Watershed Assessment Report Guidance

Webinar

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Rutgers Cooperative Extension Water Resources Program

MS4 Technical Assistance Program

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Water Resources Program

Our mission is to identify and address community water resources issues using sustainable and practical science-based solutions.

What is the MS4 Permit?

- Municipal Separate Storm Sewer System = MS4
- Five-year General permit (1/1/23 thru 12/31/27)
- The MS4 permitting program was created in 2004 and is required by both federal and state regulations to address water quality and flooding issues in municipal stormwater systems.
- The MS4 Tier A Permit was recently updated with the new permit becoming effective on January 1, 2023.

A primary objective of the MS4 stormwater program

… shall be to implement best management practices and other measures that are designed to reduce the discharge of pollutants from the permittee's MS4, municipal maintenance yards and other ancillary operations to the maximum extent practicable pursuant to N.J.A.C. 7:14A-25.6(a)1 and 40 CFR 122.34(a), to protect water quality, and to satisfy the applicable water quality requirements of the Clean Water Act.

Watershed Improvement Plan

- Designed to improve water quality problems
- Focused on reducing the MS4 contribution of pollutants to waterbodies with listed impairments and TMDLs
- Reducing or eliminating flooding with priority given based on human health and safety, environmental impacts, and frequency of occurrence
- Plan shall be developed with input from residents, businesses, neighboring towns, other dischargers

Watershed Improvement Plan

- Watershed Inventory Report (due January 1, 2026)
  - MS4 Infrastructure Mapping (due January 1, 2026)
- **Watershed Assessment Report (due January 1, 2027)**
- Watershed Improvement Plan (due December 1, 2027)

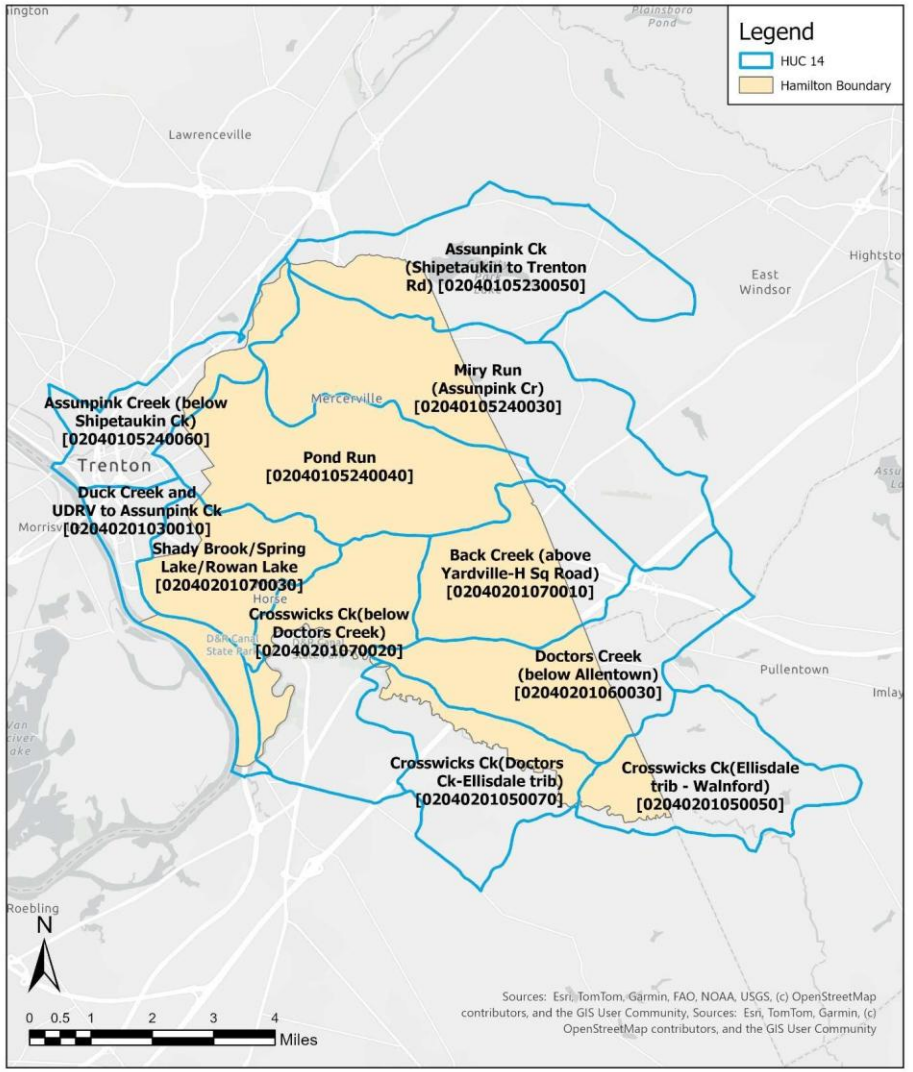
Why is this important?

- Nearly 95% of waterways impaired in NJ

- Lack of stormwater management for developments -
  - prior to 1983 (no management)
  - prior to 2004 (poor WQ management)

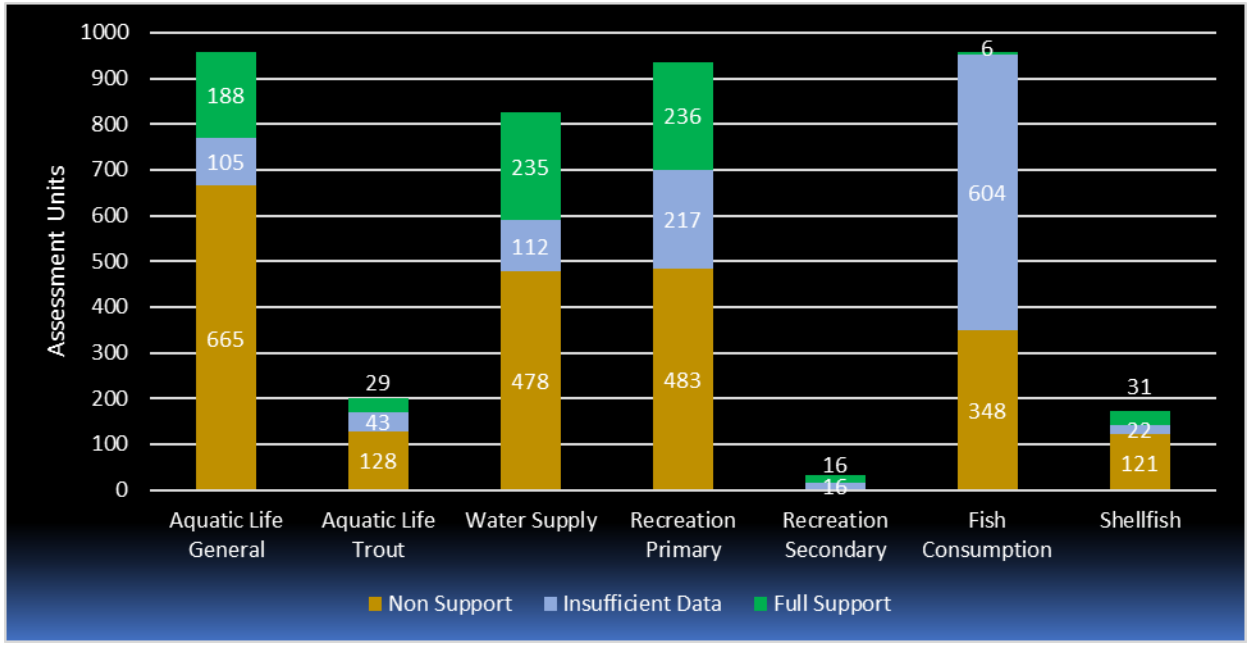
What is a Watershed?

- Area where water flows into rivers and streams
- Municipalities contain portions of many watersheds delineations (HUC14s)



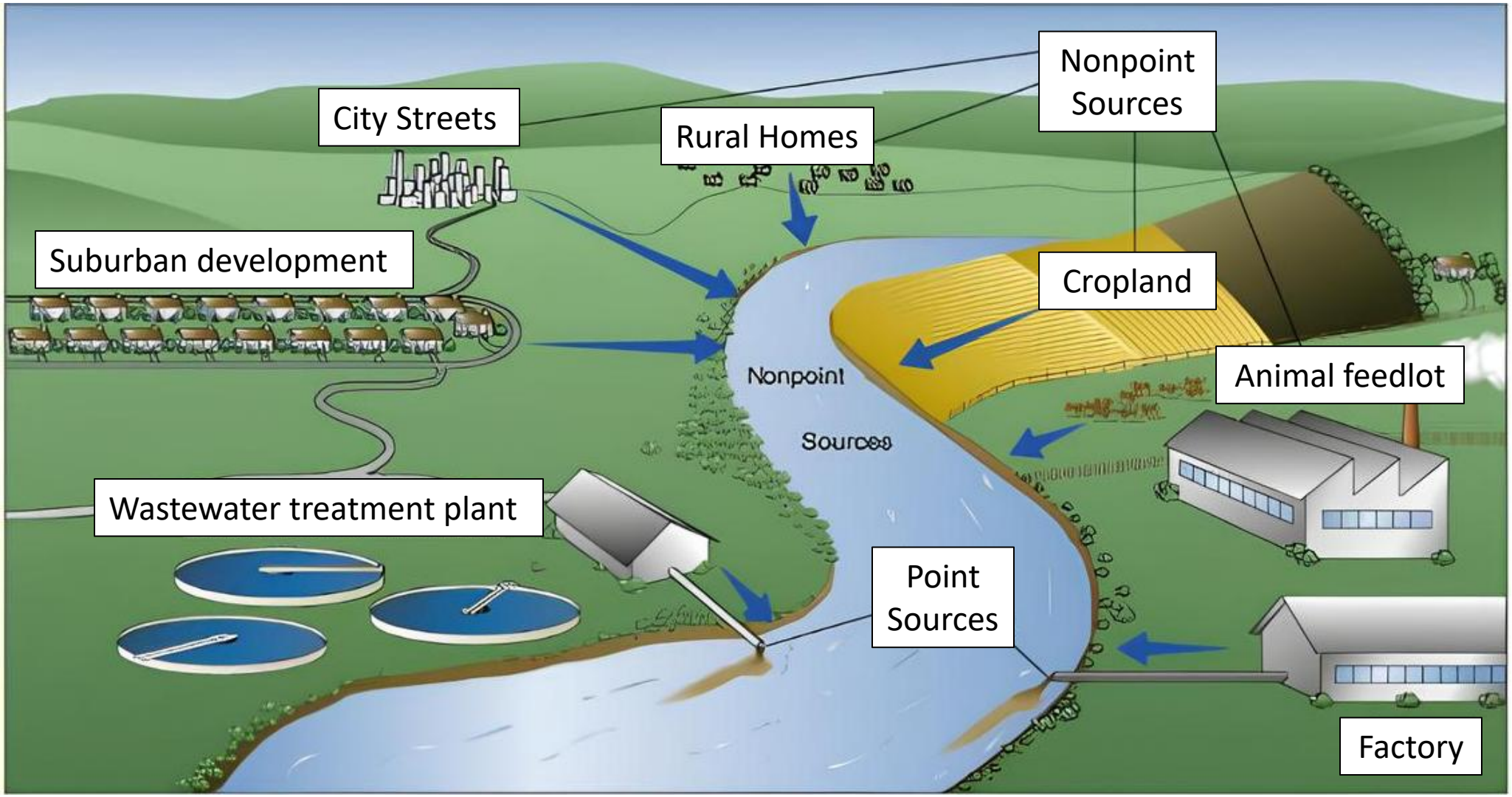
Why Water Quality?

