

# RADNOR TOWNSHIP

## Pollution Reduction Plan (PRP) and Notice of Intent (NOI)

- Required by PaDEP
- Municipal Separate Storm Sewer System (MS4)
- 2018 General Permit (PAG-13) effective March 2018
- Due **September 16, 2017**
- 45 Day Public Notice
- Focus on stream health



# RADNOR HAS A STORMWATER PERMIT

## 2013 PAG-13 (Expiring)

- Six Minimum Controls
  - Public Education and Outreach
  - Public Involvement / Participation
  - Illicit Discharge Detection & Elimination
  - Construction Site Stormwater Runoff Control
  - Post-Construction Stormwater Management (PCSM)
  - Pollution Prevention Good Housekeeping

3800-FM-SPNP3M0431 Rev. 4/2014  
MS4 Annual/Progress Report

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

**MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4)  
ANNUAL/PROGRESS REPORT**

For the Reporting Period: 16 March 2014 to 16 March 2016

Annual Report  Progress Report Due Date: 13 May 2016  
 New Permittee  Renewal Permittee

GENERAL INFORMATION					
Permittee Name:	Radnor Township	NPDES Permit No.:	PA130102		
Mailing Address:	301 Iven Avenue	Effective Date:	February 16, 2013		
City, State, Zip:	Wayne, PA 19087	Expiration Date:	February 16, 2018		
MS4 Contact Person:	Stephen F. Norcini, PE	Renewal Due Date:	August 16, 2017		
Title:	Director of Public Works	Admin. Extended?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
Phone:	610-688-5600	Municipality:	Radnor Township		
Email:	SNorcini@Radnor.org	County:	Delaware		
Co-Permittees (if applicable): N/A					

WATER QUALITY INFORMATION					
Are there any discharges to waters within the Chesapeake Bay Watershed? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
Identify all surface waters that receive stormwater discharges from storm sewers within the MS4 urbanized area and provide the requested information (see instructions).					
Receiving Water Name	Ch. 93 Class.	Impaired?	Cause(s)	TMDL?	WLA?
Darby Creek	CWF	YES	Urban Runoff/Storm Sewers	NO	NO
Ithan Creek	CWF	YES	Cause Unknown (5), Other Habitat Alterations, WaterFlow Variability (4c)	NO	NO
Meadowbrook Run	CWF	YES	Urban Runoff/Storm Sewers	NO	NO
Gulph Creek	WWF	YES	WaterFlow Variability (4c)	NO	NO
Mill Creek	TSF	YES	WaterFlow Variability (4c)	NO	NO
*See attachment for additional streams within Township*					

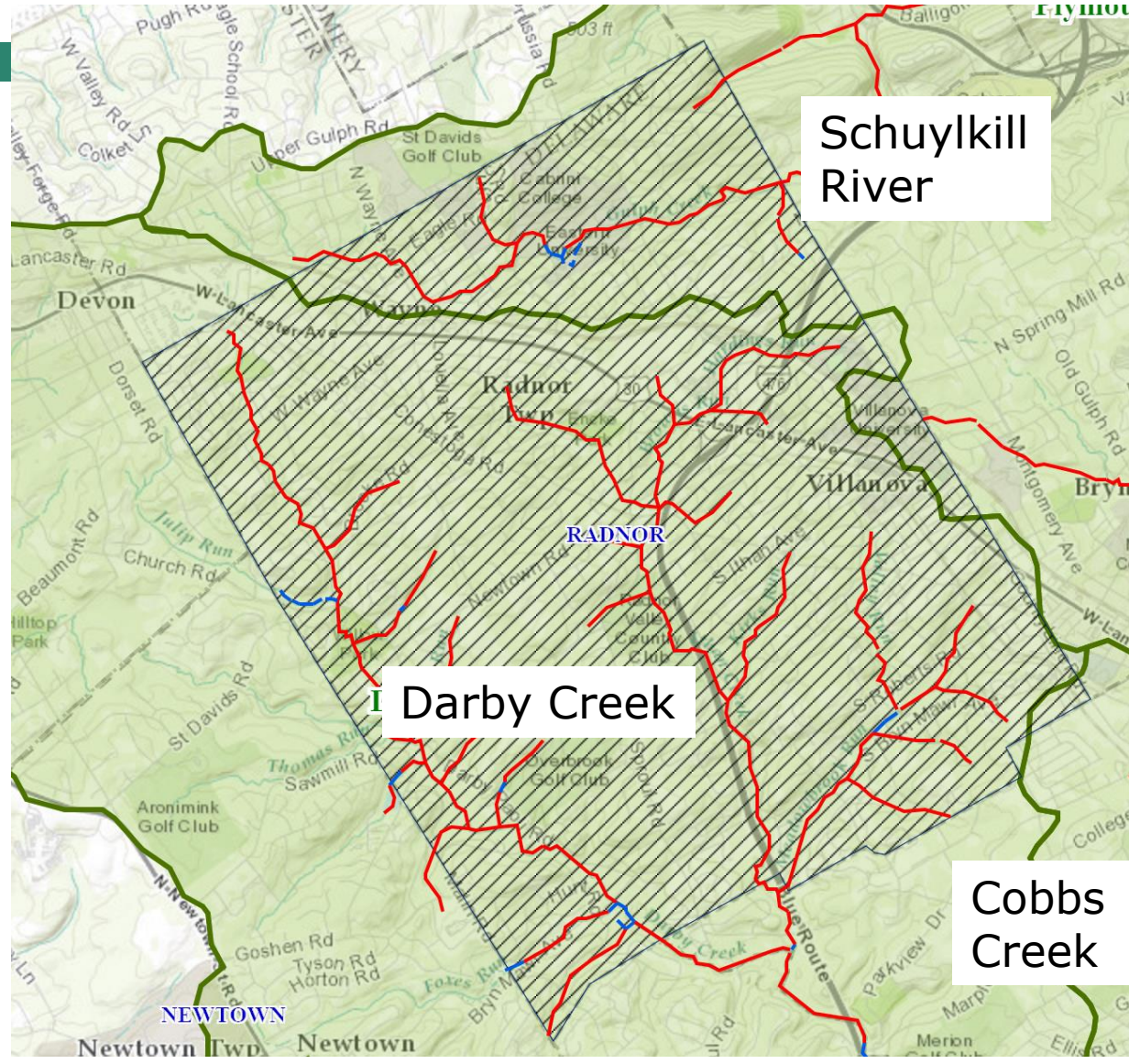
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# WHAT HAS CHANGED IN THE 2018 PERMIT?

## Pollution Reduction Plan

- Required for local waters impaired by sediment or nutrients (nitrogen or phosphorus)
- Three drainage areas (or *Hydrologic Unit Code HUC 12* areas in the terminology of the *US Geologic Survey*)





# WHAT IS AN IMPAIRED WATER?

- “Current pollution control technologies alone cannot meet the water quality standards set for that waterbody”. *EPA*
- Too polluted or degraded
- Section 303(d) of the Clean Water Act
- Updated every 2 years

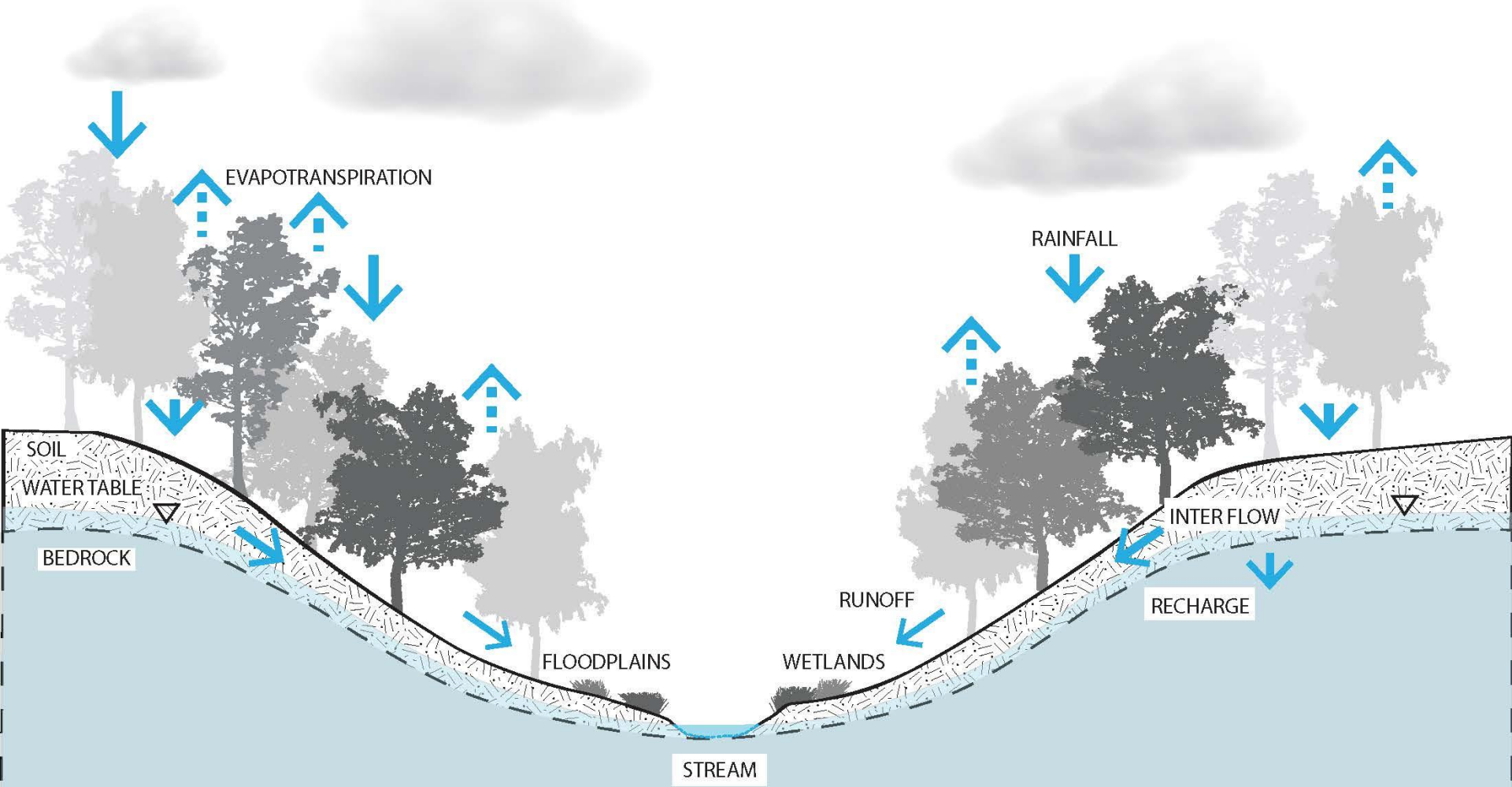
*Sediment from streambank erosion is a primary pollutant*

