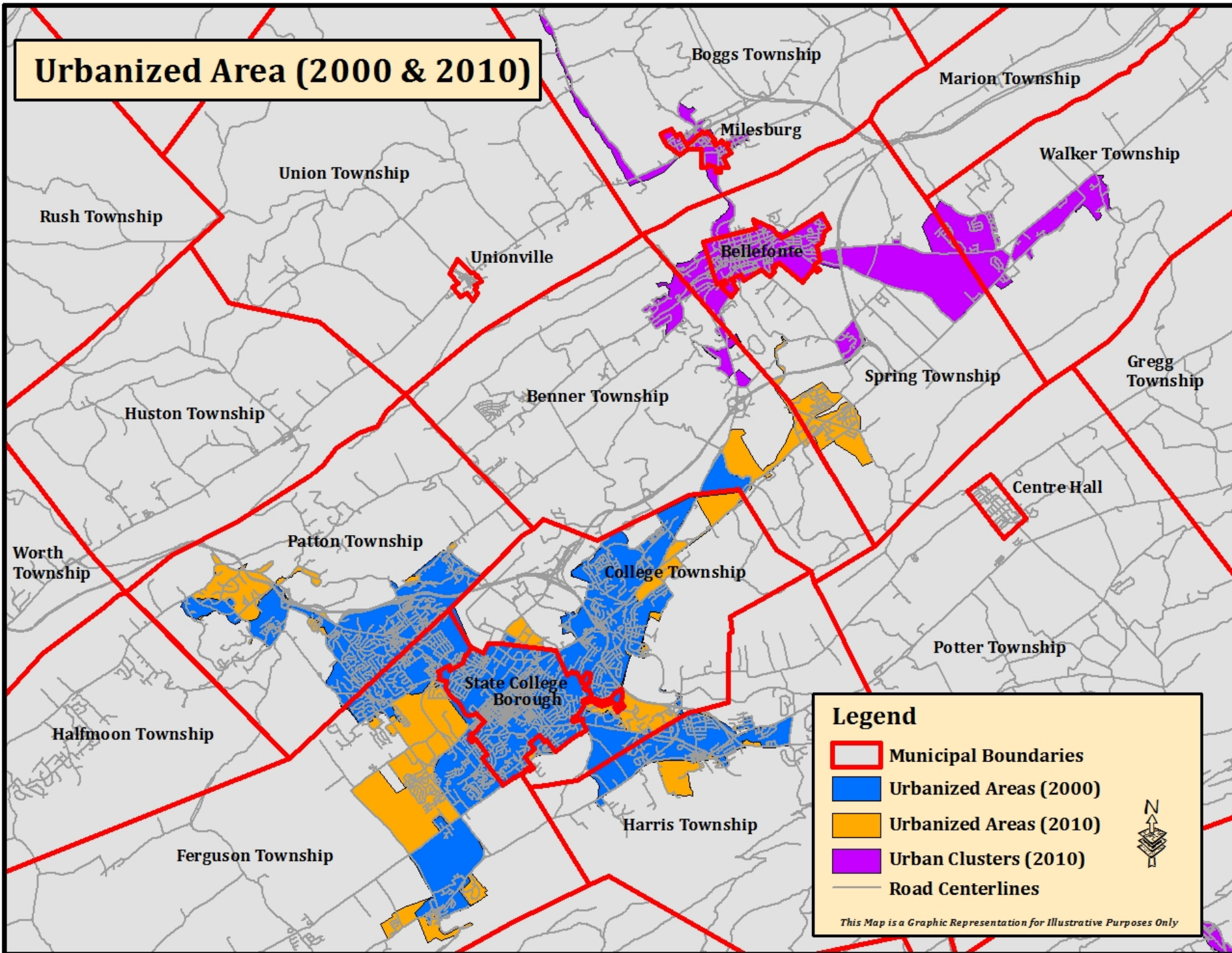


NPDES - Phase II MS4 Permit

- First MS4 permit issued to Ferguson Township in 2003.
- Permits are good for 5 years, and require submission of an annual report.
- Current Permit cycle is July 1, 2022 to June 30, 2025.
- Phase II required Pollution Reduction Plan



Urbanized Area (2000 & 2010)



Legend

- Municipal Boundaries
- Urbanized Areas (2000)
- Urbanized Areas (2010)
- Urban Clusters (2010)
- Road Centerlines

This Map is a Graphic Representation for Illustrative Purposes Only

What Does Our Permit Require?