Designated Use	Description
 Aquatic Life (General)	Can these waters support a healthy ecosystem? Monitoring focuses on determining excessive nutrients and impaired biological communities which are the primary causes of designated use impairment.
 Aquatic Life (Trout)	Can species of trout survive and reproduce in these waters? These waterbodies are monitored for meeting dissolved oxygen and cold-water temperature ranges capable of supporting trout species.
 Recreation	Can we swim, boat, and do other activities in these waters? Three bacterial indicators that are monitored and tested to determine recreational use are fecal coliform, *E. coli*, and Enterococcus.
 Water Supply	Can we use these waters as sources for drinking water? Ambient water quality is monitored in rivers and lakes for chemical pollutants, metals, and toxins before undergoing treatment to be used as a water supply.
 Shellfish Harvest	Can we eat clams, oysters, or mussels from these waters? NJDEP monitors fecal coliform levels and the bacterial species *Vibrio parahaemolyticus* to ensure safe harvests of shellfish.
 Fish Consumption	Can we eat fish from these waters? Fish tissue in different species are currently monitored for metals including "legacy" pollutants such as PCB, DDT, and chlordane which are no longer manufactured, but are still found in fish tissue.



2022 NJDEP Integrated Water Quality Assessment Report

Point vs Nonpoint Source Pollution



Point Source Pollution

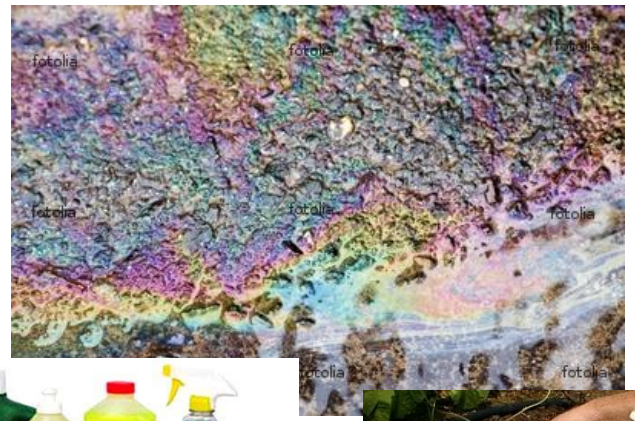
- Comes from a specific source, like a pipe
- Factories, industry, municipal treatment plants
- Typically monitored and controlled by a permit system (NJPDES)

Nonpoint Source Pollution

- Associated with stormwater runoff
- Runoff collects pollutants on its way to a sewer system or water body
- It cannot be traced to a direct discharge point such as a wastewater treatment facility

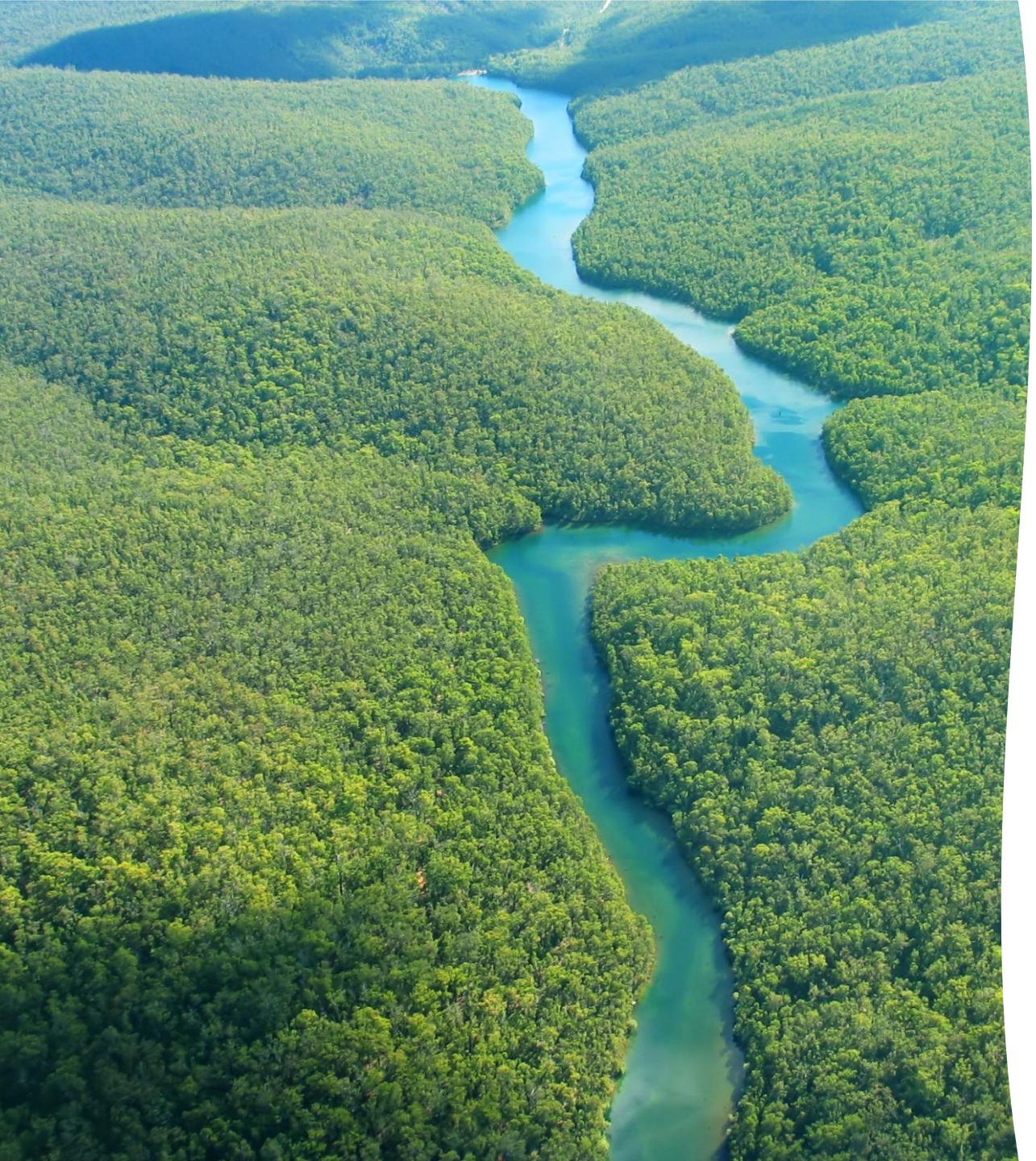
EXAMPLES OF NPS

- Oil and grease from cars
- Fertilizers
- Animal waste
- Grass clippings
- Septic systems
- Sewage leaks
- Household cleaning products
- Litter
- Agriculture
- Sediment



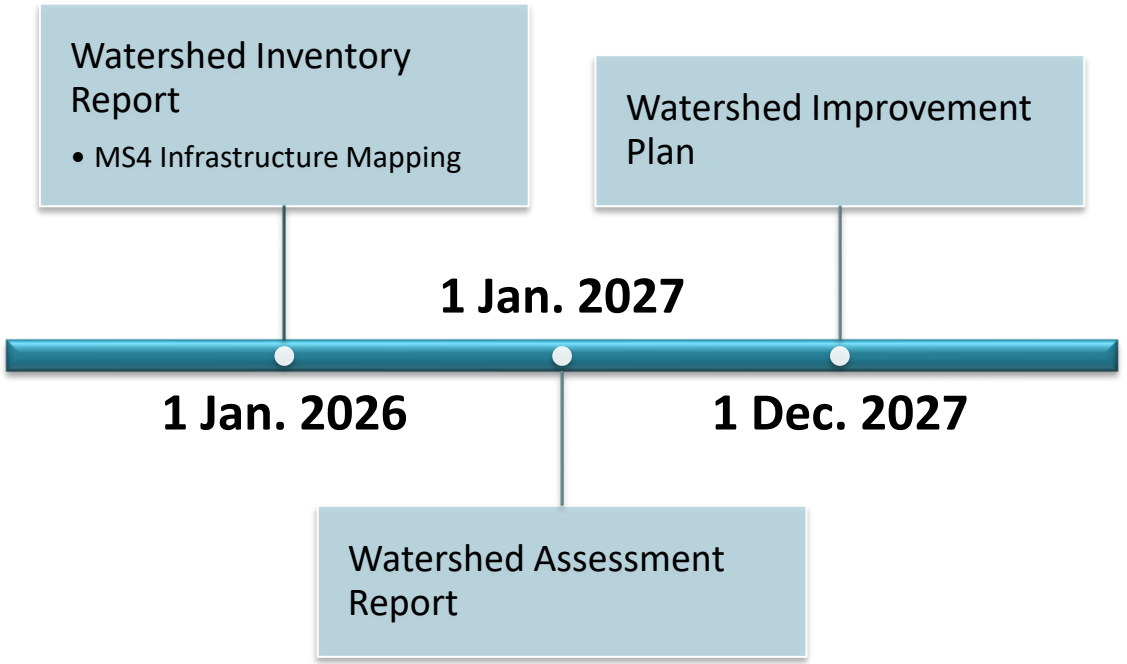
So is the MS4 System a Point or Nonpoint Source?