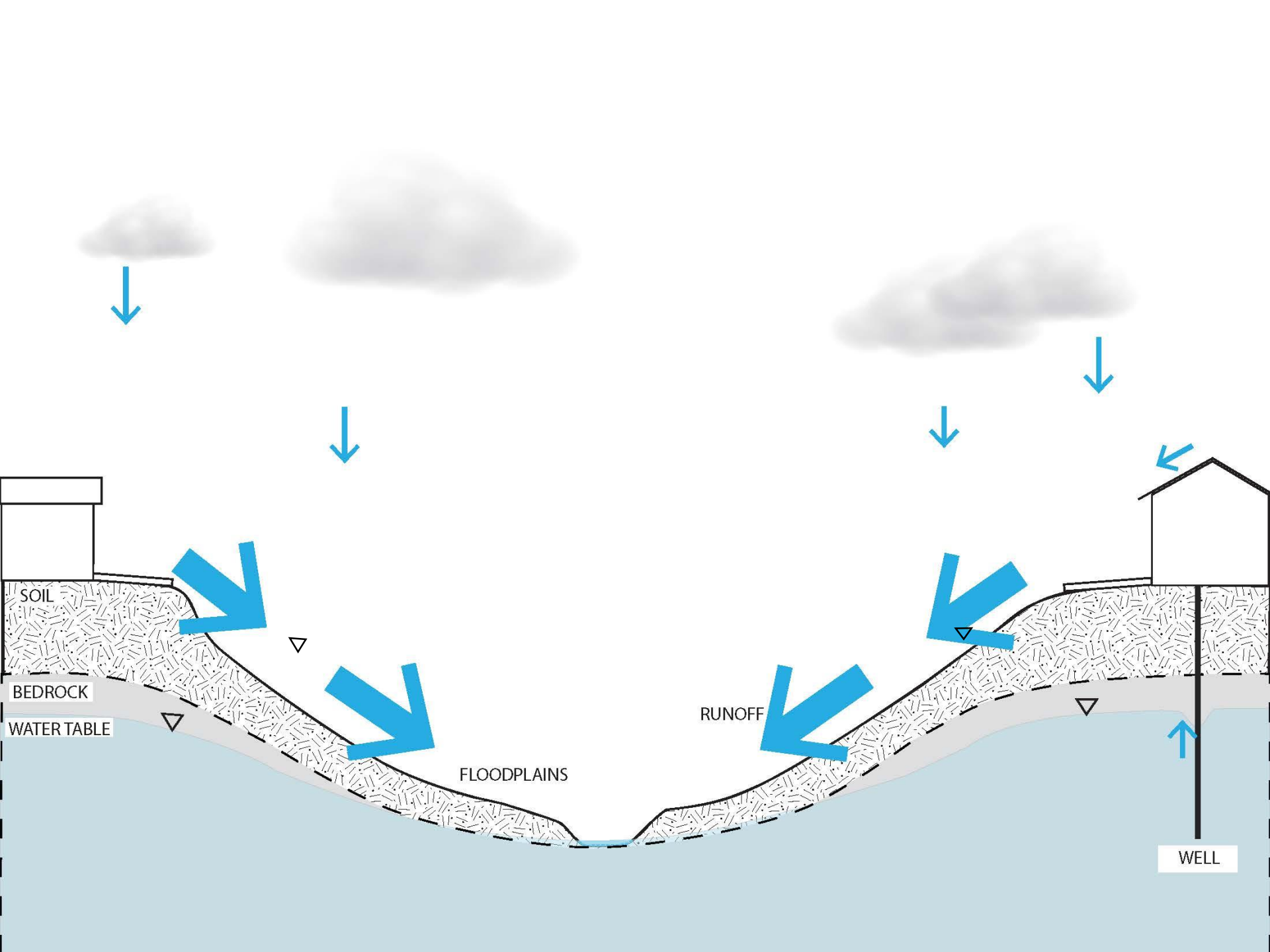
PaDEP published municipal stream list

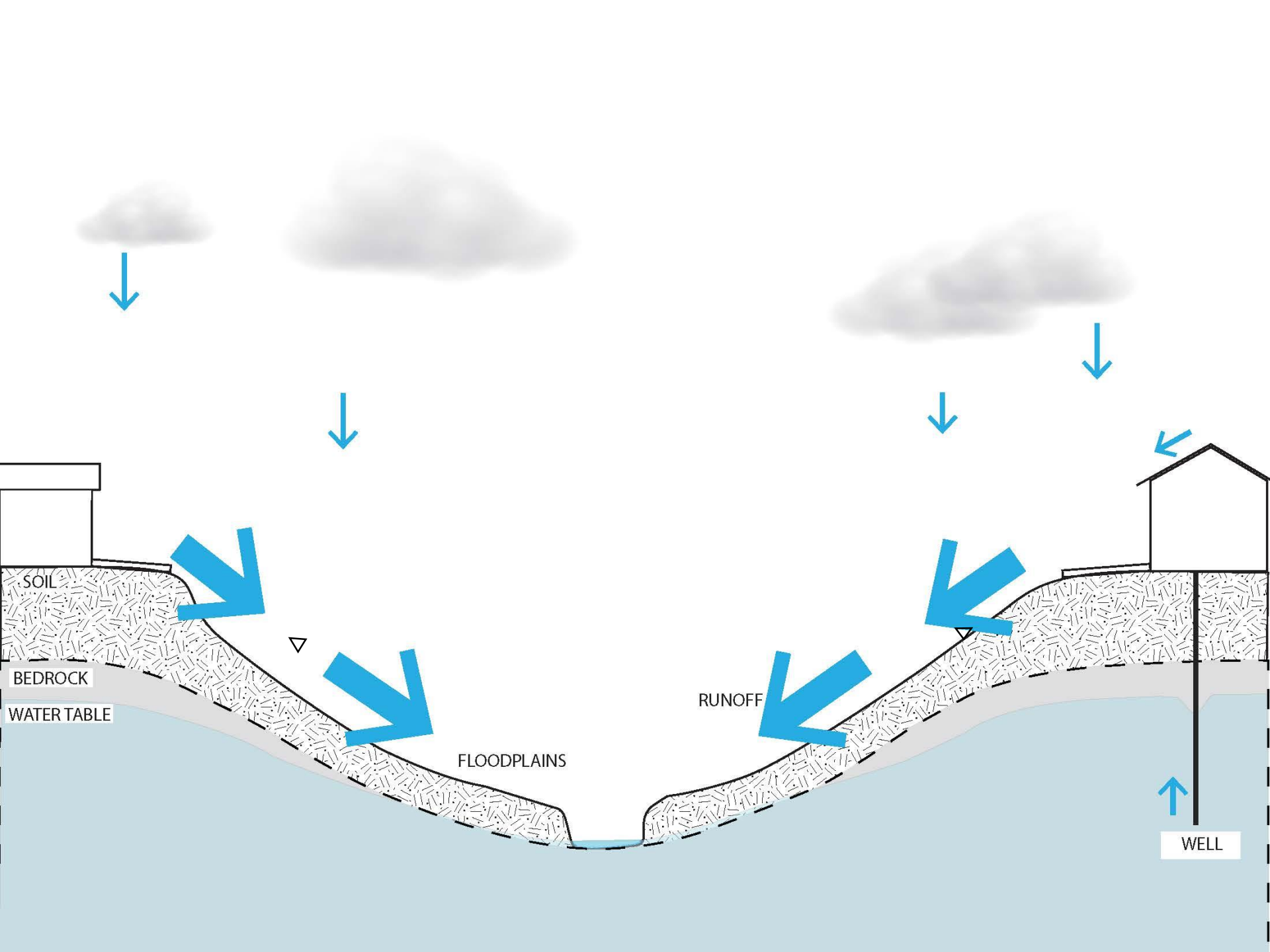


Impaired Downstream Waters or Applicable TMDL Name	Requirement(s)	Other Cause(s) of Impairment
Gulph Creek	Appendix E-Siltation (3)	Water/Flow Variability (4c)
Schuylkill River	Appendix C-PCB (4a)	
Saw Mill Run	Appendix C-PCB (3)	Cause Unknown (3), Water/Flow Variability (4c)
Mill Creek	Appendix E-Nutrients, Siltation (3)	Water/Flow Variability (4c)
Miles Run	Appendix C-PCB (3)	Cause Unknown (3), Water/Flow Variability (4c)
Meadowbrook Run	Appendix C-PCB (3), Appendix E-Siltation (3)	Cause Unknown (3), Other Habitat Alterations, Water/Flow Variability (4c)
Little Darby Creek	Appendix C-PCB (3)	Cause Unknown (3), Water/Flow Variability (4c)
Kirks Run	Appendix C-PCB (3), Appendix E-Siltation (3)	Cause Unknown (3), Other Habitat Alterations, Water/Flow Variability (4c)
Cobbs Creek	Appendix B-Pathogens (3), Appendix C-PCB (3), Appendix E- Siltation (3)	Cause Unknown (3), Other Habitat Alterations, Water/Flow Variability (4c)
Hardings Run	Appendix C-PCB (3), Appendix E-Siltation (3)	Cause Unknown (3), Other Habitat Alterations, Water/Flow Variability (4c)
Abrahams Run	Appendix C-PCB (3)	Cause Unknown (3), Water/Flow Variability (4c)
Foxes Run	Appendix C-PCB (3), Appendix E-Siltation (3)	Cause Unknown (3), Other Habitat Alterations, Water/Flow Variability (4c)
Finn Run	Appendix C-PCB (3), Appendix E-Siltation (3)	Cause Unknown (3), Other Habitat Alterations, Water/Flow Variability (4c)
Doom Run	Appendix C-PCB (3), Appendix E-Siltation (3)	Cause Unknown (3), Other Habitat Alterations, Water/Flow Variability (4c)
Darby Creek	Appendix C-PCB (3), Appendix E-Siltation (3)	Cause Unknown (3), Other Habitat Alterations, Water/Flow Variability (4c)
Camp Run	Appendix C-PCB (3)	Cause Unknown (3), Water/Flow Variability (4c)