- Implement a Stormwater Management Program (including SWM Ordinance)
 - Six Minimum Control Measures
 - Track progress toward goals
 - Document, Document, Document
 - Report on our progress
- Develop and Implement a Pollution Reduction Plan (PRP) for Chesapeake Bay and Impaired Waterways



Stormwater Management Program

Six Minimum Control Measures

1. Public Education and Outreach

2. Public Involvement and Participation

3. Illicit Discharge Detection and Elimination

4. Construction Site Runoff Management

5. Post-Construction Stormwater Management

6. Pollution Prevention and Good Housekeeping



Pollution Reduction Plan (PRP)

Objective – Implement Pollution Control Measures (PCMs) to produce tangible improvements to the quality of stormwater discharges in impaired local waterways and the Chesapeake Bay Watershed.

Plan Components –

- Describe Planning Area / Evaluate Pollutant Loading
- Propose PCMs to reduce pollutants

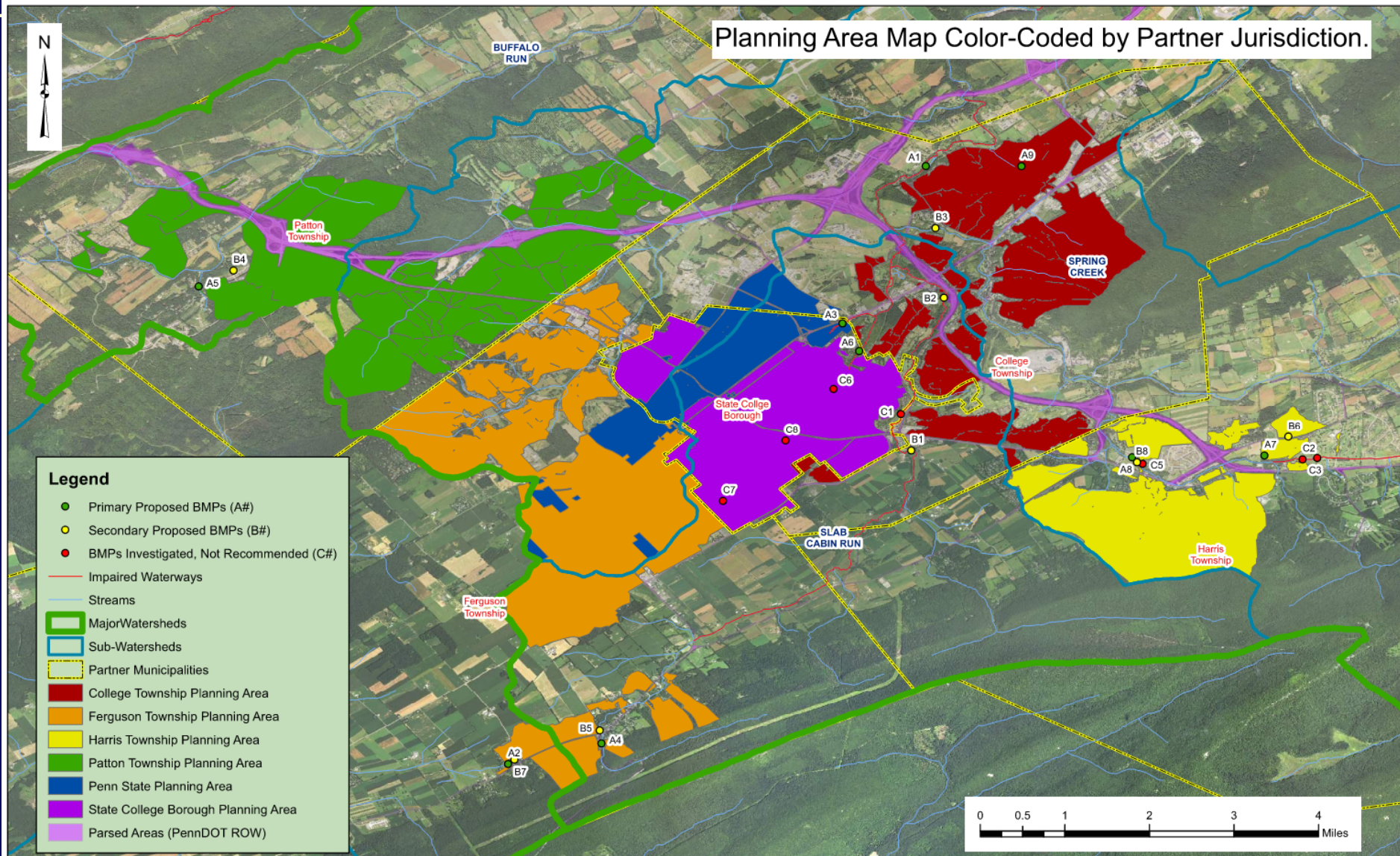


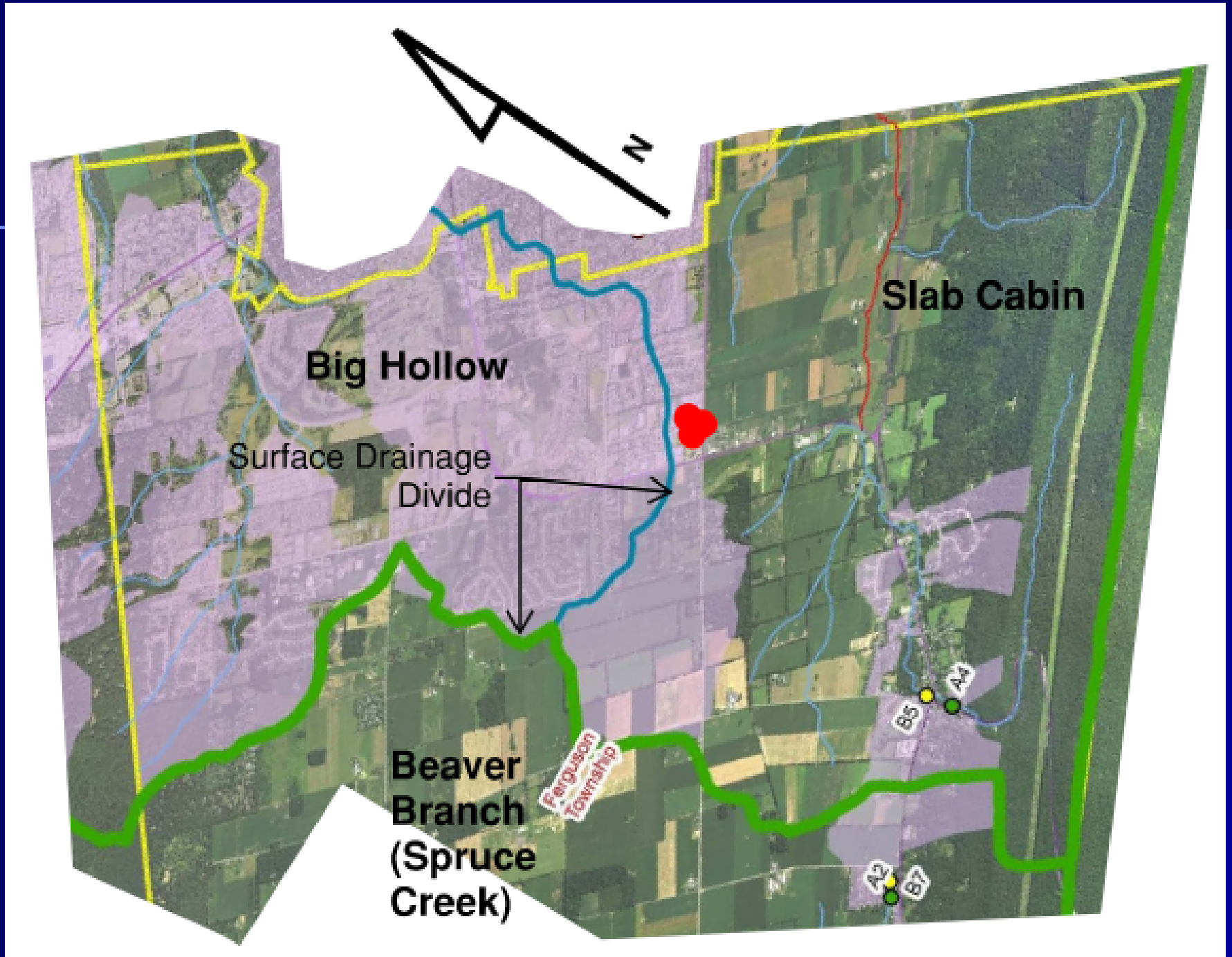
Approved PRP Highlights

- Completed study/plan development, by consultant, with MS4 Partners, using Mapshed
 - Approved with current MS4 Permit (July 2020).
 - Determined requirement for reduction of sediment pollutant loading is 10% (this permit cycle).
 - Identified PCMs to be implemented during permit cycle to address permit requirements.
- Required to design, obtain easements, permitting, and construction of PCMs within permit cycle.