- Per the permit, the MS4 System is considered a point source of pollution
  - Direct discharge via outfalls into streams
- Runoff from a MS4 system is essentially a collection of nonpoint sources concentrated into a point source



WIP is a Solution

Watershed Improvement Plan



Phase 2 –Watershed Assessment Report

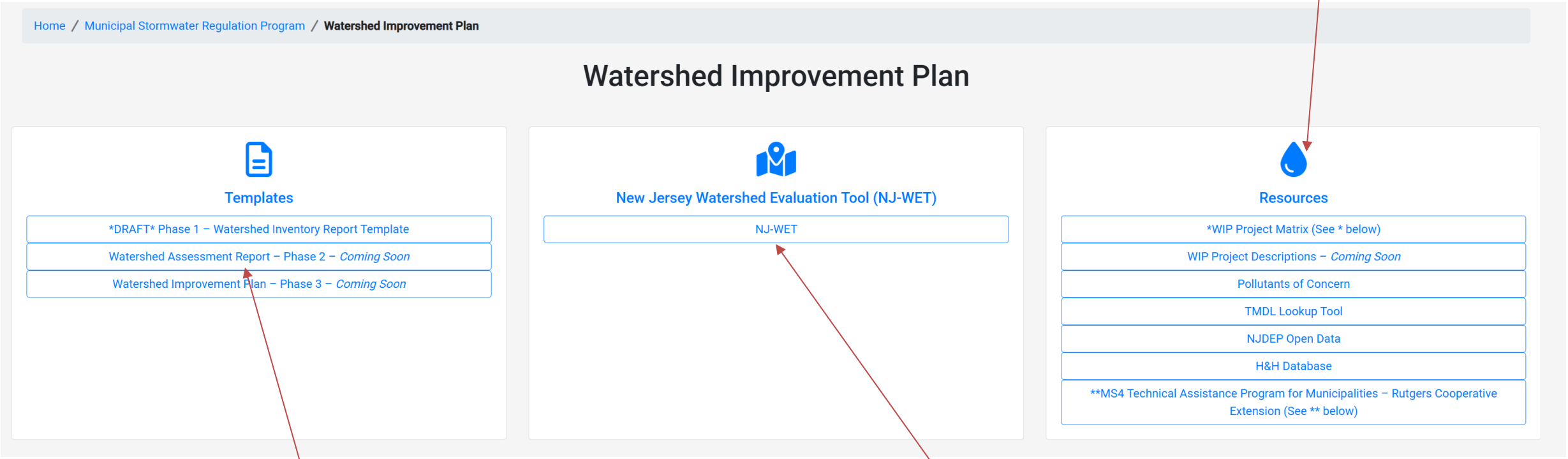
Report shall summarize and include an electronic map of the items listed below (Due January 1, 2027)

i. An assessment of **potential water quality improvement projects** by sub-watershed and parameter
ii. An estimate of the **percent reduction in loading of the TMDL/impaired parameters** due to project(s) in i. above
iii. A summary of **feedback from public information** sessions
iv. An **estimate of funding needs** for each project, and identification of potential funding sources, including the New Jersey Water Bank (NJWB); the formation of an SWU, using 319 grants, FEMA BRIC grants
v. An estimate of an **implementation schedule**

Getting Started: Key Resources

- NJDEP's WIP page

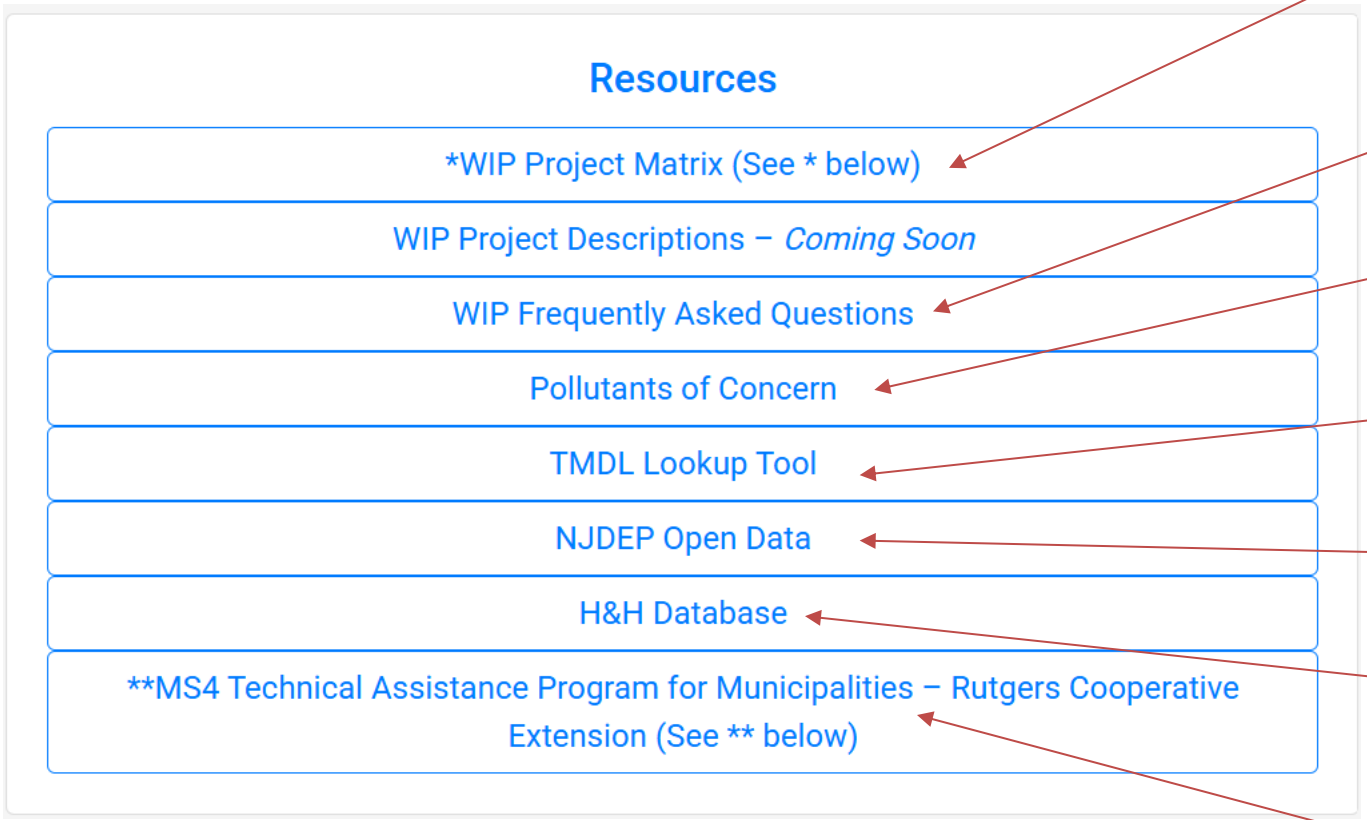
See next slide



DRAFT WAR Coming Soon
Will include guidance/clarification

Useful Tool for general reference

Key Resources



WIP Project Matrix (please submit any additional ideas to DEP for consideration)

WIP FAQ (provided good clarifications)

Pollutant of Concern descriptions

TMDL Lookup Tool (for actual TMDL Reports)

Source for all state GIS datasets

Database of stormwater facilities

That's us! See our website (http://water.rutgers.edu/Projects/MS4/MS4.html)

Additional Resources

- Watershed NJ Tool (https://watershednj.rutgers.edu/)
- Look for past plans
  - See state approved Watershed Plans
    - WatershedNJ great way to access (Improvements-> Management and Improvement Plans -> Watershed Plans)
    - NJGIN Data layer
  - RCE WRP ICA, RAP, Feasibility Study plans (see webmap)
- Other state/group guidance
  - Pennsylvania, Minnesota, Wisconsin, Chesapeake Bay

Regional Collaboration

- The Department fully supports municipalities and other MS4 permittees collaborating regionally to prepare their WIPs
- Some potential partnership ideas:
  - 2 or more MS4s that discharge to the same or adjacent waterbodies or HUC 14s that share a TMDL or impairment
  - Managed by a watershed group or similar organization
  - Managed by an existing regional authority

Regional vs. Individual Approach

- Regional Benefits
  - Cost savings on plan development
  - Foster greater collaboration among municipalities
  - Regional cost-effective strategies (i.e. shared services) possible
- Regional Concerns
  - Municipalities may need to be part of multiple plans depending on regional divisions
    - Consistent scale on HUC10 or HUC11 level recommended across state for consistency
  - Must make it clear how much each municipality contributes and how much action each needs to do to avoid inaction

Recommended Elements to Include

- Review of TMDL reports to understanding the proposed load reduction targets
- Identify sources of problems
  - Impervious cover, point sources, septic systems, leaf litter, wildlife
- Estimate loadings for pollutants of concern
  - based on the TMDL report, land use runoff coefficient, or other means
- Estimate load reductions needed to achieve TMDLs as written

Recommended Elements to Include

- Identify impact of existing management systems
- Review of potential projects w/ reductions, consider:
  - Improvements to: Leaf collection, Street sweeping
  - Stormwater facilities (bioretention systems, porous pavements, etc.) in areas with no stormwater management
  - Improvement of existing facilities (e.g. detention basins to bioretention system) to retrofit them for high pollutant removal
- Example projects to use as basis for Phase 3

Recommended Sections

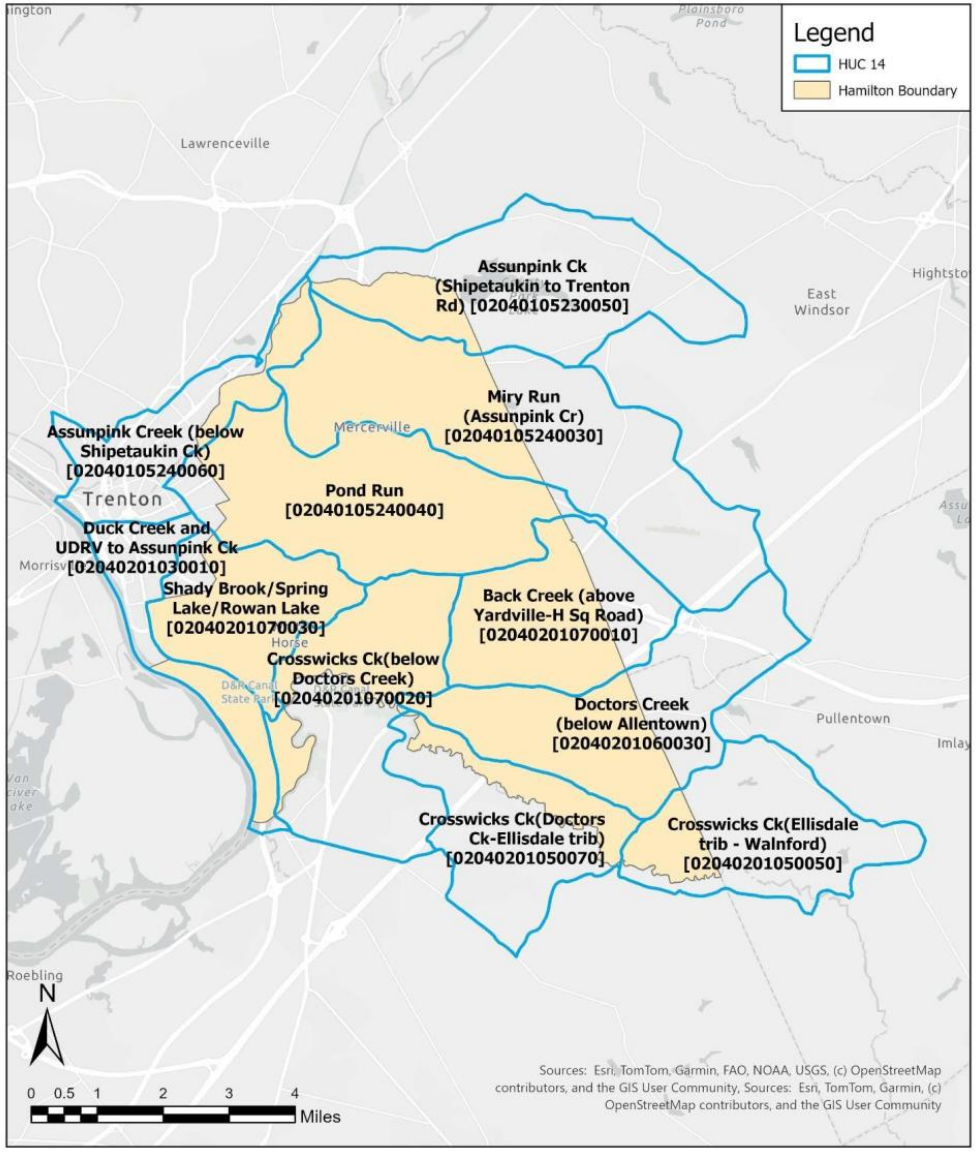
Throughout presentation
Rec: = Recommended
Rq: = Required