Browns Run	Appendix C-PCB (3), Appendix E-Siltation (3)	Cause Unknown (3), Other Habitat Alterations, Water/Flow Variability (4c)
Valley Run	Appendix C-PCB (3), Appendix E-Siltation (3)	Cause Unknown (3), Other Habitat Alterations, Water/Flow Variability (4c)
Ithan Creek	Appendix C-PCB (3), Appendix E-Siltation (3)	Cause Unknown (3), Other Habitat Alterations, Water/Flow Variability (4c)

# Healthy Stream Channel









- Too much runoff for channel
- Stream channel erosion releases sediment
- Pools and riffles are lost
- Large storms cannot reach floodplains- worsens downstream flooding
- Less recharge = less baseflow





# WHAT DOES A PRP INVOLVE?

- Radnor must **estimate the pollutant load** from all areas that drain to a storm sewer
  - Pounds per year
- In each stream segment
  - Quantify pollutant load
  - **Identify Best Management Practices** to reduce the load per PaDEP guidelines.
  - Reduce by 10% sediment, nutrients
- **Implement BMPs** within 5 years

*New Built projects, retrofits, ordinance changes*

*Existing BMP projects can reduce load*



# DIFFERENT BMPs HAVE DIFFERENT VALUES

Calculated as “percent reduction” - sediment examples



## Stream Channel Restoration

- 44.88 Pounds / foot / year



## Treatment

- Detention: 10%
- Extended detention 60%
- Retrofit existing basins



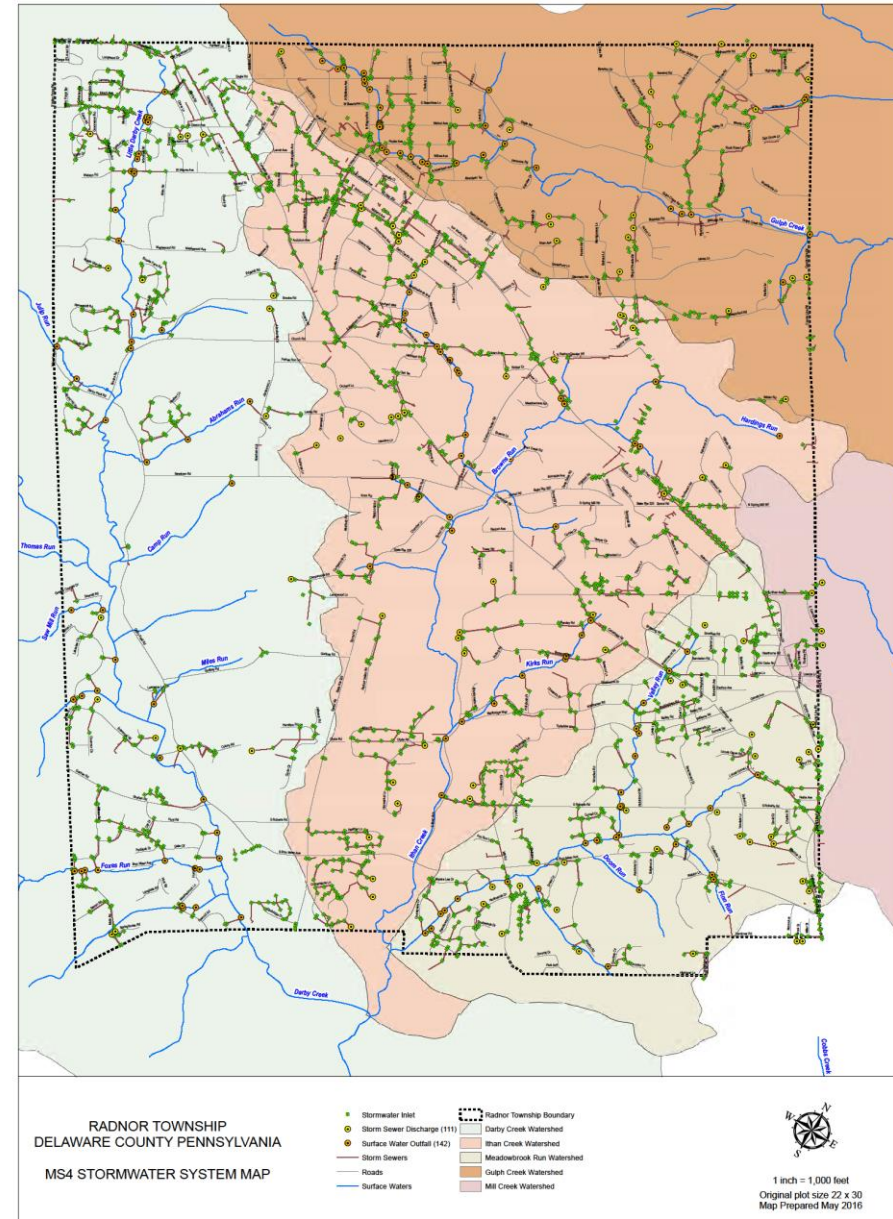
## Infiltration

- Porous pavement 85 %
- Bioretention B soils 90%



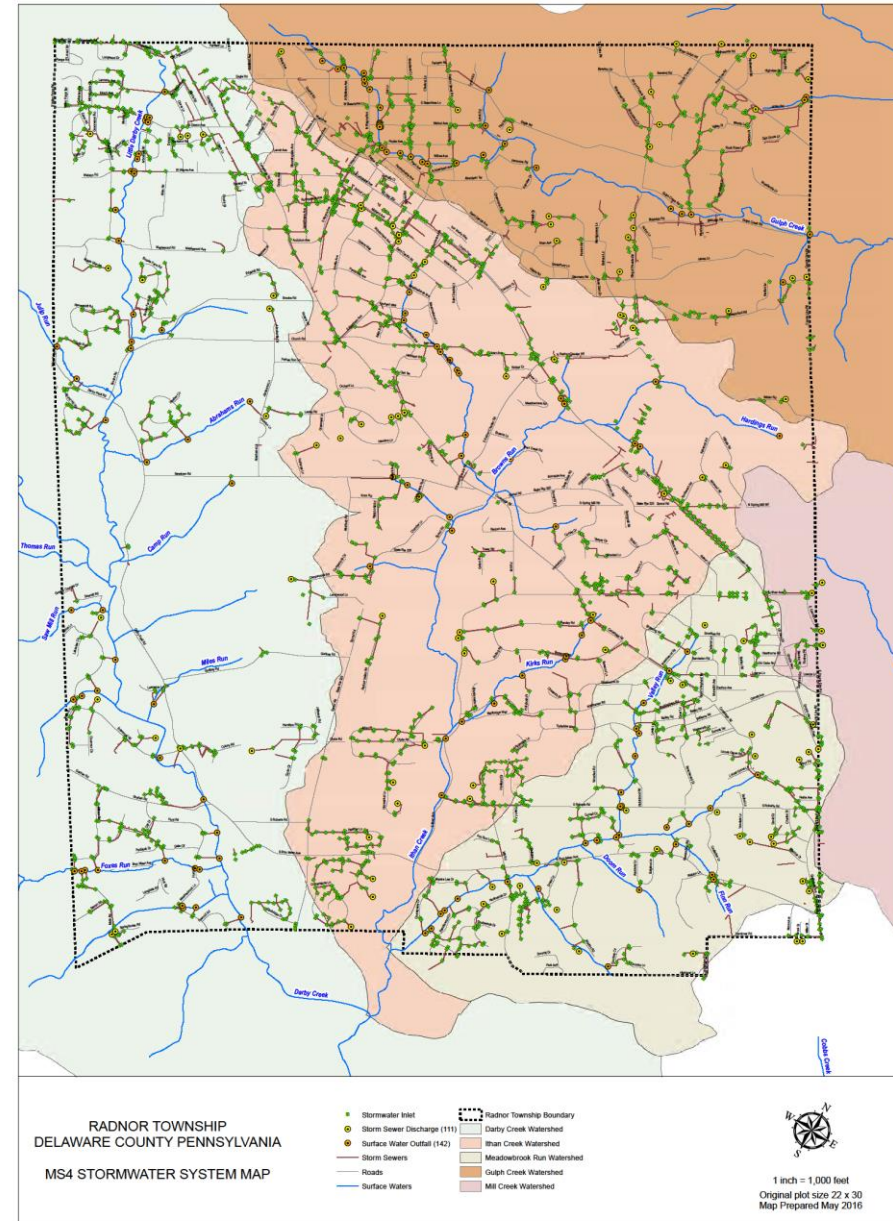
# PRP REQUIREMENTS

1. Map storm sewers and outfalls
2. Calculate pollutant load to each stream (focus on sediment)
3. Identify specific BMP projects and locations
4. Estimate the pollutant load reduction for each BMP project
5. Meet 10% Reduction: sediment
6. Implement projects within 5-year permit term
7. Maintenance