Approved PRP- Planning Areas and Project Locations





Approved PRP-Loadings

Table D.3-3 Ferguson Township Existing Pollutant Load Summary

Watershed/Condition	TSS (lb./yr.)	TN (lb./yr.)	TP (lb./yr.)
Beaver Branch			
Baseload	100,703	1,309	63
Existing BMP Credit	0	0	0
Adjusted Baseload	100,703	1,309	63
Required Load Reduction	10,070	39	3
Spring Creek (Via Big Hollow)			
Baseload	1,461	672	2
Existing BMP Credit	0	0	0
Adjusted Baseload	1,461	672	2
Required Load Reduction	146	20	0
Slab Cabin Run (Spring Creek Watershed)			
Baseload	521,100	4,552	324
Existing BMP Credit	28,010	62	10
Adjusted Baseload	493,090	4,490	314
Required Load Reduction	49,309	135	16
Total Regulatory Load Reduction:	59,525	194	19



Approved PRP- Existing PCMs and BMPs - Load Reduction

BMP Identifier	Description of BMP	BMP Type	Longitude	Latitude	Date Installed	Municipality	Watershed	Permit Number
FT3	Infiltration Basin	RR	-77.89446	40.77944	2014	Ferguson Township	Big Hollow	Unknown
FT9.02	Infiltration Basin	RR	-77.88460	40.80102	2015	Ferguson Township	Big Hollow	Unknown
FT33	Infiltration Basin	RR	-77.89223	40.80578	2014	Ferguson Township	Big Hollow	Unknown
FT34	Infiltration Trench	RR	-77.88517	40.80475	2013	Ferguson Township	Big Hollow	Unknown
FT39	Rain Garden	RR	-77.90151	40.78238	2013	Ferguson Township	Big Hollow	Unknown
FT1.02	Detention Basin	RR	-77.89427	40.80423	2006	Ferguson Township	Big Hollow	Unknown
FT8	Retention Basin	ST	-77.86817	40.76939	2006	Ferguson Township	Slab Cabin	Unknown
FT11.01	Bioretention	RR	-77.89204	40.80629	2008	Ferguson Township	Big Hollow	Unknown
FT11.02	Special Detention	ST	-77.89200	40.80627	2008	Ferguson Township	Big Hollow	Unknown
FT17	Infiltration Trench	RR	-77.88588	40.80517	2012	Ferguson Township	Big Hollow	Unknown
FT18.01	Infiltration Basin	RR	-77.88656	40.80391	2010	Ferguson Township	Big Hollow	Unknown
FT18.02	Infiltration Trench	RR	-77.88603	40.80353	2010	Ferguson Township	Big Hollow	Unknown
FT22.01	Infiltration Trench	RR	-77.90151	40.78536	2005	Ferguson Township	Big Hollow	Unknown
FT22.02	Infiltration Trench	RR	-77.90098	40.78561	2005	Ferguson Township	Big Hollow	Unknown
FT36	Retention Basin	RR	-77.90003	40.77933	2005	Ferguson Township	Big Hollow	Unknown
FT41	Infiltration Basin	RR	-77.90050	40.78404	Unknown*	Ferguson Township	Big Hollow	Unknown
FT46	Retention Basin	RR	-77.90219	40.78303	2006	Ferguson Township	Big Hollow	Unknown
FT48.01	Retention Basin	RR	-77.87426	40.74403	2006	Ferguson Township	Slab Cabin	Unknown
FT48.02	Retention Basin	RR	-77.87406	40.74297	2006	Ferguson Township	Slab Cabin	Unknown
FT48.04	Retention Basin	RR	-77.87553	40.74027	2006	Ferguson Township	Slab Cabin	Unknown
FT54.05	Infiltration Trench	RR	-77.89480	40.75010	2012	Ferguson Township	Slab Cabin	Unknown
FT54.09	Infiltration Trench	RR	-77.88233	40.75755	2012	Ferguson Township	Slab Cabin	Unknown
FT61.01	Infiltration Trench	RR	-77.88988	40.80734	2005	Ferguson Township	Big Hollow	Unknown
FT61.03	Infiltration Trench	RR	-77.89081	40.80743	2005	Ferguson Township	Big Hollow	Unknown
FT61.04	Infiltration Trench	RR	-77.89052	40.80719	2005	Ferguson Township	Big Hollow	Unknown
FT37	Rain Garden	RR	-77.90226	40.78181	Unknown*	Ferguson Township	Big Hollow	Unknown
FT50.01	Infiltration Basin	RR	-77.89190	40.80329	2012	Ferguson Township	Big Hollow	Unknown
FT51.02	Infiltration Basin	RR	-77.89767	40.79120	2016	Ferguson Township	Big Hollow	Unknown
FT51.03	Infiltration Basin	RR	-77.89364	40.79074	2016	Ferguson Township	Big Hollow	Unknown
FT51.04	Infiltration Basin	RR	-77.89354	40.78917	2016	Ferguson Township	Big Hollow	Unknown
FT51.05	Infiltration Basin	RR	-77.89501	40.78667	2016	Ferguson Township	Big Hollow	Unknown
Street Trees	Street Trees	RR	N/A	N/A	N/A	Ferguson Township	Big Hollow	Unknown
Street Trees	Street Trees	RR	N/A	N/A	N/A	Ferguson Township	Slab Cabin	Unknown
Street Trees	Street Trees	RR	N/A	N/A	N/A	Ferguson Township	Slab Cabin	Unknown