- Existing Water Quality Problems (Rec)
- Sources of Problems (Rec)
- Loading Analysis & Load Reduction Targets (Rec)
- Existing Management (Rec)
- Proposed Management (Rq, w/ proposed reductions)
- Potential Management Summary (Rec)
- Costs and Funding Sources (Rq)
- Schedule (Rq)
- Addressing All TMDLs and Impairments Summary (Rq)
- Public Feedback (Rq)

Subwatershed Overview

- **Rec:** Include summary of subwatersheds present

HUC 14	Subwatershed Name	Hamilton Area (acres)	Total Area (acres)
2040105230050	Assunpink Ck (Shipetaukin to Trenton Rd)	1,017	6,182
2040105240030	Miry Run (Assunpink Cr)	3,721	8,555
2040105240040	Pond Run	5,954	6,405
2040105240060	Assunpink Creek (below Shipetaukin Ck)	798	3,051
2040201030010	Duck Creek and UDRV to Assunpink Ck	902	2,124
2040201050050	Crosswicks Ck(Ellisdale trib - Walnford)	754	4,383
2040201050070	Crosswicks Ck(Doctors Ck-Ellisdale trib)	1,099	4,144
2040201060030	Doctors Creek (below Allentown)	3,012	5,596
2040201070010	Back Creek (above Yardville-H Sq Road)	3,009	4,171
2040201070020	Crosswicks Ck(below Doctors Creek)	2,657	5,518
2040201070030	Shady Brook/Spring Lake/Rowan Lake	2,824	3,150



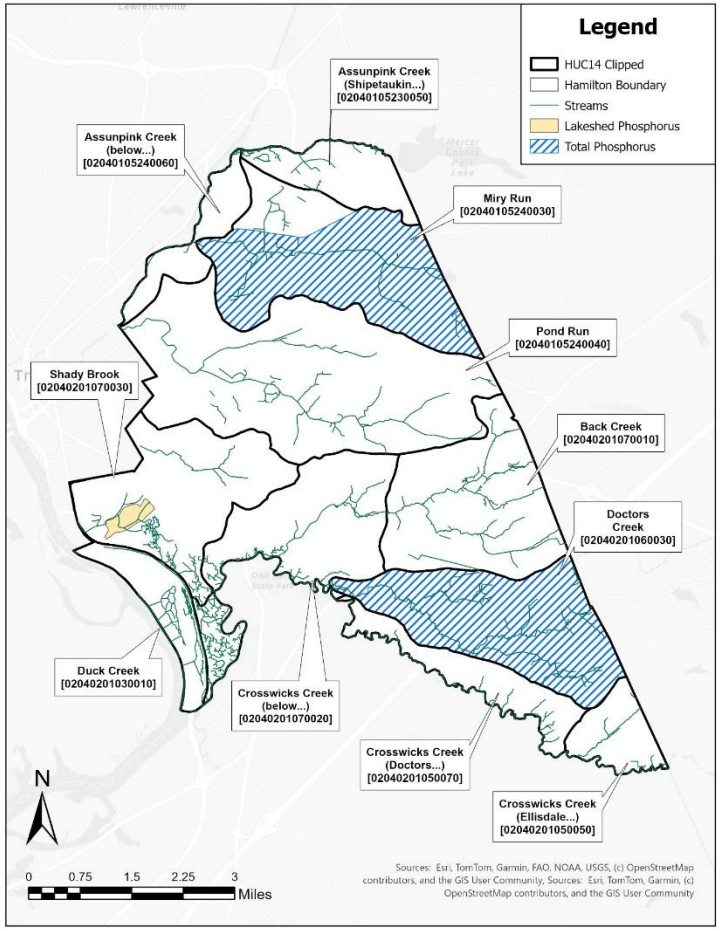
Throughout presentation

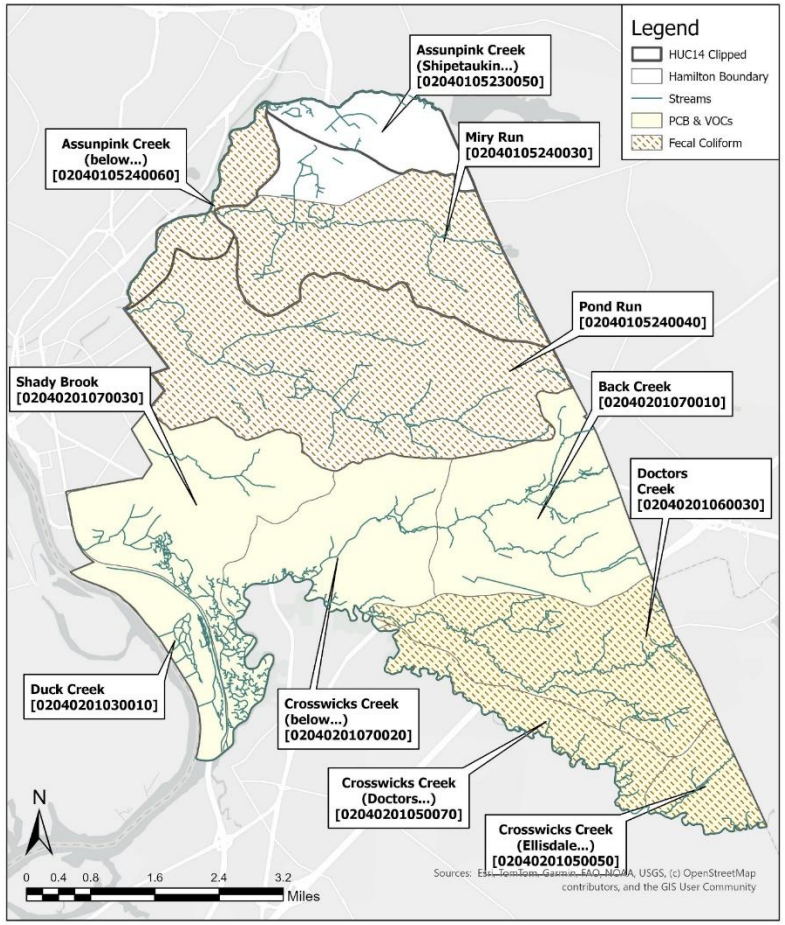
Rec: = Recommended

Rq: = Required

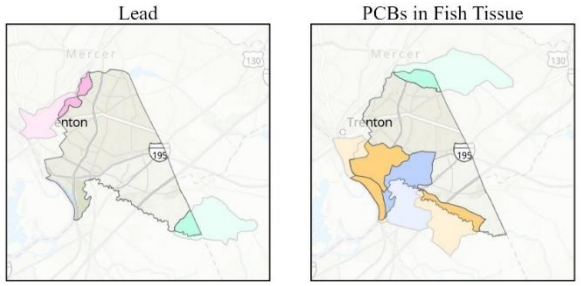
Existing Water Quality Problems

- Water Quality Impairments (see NJ-WET)
- TMDLs (see NJ-WET)

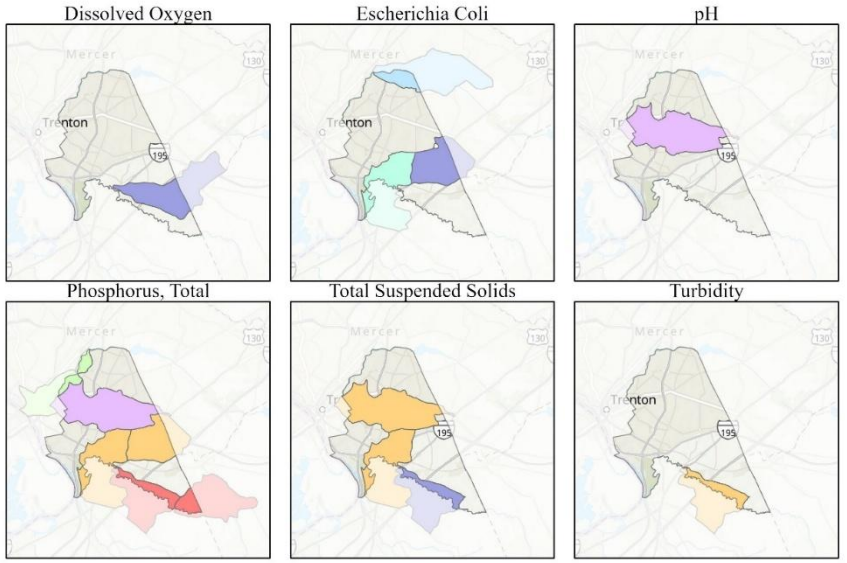




Low Priority



Medium Priority



WQ Impairments

TMDL & Impairment Table

- **Rq:** Include table summarizing TMDLs & Impairments
- **Rec:** include brief review on TMDL report
  - TMDL Reports may only apply to urban and agricultural land uses or all land uses
  - Usually % reduction target provided
  - Reports usually include some recommended strategies or locations to focus on