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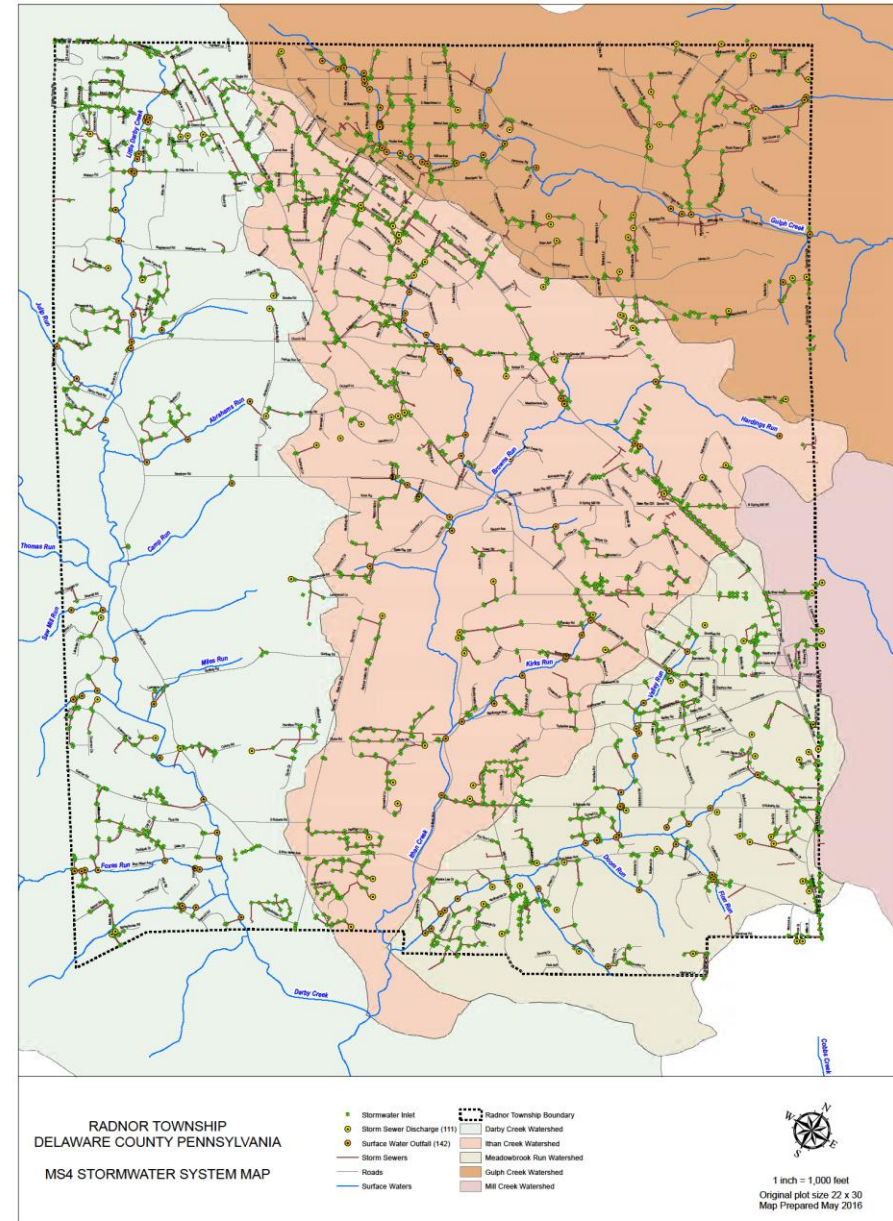
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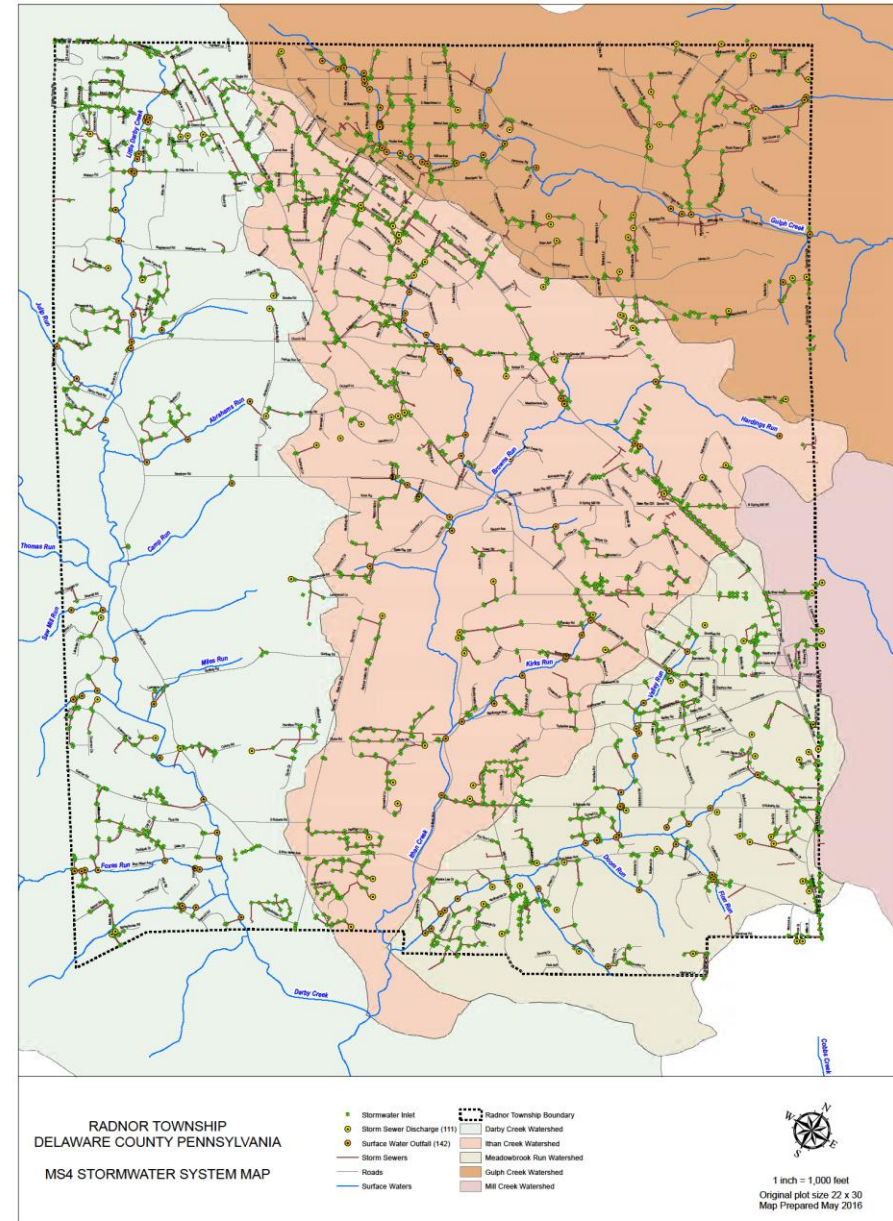
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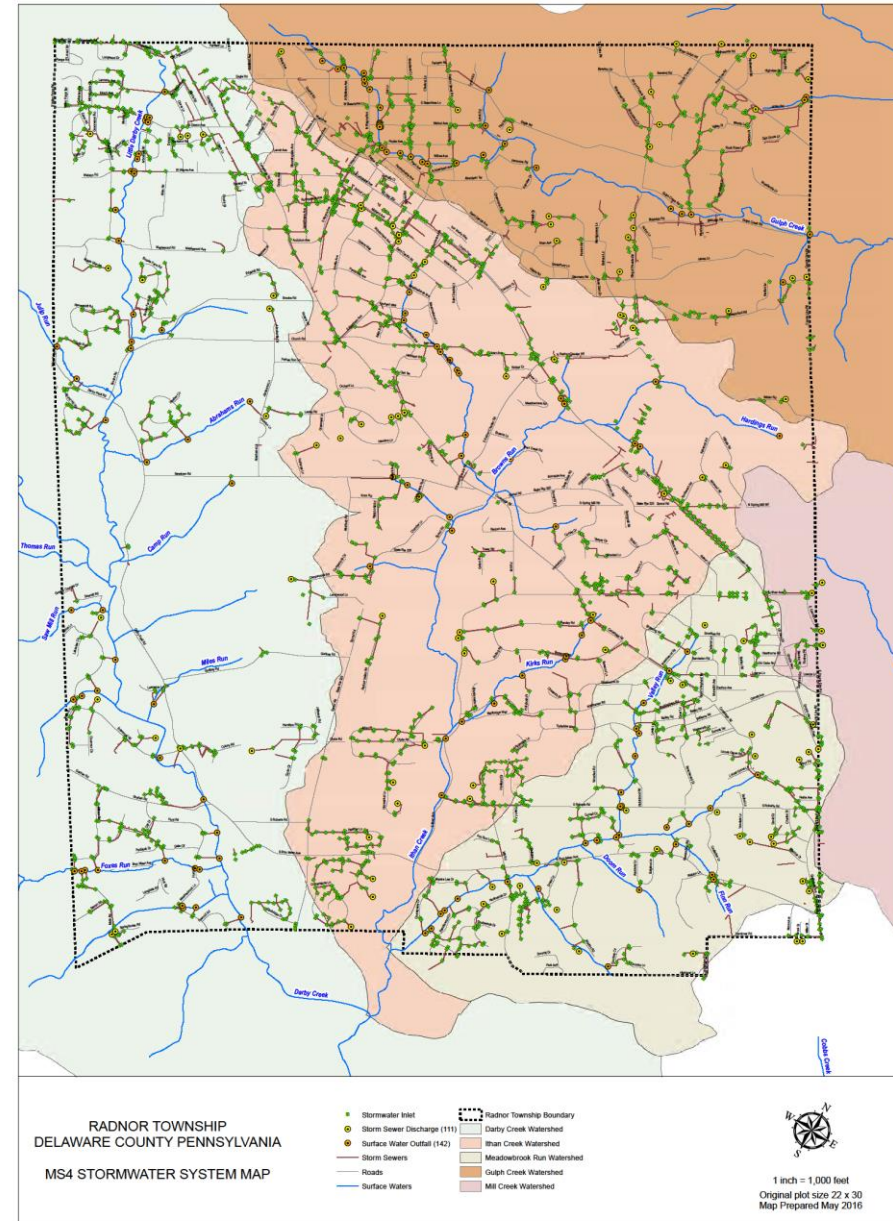
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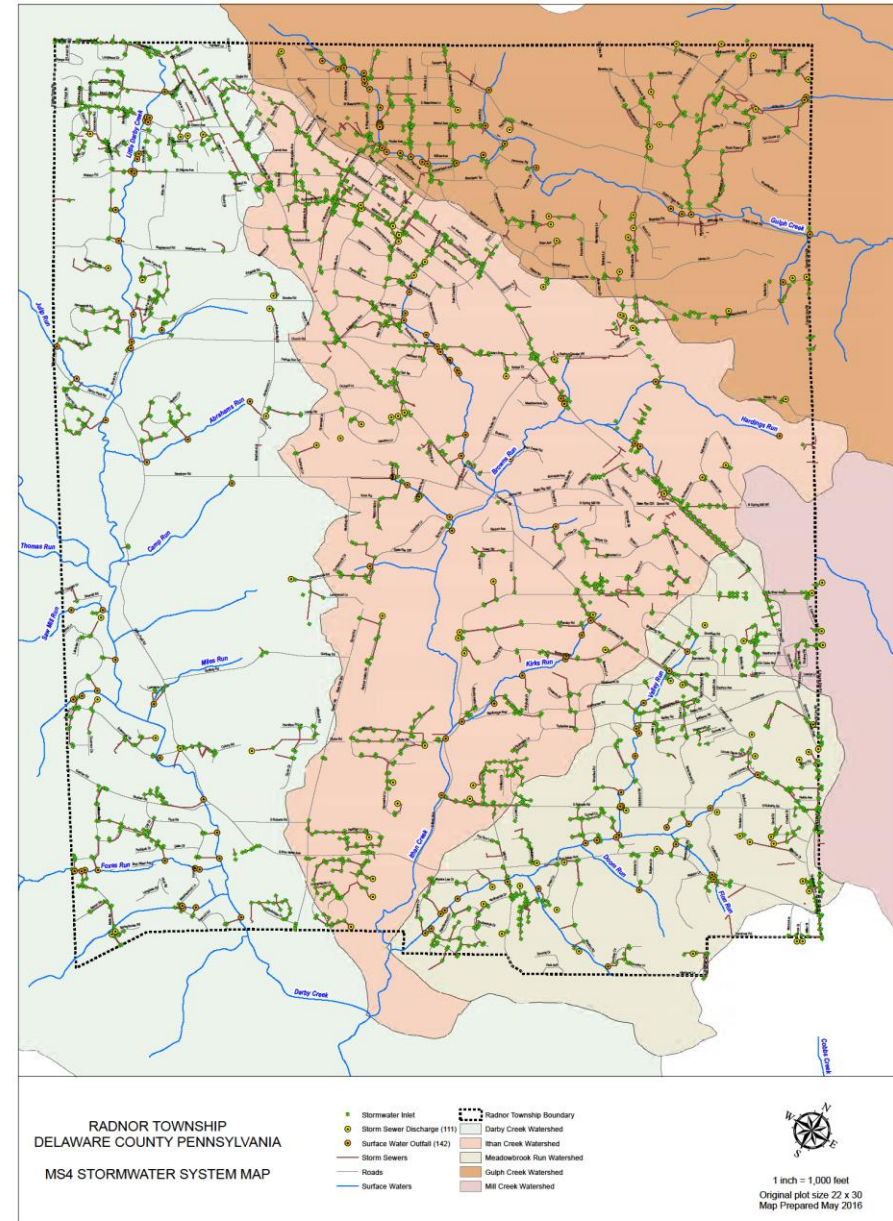
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5. Meet 10% Reduction: sediment
6. **Implement projects within 5-year permit term**
7. Maintenance