PRP Insight

Insight for a better understanding:

- **Load reductions for local impaired waters must be addressed.**
- **To obtain load reductions within the local watershed, Twp has a choice to complete any combination of the primary and secondary projects. We have some level of choice to adjust the stream restoration projects based on project constraints and budgets, as long as we meet the reduction goals for the local watershed, using the approved projects.**
- **Modification of the PRP (e.g. project watershed, location or types) would require staff to:**
 - **Determine new projects and feasibility/complete MapShed modeling as required (est. 4-12 weeks)**
 - **Preliminary discussion and documentation with DEP (est. 4-12 weeks)**
 - **Complete Plan Updates for Advertising (est. 2-6 weeks)**
 - **Advertise for Public Comment (6 weeks)**
 - **Approval By BOS (est. 2 weeks)**
 - **Approval by DEP (est. 6-8 weeks)**
 - **Total Estimated Additional Time Frame = 24 - 46 weeks**
- **Any additional credit obtained through project completion may be credited to the next PRP cycle.**



Approved PRP PCMs

PRIMARY

Primary BMP Description	Watershed	Land Use	Expert Panel Protocol	TSS Reduction	Cost Sharing Partners
UNT to Slab Cabin Run (locally known as the Duck Pond Stream) Stream Restoration - A3 (1000 LF) A3	Slab Cabin Run	Pervious Urban	Protocol 1: Prevent Sediment during Stormflow	115,000 lb./yr.	Ferguson Twp. (17.5%) Penn State (62.5%) College Twp. (20%)
Pine Grove Mills Route 26 Stream Restoration - A4 (300 LF) A4	Slab Cabin Run	Pervious Developed	Protocol 1: Prevent Sediment during Stormflow	34,500 lb./yr.	Ferguson Twp. (100%)
Piney Ridge Subdivision Stream Restoration - A2 (350 LF) A2	Beaver Branch	Pervious Developed	Protocol 1: Prevent Sediment during Stormflow	40,250 lb./yr.	Ferguson Twp. (100%)

SECONDARY

BMP Description	Watershed	Land Use	Expert Panel Protocol	TSS Reduction	Cost Sharing Partners
Meyer-Everhart Farm Streamside Forest Buffer (3,723 LF) - B1 B1	Slab Cabin Run	Pasture	NA	1,501 lb./yr.	Borough of State College Ferguson Twp. College Twp. Harris Twp.
Stream Restoration Pine Grove Mills Downstream of the Route 45 and Route 26 Intersection - B5 B5	Slab Cabin Run	Pervious Developed	Protocol 1: Prevent Sediment during Stormflow and Protocol 3: Floodplain restoration	23,000 lb./yr.	Ferguson Twp.
Wyoming Avenue Stream Restoration (upstream) - B7 B7	Beaver Branch	Pervious Developed	Protocol 1: Prevent Sediment during Stormflow and Protocol 3: Floodplain restoration	23,000 lb./yr.	Ferguson Twp.