Rq: All TMDLs and impairments must be addressed within the report

HUC 14	Subwatershed Name	TMDL(s)	Impairment(s)
2040105230050	Assunpink Ck (Shipetaukin to Trenton Rd)	n/a	PCBs in Fish Tissue E. Coli
2040105240030	Miry Run (Assunpink Cr)	Streamsheds Pre-2008 Fecal Coliform Total Phosphorus	n/a
2040105240040	Pond Run	Streamsheds Pre-2008 Fecal Coliform	pH Total Phosphorus (TP) Total Suspended Solids (TSS)
2040105240060	Assunpink Creek (below Shipetaukin Ck)	Streamsheds Pre-2008 Fecal Coliform	Lead Total Phosphorus (TP)
2040201030010	Duck Creek and UDRV to Assunpink Ck	Streamsheds PCBs VOCs	PCBS in Fish Tissue
2040201050050	Crosswicks Ck(Ellisdale trib - Walnford)	Streamsheds Pre-2008 Fecal Coliform Streamsheds PCBs VOCs	Lead Total Phosphorus
2040201050070	Crosswicks Ck(Doctors Ck-Ellisdale trib)	Streamsheds Pre-2008 Fecal Coliform Streamsheds PCBs VOCs	PCBs in Fish Tissue Total Phosphorus (TP) Total Suspended Solids (TSS) Turbidity
2040201060030	Doctors Creek (below Allentown)	Streamsheds Pre-2008 Fecal Coliform Total Phosphorus Streamsheds PCBs VOCs	Dissolved Oxygen (DO)
2040201070010	Back Creek (above Yardville-H Sq Road)	Streamsheds PCBs VOCs	E. Coli Total Phosphorus
2040201070020	Crosswicks Ck(below Doctors Creek)	Streamsheds PCBs VOCs	PCBs in Fish Tissue E. Coli Total Phosphorus, Total Suspended Solids (TSS)
2040201070030	Shady Brook/Spring Lake/Rowan Lake	Streamsheds PCBs VOCs Lakesheds Total Phosphorus	PCBs in Fish Tissue

- **Rec**: Include table summarizing TMDLs reduction targets

TMDL Reduction Targets

Waterbody	Fecal Coliform	PCBs[1]	VOCs	Total Phosphorus
Assunpink Creek (2040105230050, 2040105240060)	99%	99.9%	65%	-
Pond Run (2040105240040)	99%	99.9%	65%	-
Crosswicks Creek/ Pleasant Run (2040201050050, 2040201050070, 2040201070020)	86%	99.9%	65%	-
Duck Creek (2040201030010)	-	99.9%	65%	-
Miry Run (2040105240030)	96%	99.9%	65%	22.0%
Doctors Creek (2040201060030)	86%	99.9%	65%	77.5%
Back Creek (2040201070010)	-	99.9%	65%	-
Shady Brook (2040201070030)	-	99.9%	65%	-
Spring Lake (2040201070030)	-	-	-	0%

Rec: Sources of WQ Problems

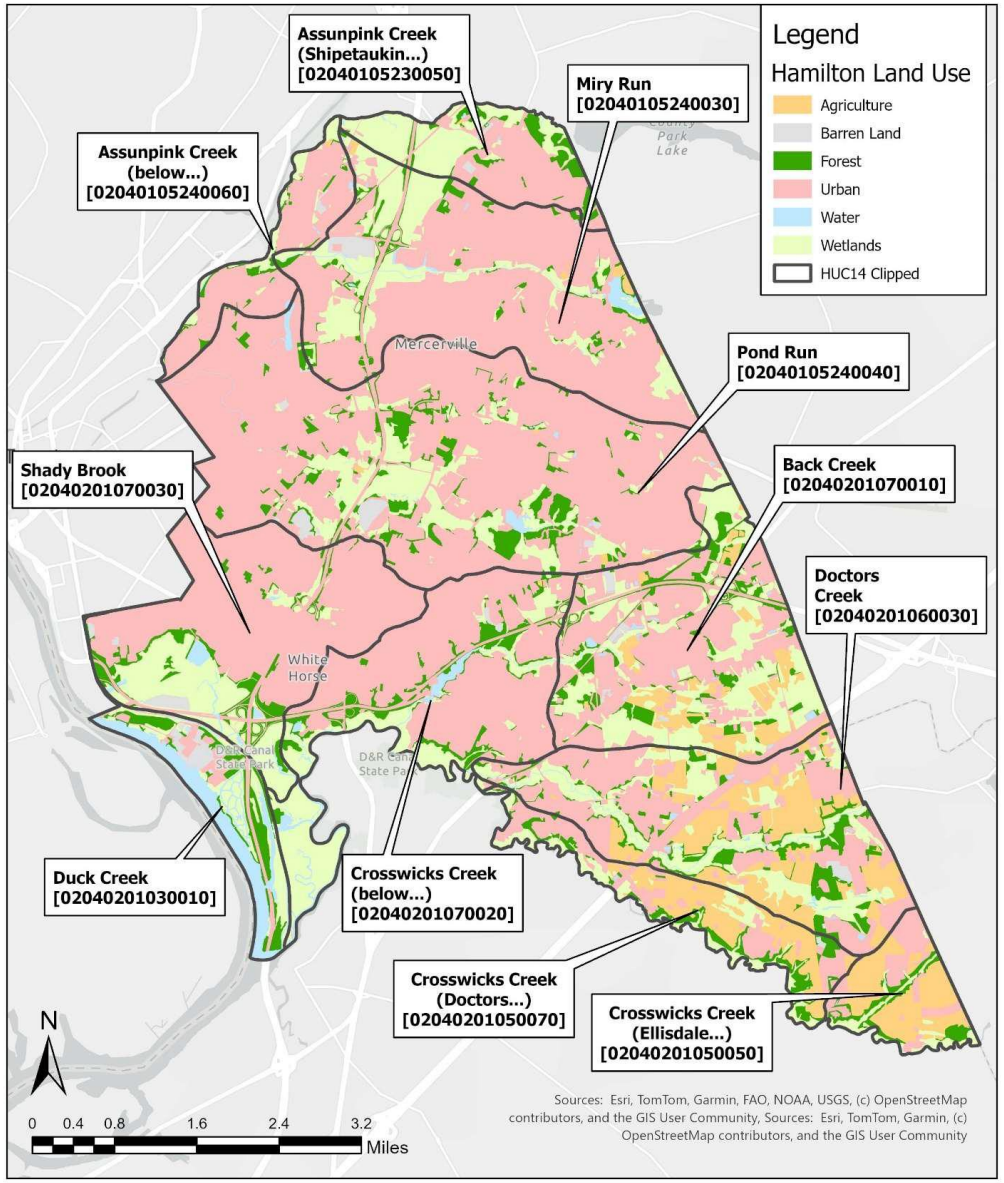
- Land Use (Urban, Agricultural)
- Impervious Cover
- Point Sources
- Other Notable
  - Septic Systems
  - Leaf Litter/Road Debris
  - Wildlife

Land Use Analysis

- Land Use (NJGIN)
  - High Urban Development
  - Lack of existing stormwater management
  - Agriculture also contributes significantly in some areas

HUC14	Assunpink Ck 2040105230050	Miry Run 2040105240030	Pond Run 2040105240040
Agriculture	0.1%	0.8%	0.2%
Barren Land	1.0%	1.3%	1.2%
Forest	13.3%	4.8%	7.1%
Urban	47.1%	72.3%	78.5%
Water	1.0%	1.8%	0.9%
Wetlands	37.5%	19.1%	12.1%

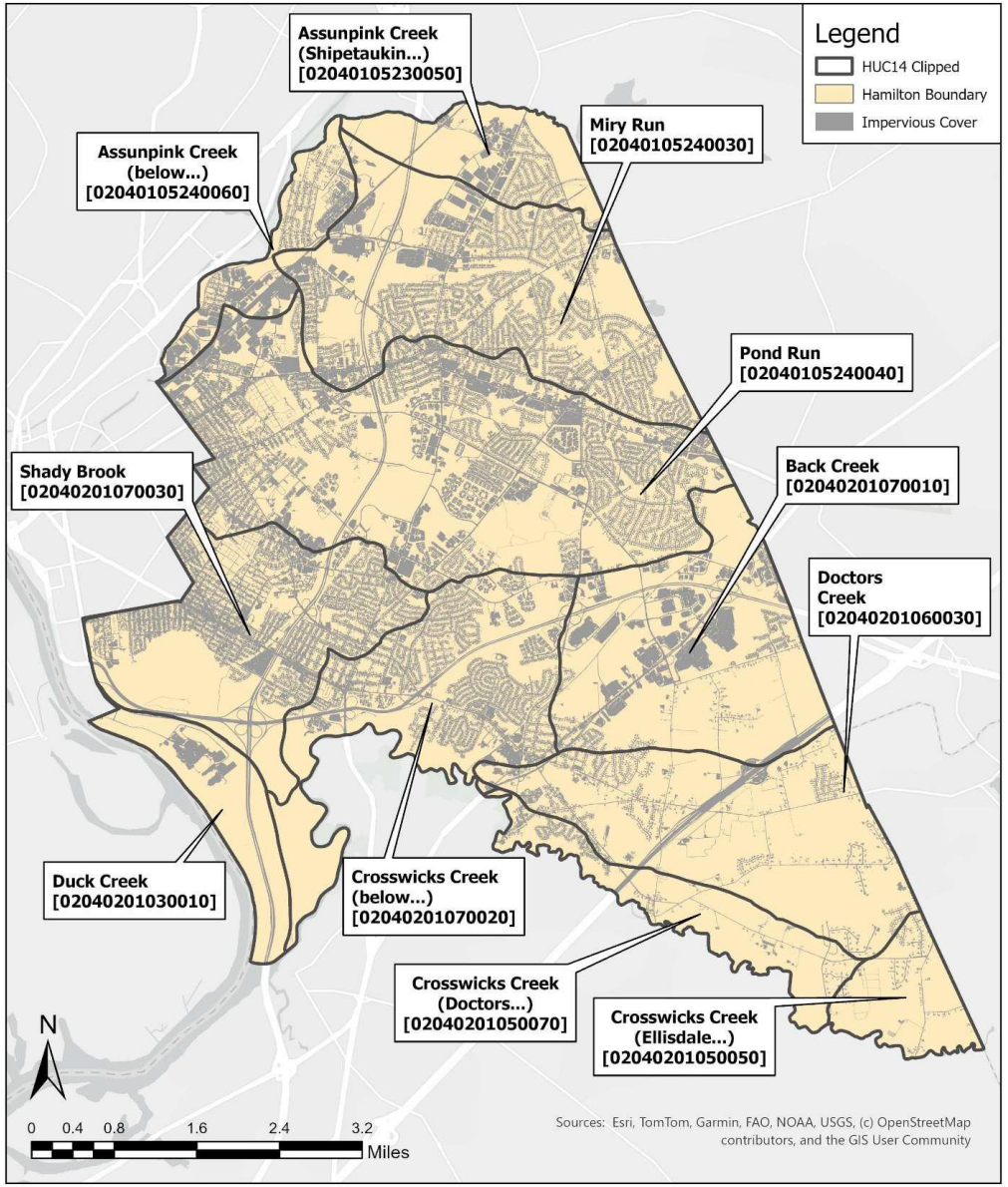
Table of % and/or area in acres



Impervious Cover

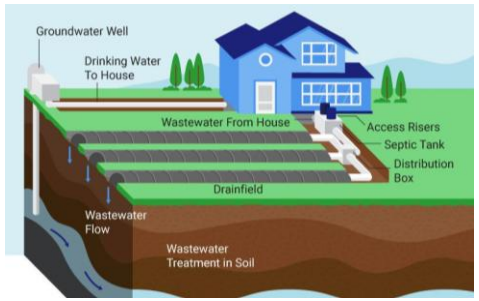
- High imperviousness (NJGIN)
  - Stream degradation starts at 2-15%