# CHOICES TO ESTIMATE POLLUTANT LOADS

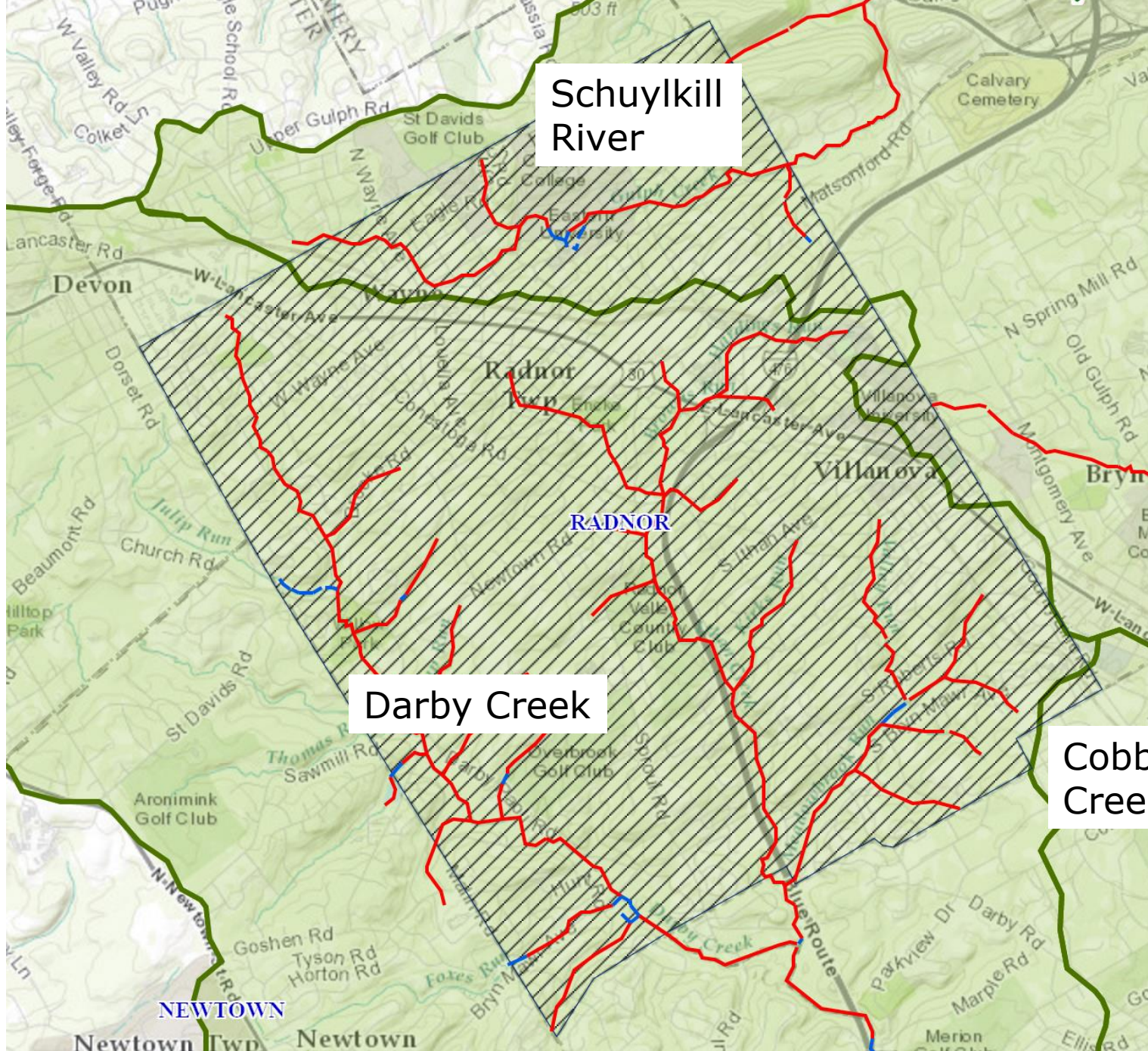
## Calculations

1. Simple Method: Sediment
  - Impervious 1,839 pounds/acre/year x area
  - Pervious 264.96 pounds/acre/year x area
2. Or MapShed – PaDEP approved model