Credit for Stream Bank Stabilization = 115 lbs/lf/year (Understood by industry to offer the most credit for the least cost)



PCM Locations



PRP PROJECT UPDATE

Highlight Updates

- **Background Research**
- **Owner notifications**
- **Field Meetings with DEP, CCCD, TU, Clearwater Conservancy, Owners to determine permitting and basis of design**
- **Preparation of concept level design/modeling, sketches and cost estimates**
- **Correspondence with DEP/MS4 group for design and crediting options**
- **Coordination with permitting agencies on environmental sensitivity**

Challenges

- **Balancing land-owner impacts and project costs with PRP requirements**
- **Current urban condition- locations of infrastructure and flooding**
- **Design limitations and constraints (geomorphic, environmental, life of project expectations, etc.)**
- **Fragmented projects must consider upstream and downstream impacts**
- **Design Time: These are intensive design/permitting projects which typically require a team of consultants significant time for design, permitting and construction ready documentation**
- **Costs: Projects have a significant potential to go well over the typical linear foot costs because of hard armoring techniques required and limited space-requiring ROW acquisition, etc.**



PRP Budgets and Estimates

2019 PRP Construction Costs = \$258,250

Project	Lead Municipality or Institution	Costs						
		Capital Cost per Unit	Capital Unit	Annual O&M Cost per Unit	Design Life (yr.)	Unit Size	O&M Cost Over Life	Capital Cost
Piney Ridge Stream Restoration - UNT Beaver Branch (A2)	Ferguson Twp.	\$225.00	LF	\$3.05	20	350	\$21,350	\$78,750
Duck Pond Channel Restoration - UNT Slab Cabin Run (A3) 17.5%	Penn State	\$640.00	LF	\$8.60	20	1000	\$172,000	\$640,000
Pine Grove Mills Stream Restoration - Slab Cabin Run (A4)	Ferguson Twp.	\$225.00	LF	\$3.05	20	300	\$18,300	\$67,500

Stormwater Fee Cost of Service Model Through 2024 = \$575,000

Capital Projects	FY22	FY23	FY24	FY25	FY26
MS4 Chesapeake Bay Pollutant Reduction Plan Implementation (Design, ROW, Permitting, 1 Construction)	\$ 75,000	\$ 250,000	\$ 250,000	\$ -	

CIP Budget through 2025 = \$750,000

FERGUSON TOWNSHIP						
2023 – 2027 CIP CAPITAL PROJECTS DETAIL-CASH BASIS						
STORMWATER FUND PROJECTS						
DESCRIPTION	2023	2024	2025	2026	2027	TOTAL
MS4 Chesapeake Bay Pollutant Reduction Program	250,000	250,000	250,000		75,000	825,000

PRP Conceptual Estimates

Primary Projects	Length	Construction Cost Low	Construction Cost High	Design/ Permit/ROW Acquisition	Total Cost Low	Total Cost High
A2 - Piney Ridge - Below Wyoming Ave - Beaver Branch	350	\$ 210,000	\$ 245,000	\$ 64,000	\$ 274,000	\$ 309,000
A2 Alt* - Piney Ridge - Below Wyoming Ave - Beaver Branch	150	\$ 90,000	\$ 105,000	\$ 27,429	\$ 117,429	\$ 132,429
A3- Duck Pond - Slab Cabin	175		100,000	NA		100,000
A4 - Chestnut to Butternut - Slab Cabin	300	\$ 495,000	\$ 666,140	\$ 217,181	\$ 712,181	\$ 883,321
A4 Alt* - Chestnut to Butternut - Slab Cabin	518	\$ 847,000	\$ 1,150,200	\$ 375,000	\$ 1,222,000	\$ 1,525,200
			Total Cost Low		Total Cost High	
		Total Costs (A2+A3+A4)	\$1,086,181		\$1,292,321	
		Total Costs (A2+Alt A4*)	\$1,496,000		\$1,834,200	
		Total Costs (A2 Alt*+A3+A4)	\$929,610		\$1,115,750	
		Total Costs (A2 Alt*+A4 Alt*)	\$1,339,429		\$1,657,629	



Cost - Explained

Items impacting project costs:

- **Original estimates were only for construction.**
- **Original cost estimate were based on guidance for much smaller drainage areas (smaller facilities). In review of other more recent pricing estimates, these types of projects are known to costs the \$600-\$800 per LF.**
- **Designing for the 100-Year Storm (considering design parameters, these restorations require hard armoring vs soft armoring and habitat rehabilitation)**
- **Space requirements in urban setting.**
- **Easement acquisition.**
- **Steep drainage features require larger materials for stabilization**
- **Urban areas require walls to minimize impacts to homes/properties.**
- **Work is on private property (Slab Cabin) where easements will need to be aquired.**



PRP Project Choices

What is requirements to meet our minimum nutrient load reduction?