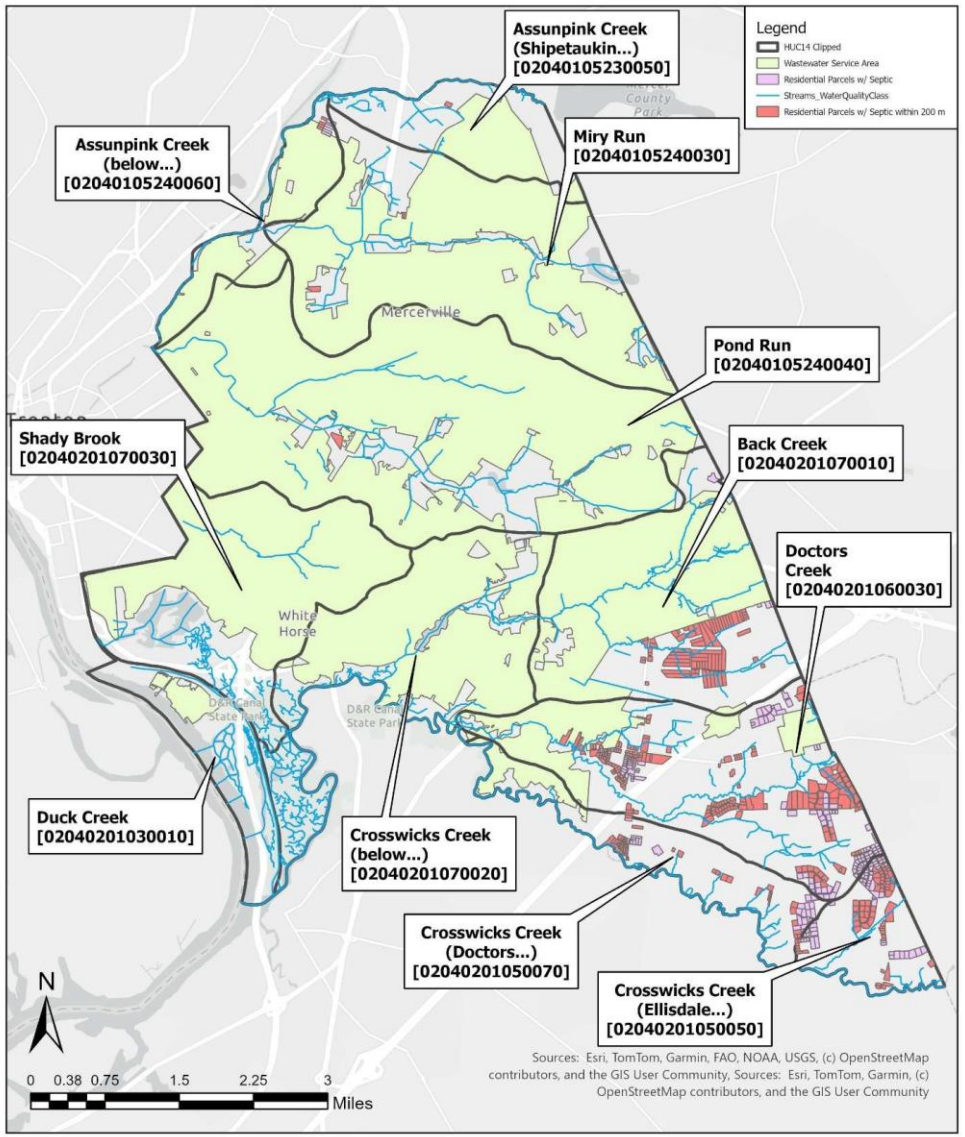
HUC14	Subwatershed Name	Area (Acres)	Impervious %
2040105230050	Assunpink Ck (Shipetaukin to Trenton Rd)	237.3	23.3%
2040105240030	Miry Run (Assunpink Cr)	1367.3	36.7%
2040105240040	Pond Run	2354.3	39.5%
2040105240060	Assunpink Creek (below Shipetaukin Ck)	366.7	45.9%
2040201030010	Duck Creek and UDRV to Assunpink Ck	142.2	15.8%
2040201050050	Crosswicks Ck(Ellisdale trib - Walnford)	54.0	7.2%
2040201050070	Crosswicks Ck(Doctors Ck-Ellisdale trib)	117.8	10.7%
2040201060030	Doctors Creek (below Allentown)	425.4	14.1%
2040201070010	Back Creek (above Yardville-H Sq Road)	746.4	24.8%
2040201070020	Crosswicks Ck(below Doctors Creek)	844.7	31.8%
2040201070030	Shady Brook/Spring Lake/Rowan Lake	1121.6	39.7%
Total		**7777.8**	**30.2%**



Other Notable Sources

- Point Sources
  - Regulated by NJPDES Permits
- Septic Systems (NJGIN)
- Leaf Litter/Road Debris
- Wildlife



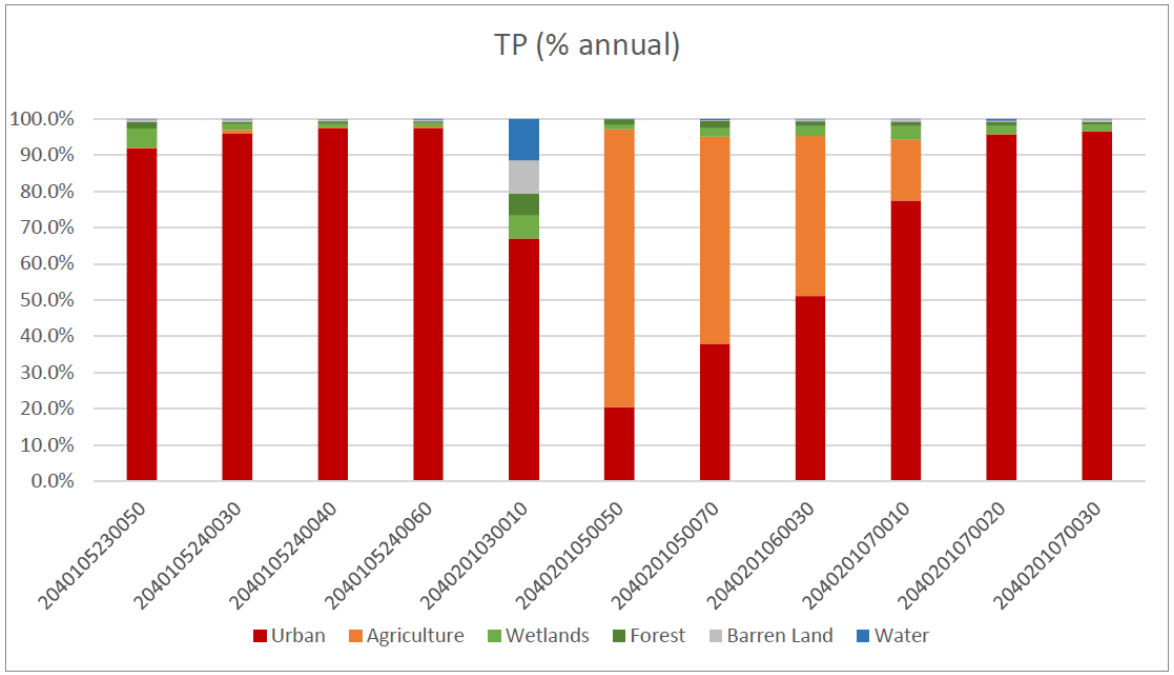


Septic Systems Areas (NJGIN)

Rec: Loading Analysis

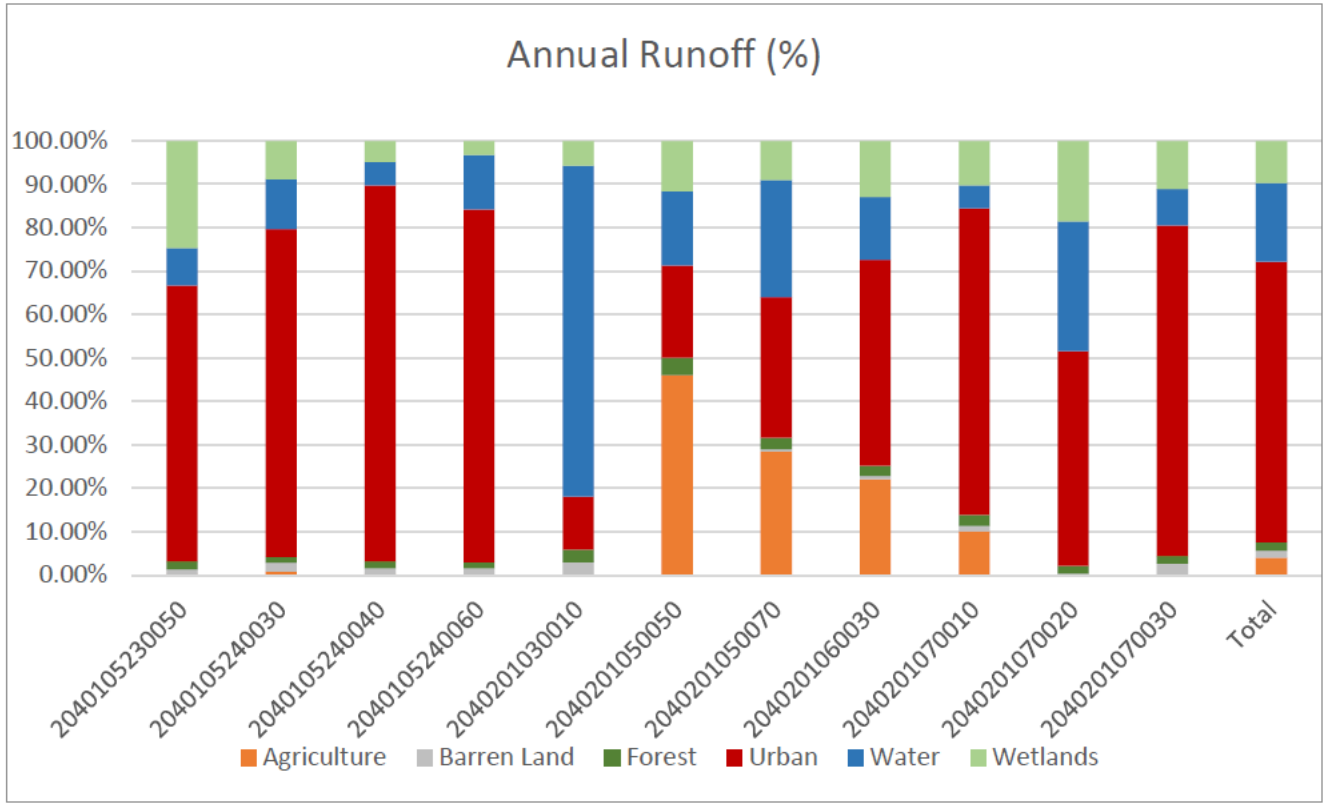
- TP (total phosphorus)
- TSS (total suspended solids)
- TN (total nitrogen)