## Area Evaluated

1. Entire Township or
2. Only areas that drain to storm sewers (parsed)
  - Does not include direct drainage to streams
  - Does not include PennDOT Right-of-way

*We have done it two ways*



Schuylkill River

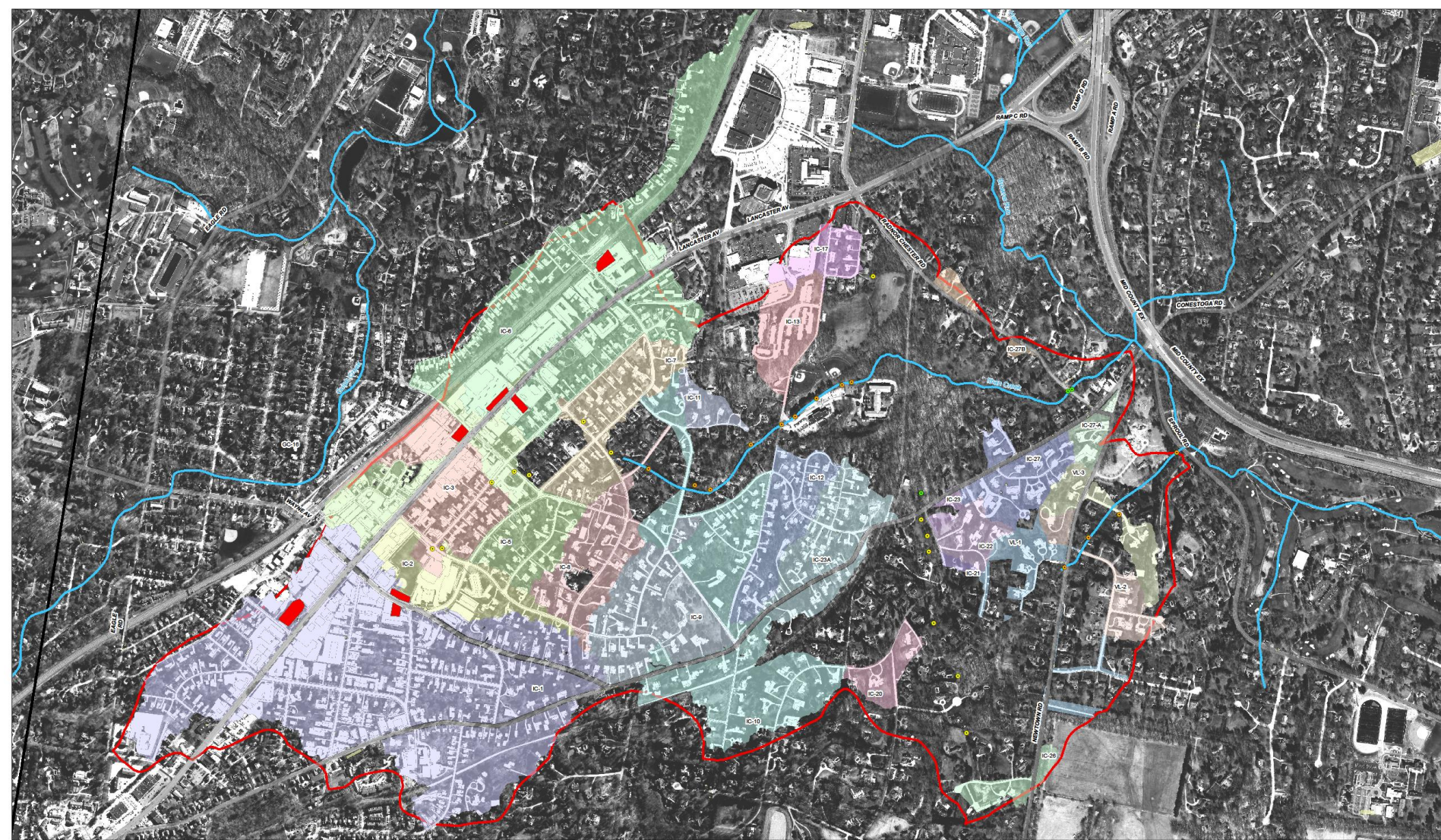
Darby Creek

Cobbs Creek

NEWTOWN

Newtown Twp. Newtown





**Legend**

- Added Outfall: Upper Ithan
- Storm Sewer Discharge
- Surface Water Discharge
- Proposed BMP: Upper Ithan
- PADEP Impaired Streams (2016)
- Stormwater System Areas (Polygon, MapInfo)
- Impervious

Scale: 1" = 5000'

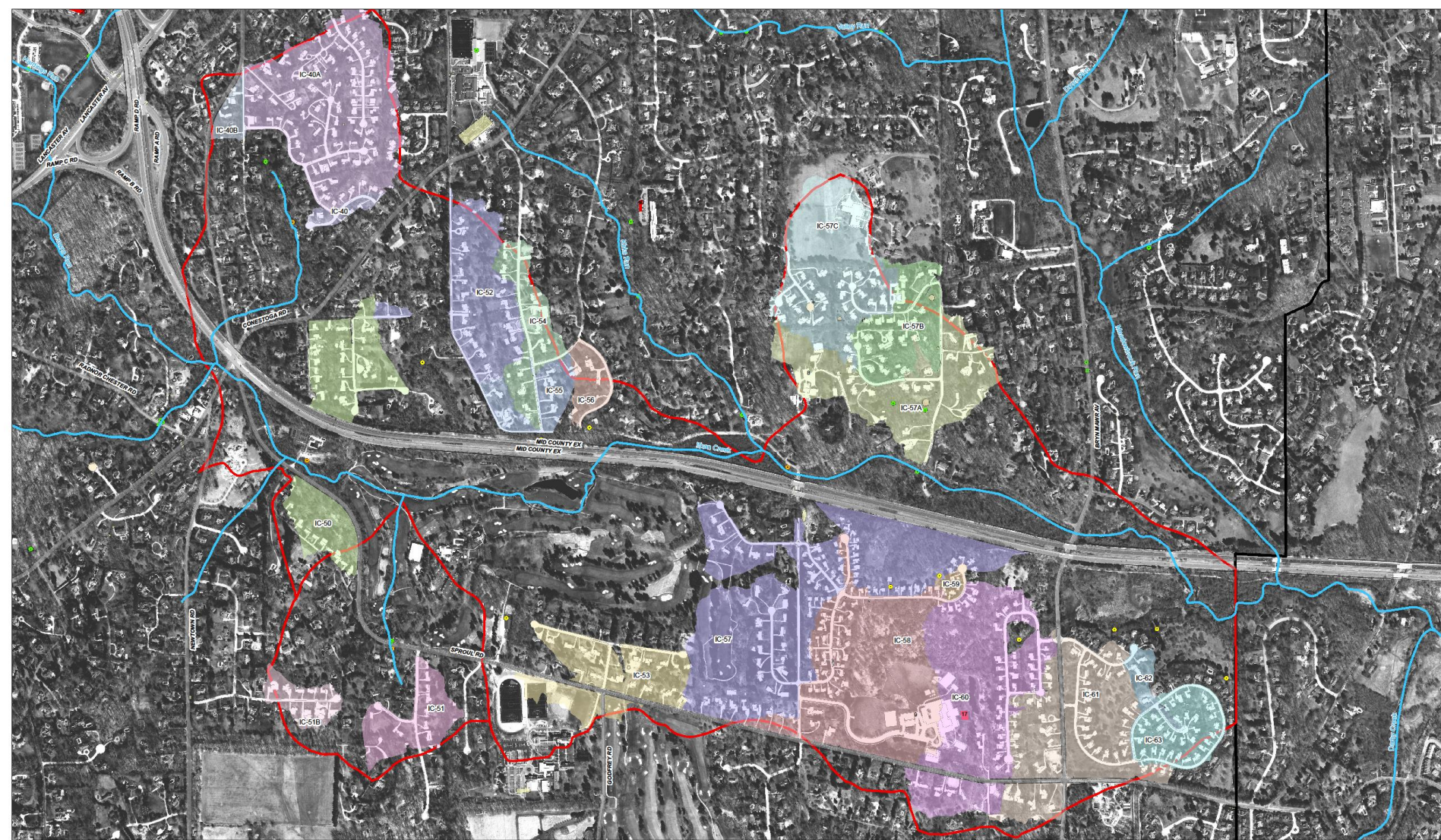


**Radnor Township**

Upper Ithan Creek  
Watershed  
(Including Van Lear's Run)

# Ithan Creek North Watershed Drainage Areas to Storm Sewers





- Legend**
- PADEP Impaired Streams (2016)
  - Stormwater System Areas (Ellipse, MapInfo)
  - Stormwater System Areas (Polygon, MapInfo)
  - Impervious
  - Proposed BMP
  - Added Outfalls: Lower Ithan
  - Storm Sewer Discharge
  - Surface Water Discharge

Scale: 1" = 5000'