Beaver Branch = 10,070 lbs/yr

Projects in Beaver Branch Watershed:

A2 or A2 Alt* - Piney Ridge Subdivision Stream Restoration– 350 or 150 L.F. below Wyoming Ave. (40,250 or 17,250 lb/yr)

B7 - Piney Ridge Subdivision Stream Restoration – 200 L.F. above Wyoming Ave. (23,00 lb/yr)

Choose 1

Spring Creek (Big Hollow and Slab Cabin) = 49,455 lbs/yr (146 +49,309)

Projects in Spring Creek Watershed (Big Hollow and Slab Cabin):

A3 - Duck Pond Stream Restoration– 1000 LF, (Twp. receives 17.5% credit or 20,125 lbs/yr)

A4 or A4 Alt*- Slab Cabin Stream Restoration – 300-518* LF between Chestnut and Butternut Street (34,000 or 59,570 lbs/yr)

B1 - Myers-Everhart Farm Buffer Township receives up to 1501 lbs/year

B5 or B5 Alt*- Slab Cabin Stream Restoration Below the intersection of Rt 26 and Rt 45 – 200-300* LF (23,000-34,500 lbs/yr)

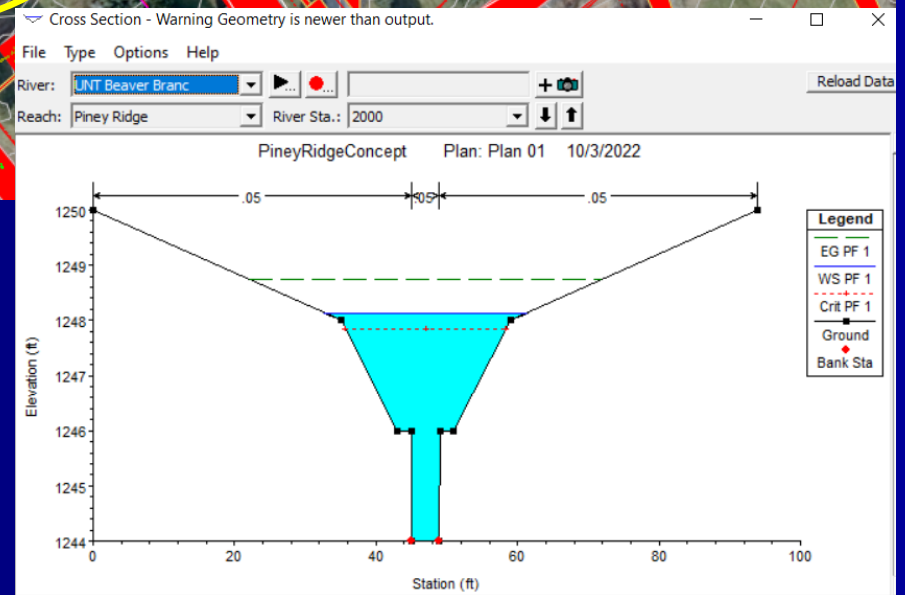
Possible Combinations: A3 + A4, A3 + B5 Alt*, A4 Alt*

*** Based on correspondence, the PRP projects linear footages are approximates that may be adjusted depending on limitations; however this will be confirmed with DEP and the reduced/expanded project must be feasible from an engineering standpoint.**