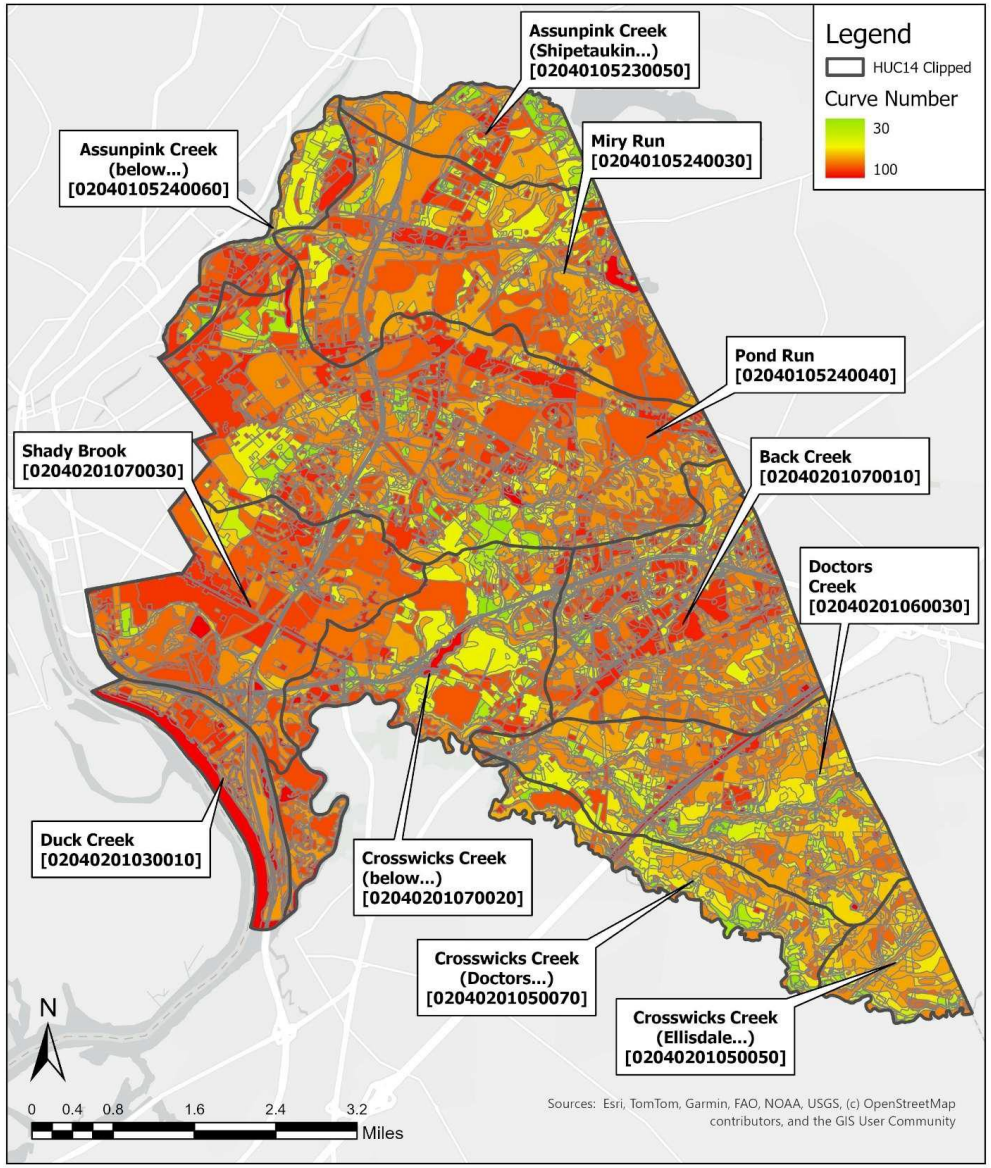
Land Cover	TP [lbs/acre/yr]	TN [lbs/acre/yr]	TSS [lbs/acre/yr]
High, Medium Density Residential	1.4	15	140
Low Density, Rural Residential	0.6	5	100
Commercial	2.1	22	200
Industrial	1.5	16	200
Urban, Mixed Urban, Other Urban	1	10	120
Agriculture	1.3	10	300
Forest, Water, Wetlands	0.1	3	40
Barrenland/ Transitional Area	0.5	5	60



NJDEP BMP Manual Table 3-1 (or use data from TMDL report as available)

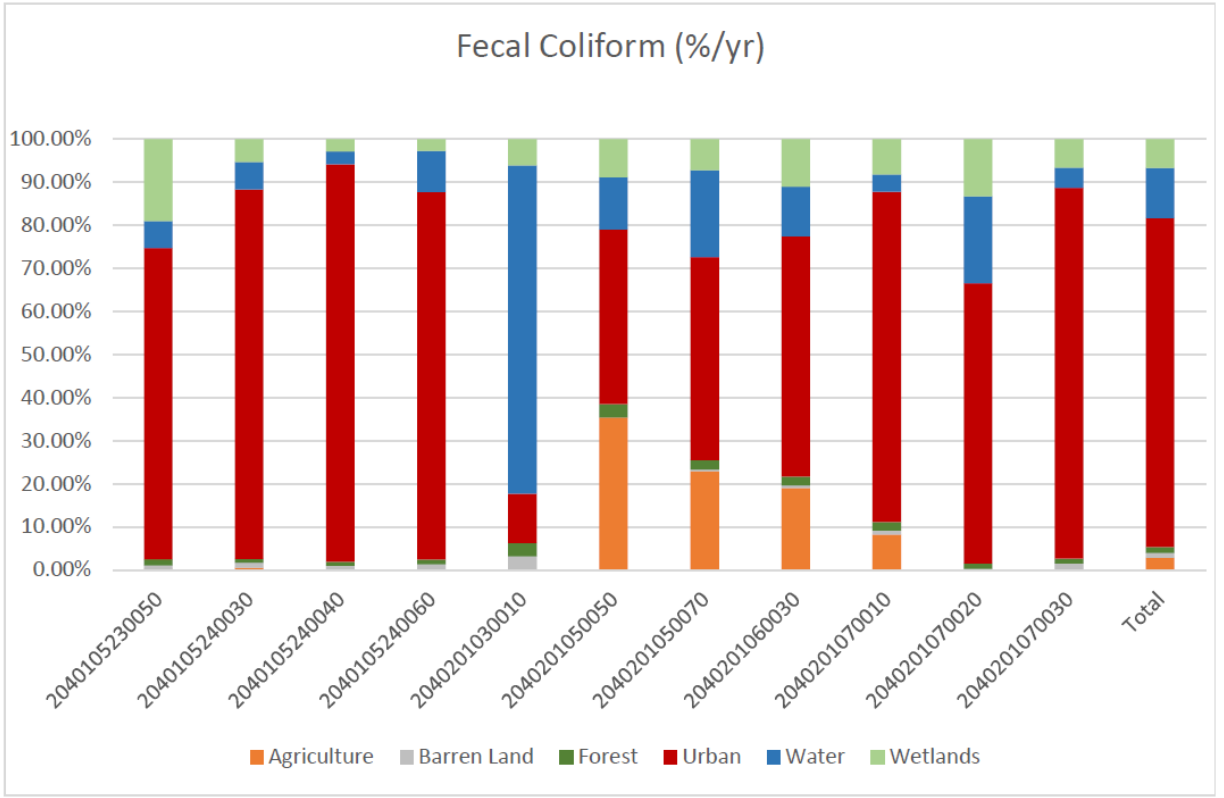
Rec: Runoff Volume





Example: Fecal Coliform

Land Cover	EMC [CFU/100 mL]
High, Medium Density Residential	7,750
Low Density, Rural Residential	7,750
Commercial	4,500
Industrial	2,500
Urban, Mixed Urban, Other Urban	4,500
Agriculture	10,000
Forest, Water, Wetlands	3,100
Barrenland/ Transitional Area	3,100



- Use runoff volume to calculate or use alternative simpler method in reference below.

Reference: Theriault, Amelie and S. Duchesne. 2005. Quantifying the Fecal Coliform Loads in Urban Watersheds by Hydrologic/Hydraulic Modeling: Case Study of the Beauport River Watershed in Quebec

How do we achieve the TMDL?

- Rec: Load Reduction Targets

Table 24: TSS Target Load Reductions [lb/yr]

HUC14	Pond Run*	Crosswicks Ck*	Crosswicks Ck*2
	2040105240040	2040201050070	2040201070020
Total	742,622	169,386	281,443
Ag +Urban	690,394	153,173	242,651
Manage %	20%	20%	20%
Target Load Reductions	**138,079**	**30,635**	**48,530**
Allowable Load	604,543	138,751	232,913

"Manageable" Loads

TMDL Target

Target Reduction Needed

How do we deal with WQ Impairments?

- No clear criteria for reduction without a TMDL report or extensive analysis outside report scope
- Pick reasonable target or just provide potential projects to address them (we chose 20%)
- Many may overlap with TMDLs
- Prioritize based on 303d list prioritization for TMDL

Rec: Accounting for Existing Management

- What has stormwater management already?