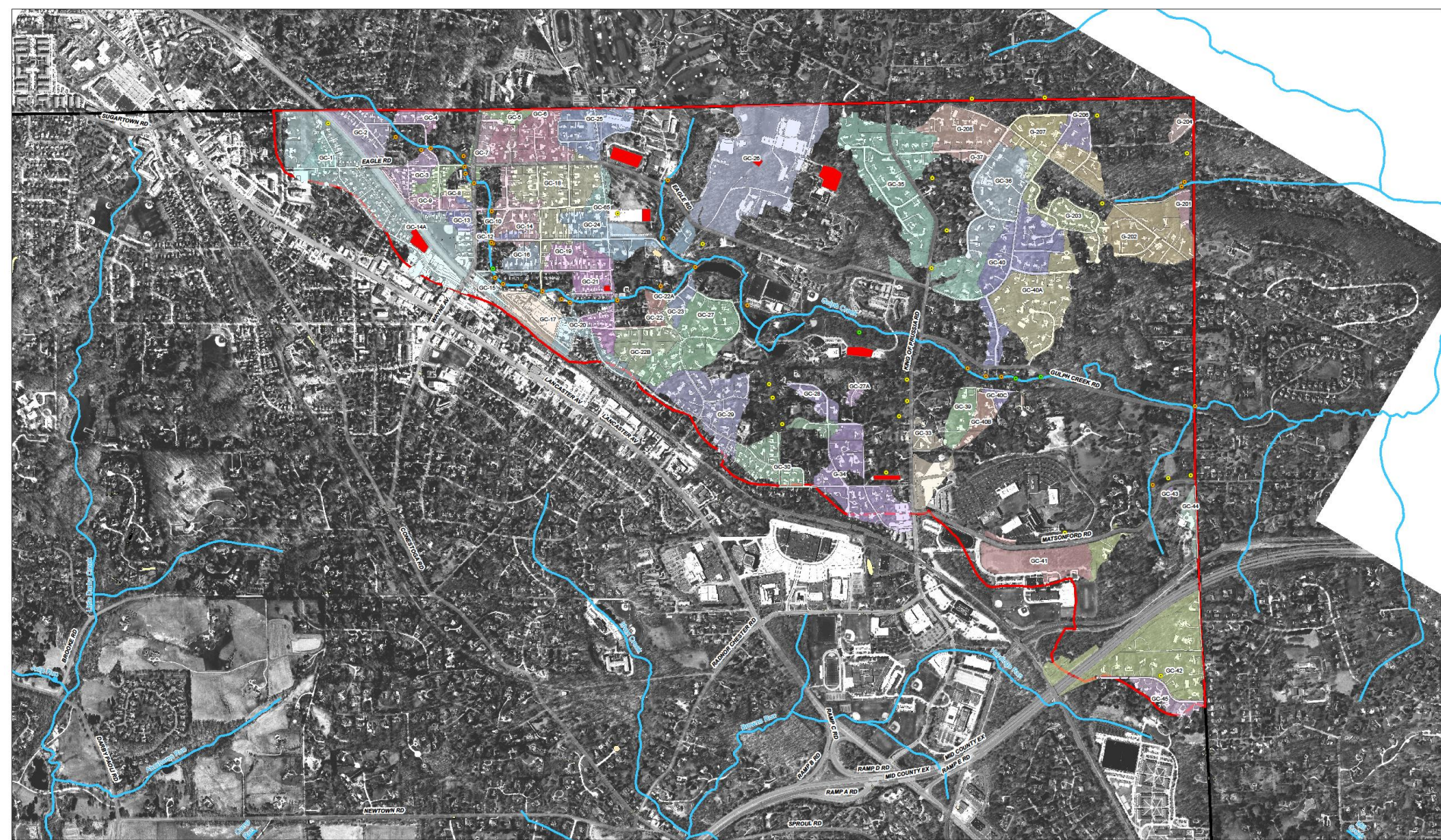


**Radnor Township**

Lower Ithan Creek Watershed  
(Including Wigwam Run)

# Ithan Creek South Watershed Drainage Areas to Storm Sewers





**Legend**

- Add\_outfall selection
- Storm Sewer Discharge
- Surface Water Discharge
- Proposed BMP selection
- PADEP Impaired Streams (2016)
- Stormwater System Areas (Ellipse, MapInfo)
- Stormwater System Areas (Polygon, MapInfo)
- 0

Scale: 1" = 6000'



**Radnor Township**

Gulph Creek  
Outfall Drainage Areas

# Gulph Creek Watershed Drainage Areas to Storm Sewers - Parsed



# ESTIMATED POLLUTANT LOADS AND REQUIRED REDUCTION

**PARSED AREA (STORM SEWERS) 10% Reduction = 303,118 pounds sediment**

Stream/Watershed	Impervious (ac)	Pervious	Total Area (acres)	Impervious Sediment Load (lbs/year)	Pervious Sediment Load (lbs/year)	Total Load (lbs/year)	10% Required Reduction
Cobbs Creek	12.8	11.5	24.3	23,557	3,046	26,602	2,660
Saw Mill Run	3.9	8.9	12.9	7,243	2,370	9,614	961
Browns Run	50.1	105.0	155.2	92,225	27,830	120,056	12,006
Abrahams Run	9.9	26.6	36.5	18,185	7,055	25,240	2,524
Miles Run	7.2	63.4	70.7	13,318	16,808	30,126	3,013
Glenn Brook	15.3	13.1	28.4	28,177	3,477	31,654	3,165
Mills Creek	45.3	45.7	91.0	83,319	12,120	95,439	9,544
Kirks Run	55.3	163.8	219.1	101,756	43,394	145,150	14,515
Meadowbrook	80.8	189.3	270.1	148,520	50,168	198,689	19,869
Gulph Creek	199.0	524.8	723.8	365,931	139,046	504,977	50,498
Little Darby	136.0	197.5	333.6	250,141	52,342	302,482	30,248
Van Lear's Run	11.7	38.6	50.3	21,482	10,222	31,704	3,170
Darby Creek	45.5	172.1	217.6	83,596	45,603	129,199	12,920
Valley Run	95.9	146.5	242.4	176,303	38,827	215,130	21,513
Ithan Creek	381.7	843.4	1225.1	701,922	223,464	925,386	92,539
Hardings Run	83.5	83.7	167.2	153,582	22,168	175,749	17,575
Foxes Run	18.6	71.9	90.5	34,274	19,043	53,316	5,332
Camps Run	4	14	18	6,923	3,742	10,665	1,066
Finn Run	15	39	54	26,978	10,450	37,428	3,743
Doom Run	1	1	2	1,263	327	1,590	159

**Total Radnor**

**1256.4**

**2720.1**

**3976.5**

**2,310,452**

**720,725**

**3,031,178**

**303,118**



# ESTIMATED POLLUTANT LOADS AND REQUIRED REDUCTION

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Miles Run	7.2	63.4	70.7	13,318	16,808	30,126	3,013
Glenn Brook	15.3	13.1	28.4	28,177	3,477	31,654	3,165
Mills Creek	45.3	45.7	91.0	83,319	12,120	95,439	9,544
Kirks Run	55.3	163.8	219.1	101,756	43,394	145,150	14,515
Meadowbrook	80.8	189.3	270.1	148,520	50,168	198,689	19,869
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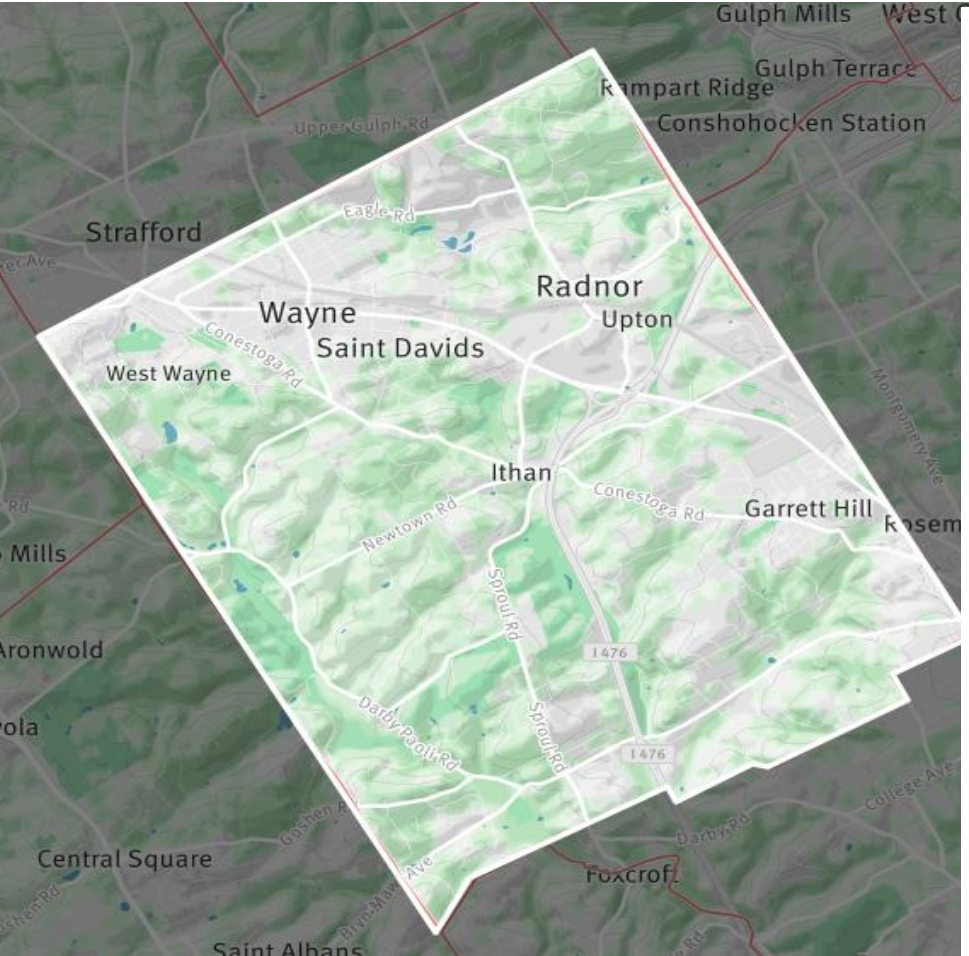
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**303,118**