Piney Ridge Stream Restorations

Project A2, A2 Alt* or B7 - Beaver Branch

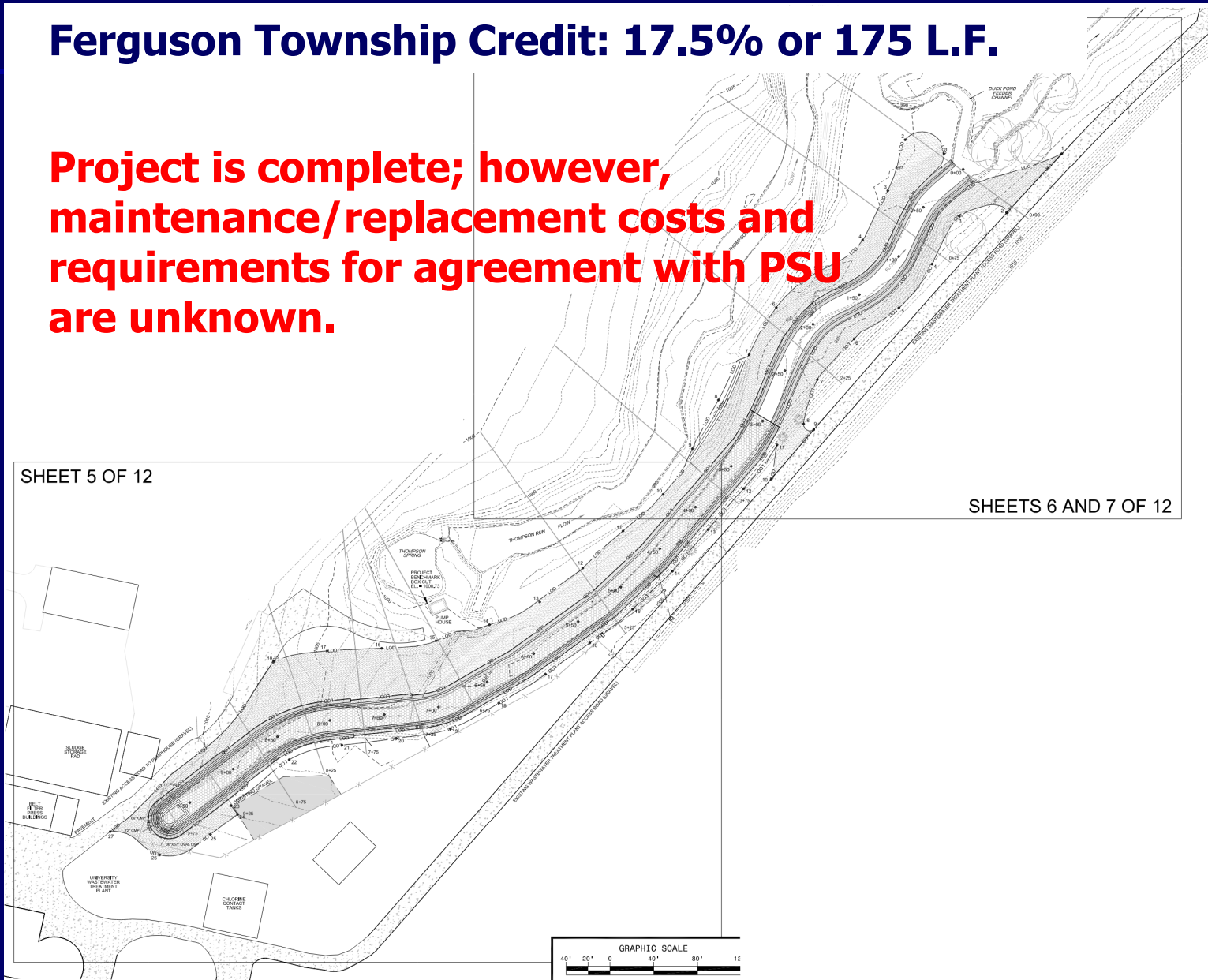


Slab Cabin – Duck Pond Stream Restoration

Project A3 Shared with PSU, Borough of State College and Ferguson Township

Ferguson Township Credit: 17.5% or 175 L.F.

Project is complete; however, maintenance/replacement costs and requirements for agreement with PSU are unknown.



Next Steps

- **Understand if there is any Board objections, for staff to continue gathering information from PSU, on what an agreement and maintenance costs for the Duck Pond project might cost.**
- **Obtain boundary and topographic survey**
- **Continue coordination with potential partners and owners**
- **Continue development of conceptual design approaches into preliminary design, to better understand constraints and potential costs. (Likely Late Spring or Early Summer depending on when survey is received and other work duties)**
- **Update to BOS at work session or regular meeting on preliminary design information**
- **Determine which projects to move forward in final design process**
- **Outreach with adjoining property owners and public**
- **Utility adjustments, right of way acquisition, permits, final design**
- **Construction (completed by June 2025)**



MS4 – SWMP Review

Questions?