# ALTERNATE ESTIMATE OF POLLUTANT LOADS

ENTIRE TOWNSHIP USING MAPSHED 10% Reduction = 854,624 pounds sediment



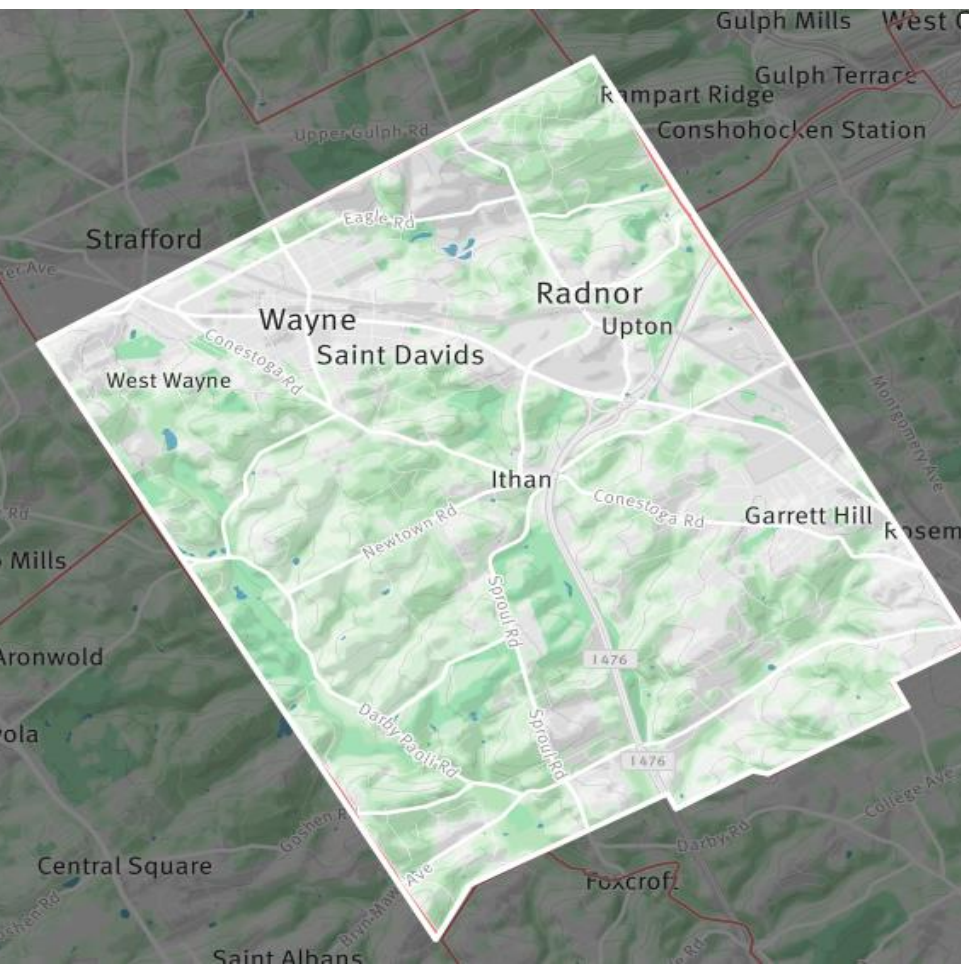
Type	Area (km <sup>2</sup> )	Coverage (%)
Open Water	0.03	0.1
Perennial Ice/Snow	0.00	0.0
Developed, Open Space	15.10	42.4
Developed, Low Intensity	4.03	11.3
Developed, Medium Intensity	2.36	6.6
Developed, High Intensity	0.65	1.8
Barren Land (Rock/Sand/Clay)	0.01	0.0
Deciduous Forest	9.52	26.8
Evergreen Forest	0.20	0.6
Mixed Forest	0.51	1.4
Shrub/Scrub	0.51	1.4
Grassland/Herbaceous	0.00	0.0
Pasture/Hay	1.47	4.1
Cultivated Crops	0.69	1.9
Woody Wetlands	0.47	1.3
Emergent Herbaceous Wetlands	0.00	0.0
0	0.05	0.1

**8,546,240 pounds sediment**

# ALTERNATE ESTIMATE OF POLLUTANT LOADS

ENTIRE TOWNSHIP USING MAPSHED

**10% Reduction = 854,624 pounds sediment**



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Woody Wetlands	0.47	1.3
Emergent Herbaceous Wetlands	0.00	0.0
0	0.05	0.1

**8,546,240 pounds sediment**



# NEXT STEP: TAKE CREDIT FOR EXISTING BMPs

Reduce obligation from 303,118 lbs to 299,914 lbs



Stream/Watershed	TOTAL SEDIMENT LOAD (lb/year)	EXISTING BMP REDUCTION (lb/year)	ADJUSTED TOTAL SEDIMENT LOAD (lb/year)	ADJUSTED REQUIRED REDUCTION (lb/year)
Cobbs Creek	26,602	0	26,602	2,660
Saw Mill Run	9,614	0	9,614	961
Browns Run	120,056	0	120,056	12,006
Abrahams Run	25,240	0	25,240	2,524
Miles Run	30,126	453	29,674	2,967
Glenn Brook	31,654	0	31,654	3,165
Mills Creek	95,439	0	95,439	9,544
Kirks Run	145,150	7,690	137,459	13,746
MEadowbrook	198,689	6,873	191,815	19,182
Gulph Creek	504,977	14,056	490,920	49,092
Little Darby	302,482	19,604	282,878	28,288
Van Lear's Run	31,704	0	31,704	3,170
Darby Creek	129,199	0	129,199	12,920
Valley Run	215,130	0	215,130	21,513
Ithan Creek	925,386	21,276	904,110	90,411
Hardings Run	175,749	1,102	174,647	17,465
Foxes Run	53,316	0	53,316	5,332
Camps Run	10,665	0	10,665	1,066
Finn Run	37,428	0	37,428	3,743
Doom Run	1,590	0	1,590	159

Total Radnor

3,031,178

71,054

2,999,141

299,914

# NEXT: IDENTIFY POTENTIAL BMPs

## Project Location and Type Needed for PRP

- Potential Synergy with Flood Reduction Projects
- Stream Restoration
- Existing Detention Basin Retrofits
- Work on Private Property likely will be needed

***PROJECTS MUST BE IMPLEMENTED WITHIN 5 YEAR PERMIT TERM***



# IDENTIFY BMPs FOR 2018 PERMIT (5 YEAR)

WORK IN PROGRESS! MUST INCLUDE IN PRP

Stream/Watershed	ADJUSTED TOTAL SEDIMENT LOAD (lb/year)	ADJUSTED REQUIRED REDUCTION (lb/year)	PROPOSED BMP REDUCTION (lb/year)
Cobbs Creek	26,602	2,660	6,393
Saw Mill Run	9,614	961	0
Browns Run	120,056	12,006	0
Abrahams Run	25,240	2,524	0
Miles Run	29,674	2,967	0
GlennBrook	31,654	3,165	0
Mills Creek	95,439	9,544	0
Kirks Run	137,459	13,746	0
MEadowbrook	191,815	19,182	21,473
Gulph Creek	490,920	49,092	37,127
Little Darby	282,878	28,288	51,912
Van Lear's Run	31,704	3,170	0
Darby Creek	129,199	12,920	0
Valley Run	215,130	21,513	15,423
Ithan Creek	904,110	90,411	243,093
Hardings Run	174,647	17,465	50,317
Foxes Run	53,316	5,332	0
Camps Run	10,665	1,066	0
Finn Run	37,428	3,743	0
Doom Run	1,590	159	0
<b>Total Radnor</b>	<b>2,999,141</b>	<b>299,914</b>	<b>425,738</b>





# SEQUENCE OF EVENTS AND NEXT STEPS



1. Complete DRAFT PRP by August 1
2. Public Comment – 45 days
  - Develop Cost Estimates and Priorities
3. September 16, 2017 – Submit PRP and Notice of Intent (NOI or permit application) to PaDEP
4. Begin Project Implementation
5. Ordinance Work
6. Six MCMs – Outfall Sampling, Training
7. Revise and Update PRP by September 2018

# STORMWATER ORDINANCE

## All New and Redevelopment

- All projects manage volume 1.5”
- Does not matter if site was impervious – no grandfathering
- Improving water quality through redevelopment

***IMPROVE WATER QUALITY AS  
PART OF REDEVELOPMENT***

## Green City Clean Waters

The City of Philadelphia's Program for Combined Sewer Overflow Control  
A Long Term Control Plan Update

Submitted by the Philadelphia Water Department  
September 1, 2009







## IMPORTANCE OF STREAM HEALTH

- 303(d) List of impaired streams
- Permit requirements will continue and increase until stream health improves
- Short term: PRP Deadline
- Longterm: Stream Health

**QUESTIONS?**