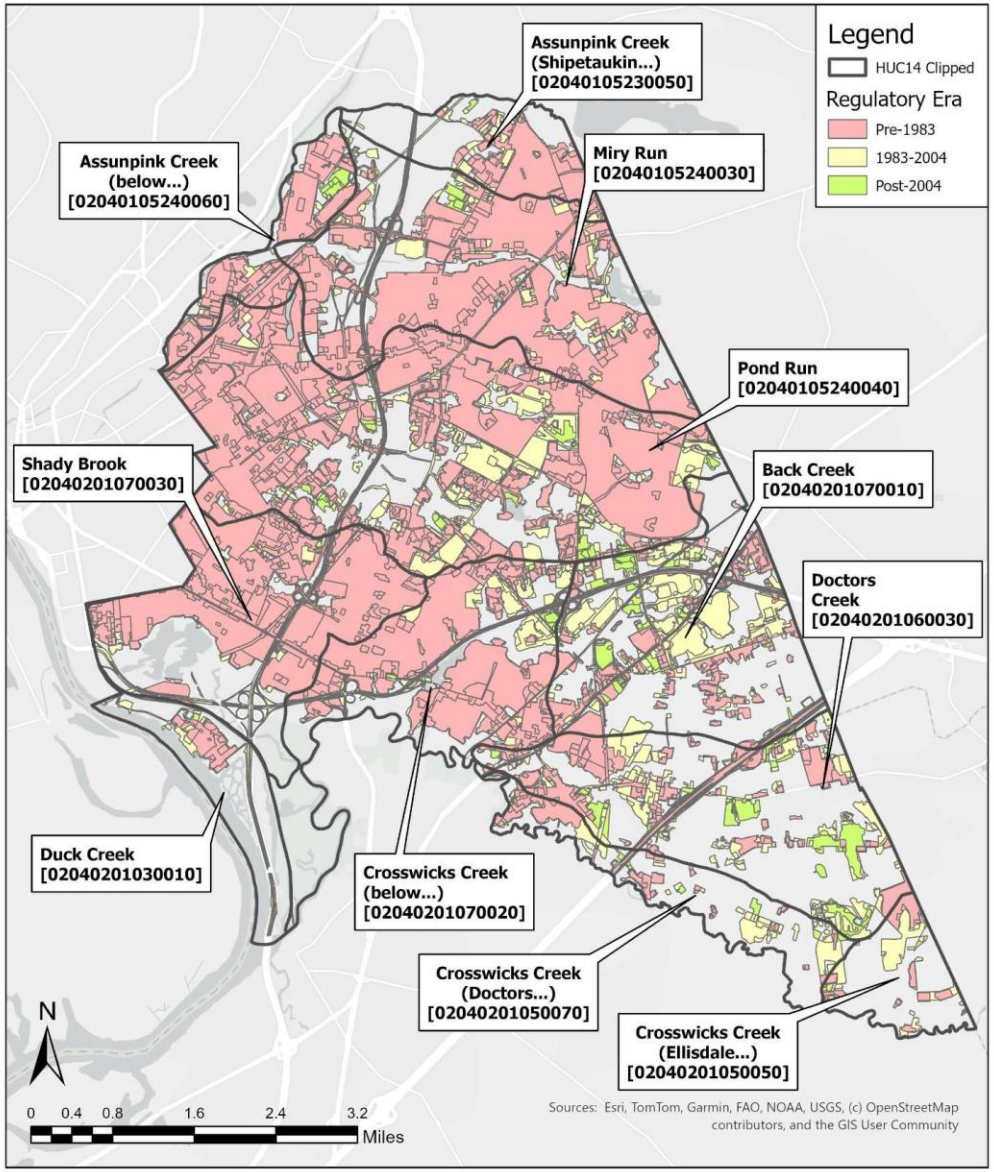
None

Ok

Good

Subwatershed	HUC14	Pre-1983	1983-2004	Post-2004
Assunpink Creek	204010523005	79.4%	19.5%	1.1%
Miry Run	2040105240030	88.4%	10.1%	1.5%
Pond Run	2040105240040	81.4%	16.2%	2.5%
Assunpink Creek	2040105240060	89.2%	5.1%	5.7%
Duck Creek	2040201030010	35.7%	61.9%	2.4%
Crosswicks Creek	2040201050050	43.3%	54.0%	2.7%
Crosswicks Creek	2040201050070	46.8%	45.1%	8.1%
Doctors Creek	2040201060030	45.9%	33.6%	20.5%
Back Creek	2040201070010	39.7%	49.0%	11.3%
Crosswicks Creek	2040201070020	82.4%	16.4%	1.2%
Shady Brook	2040201070030	92.3%	7.4%	0.2%
Total		**76.2%**	**19.5%**	**4.3%**

- Compare Urban Land Use Data from 2020, 2007, and 1986 OR use existing mapped management with drainage areas



Rec: Accounting for Existing Management

- Existing Stormwater Facilities

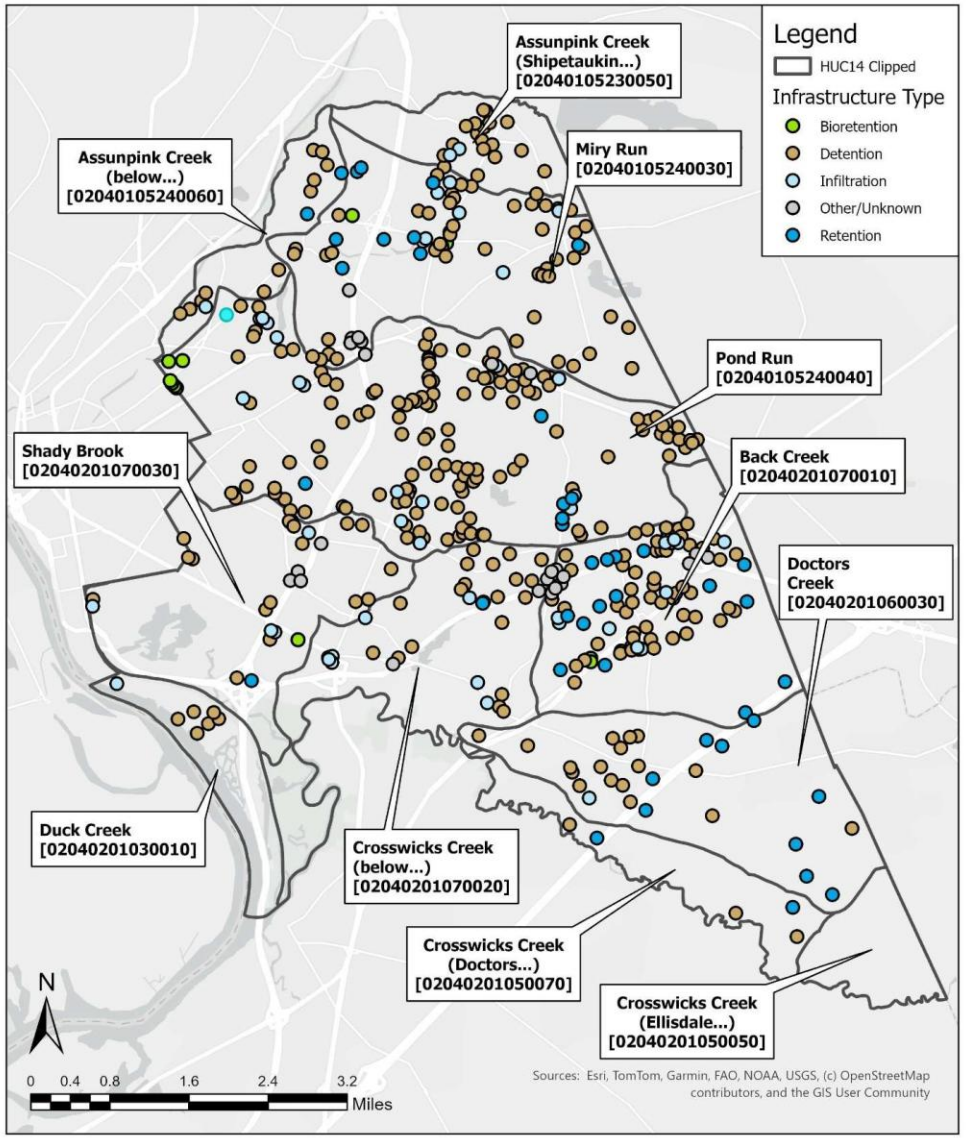
Management Era	BMP	Fecal Coliform	TP	TN	TSS
Pre-1983	None	0%	0%	0%	0%
1983-2004	Detention Basin	5%	20%	20%	50%
Post-2004	Infiltration Basin	90%	60%	50%	80%

Management assumptions (Reduction from NJDEP BMP Manual Table 4-3/WIP Project Matrix)

Total Suspended Solids

Table 30: TSS Load Reductions from Existing Management (lb/yr)

Load Category	Pond Run*	Crosswicks Ck*	Crosswicks Ck*
	2040105240040	2040201050070	2040201070020
Pre-1983	-	-	-
1983-2004	52,566	8,468	20,398
Post-2004	13,893	2,228	2,109
Grand Total	66,459	10,696	22,507
Target Load Reductions	138,078	30,634	48,530
Remaining load reductions	**71,620**	**19,939**	**26,024**



Rec: Accounting for MS4 Ordinances/Actions

- Very difficult to quantify impacts but all contribute to reductions
- Helpful to illustrate, but proposed projects must go past MS4 permit minimum requirements
  - Can enhance these elements to increase reductions (e.g. street sweeping, roadside erosion control, stream scouring program)

Table 31: MS4 Permit Actions Impact on Pollutants of Concern

MS4 Permit Actions	Dissolved Oxygen	Nitrate	Fecal Coliform	pH	Total Phosphorous
Pet Waste Ordinance	x	x	x	x	x
Wildlife Feeding Ordinance	x	x	x	x	x
Litter Control Ordinance	x	x	x	x	x
Improper Disposal of Waste Ordinance	x	x	x	x	x
Yard Waste Ordinance	x	x	x	x	x
Street Sweeping Program	x	x	x	x	x
Herbicide Application Management	x	x	x	x	x
Roadside Vegetative Waste Management	x	x	x	x	x
Roadside Erosion Control	x	x	x	x	x
Inspection and Maintenance of Stormwater Facilities	x	x	x	x	x
Stream Scouring Program	x	x	x	x	x
Illicit Discharge Detection and Elimination Program	x	x	x	x	x
BMPs at Municipal Maintenance Yards				x	
Storm Drain Inlet Retrofitting					

See Pollutants of Concern document from WIP webpage

Rec: Other Actions with Reductions

- NJ Fertilizer Law
  - Estimated reduction from residential lawn areas (see Minnesota DoA, 2018)
- Street Sweeping
  - Altered sweeping schedule and technology can create large estimated reductions in curb and gutter areas (see Chesapeake Bay and Molloy, 2019)
- Storm Drain Cleaning
  - Can report TP and TN reductions if sediment mass tracked (see Chesapeake Bay and Bateman, 2012)
- Leaf Collection (Wisconsin DNR)
  - Can credit 17% reduction for TP if collected three times in the fall

Rq: Proposed Management

- Prioritize areas with TMDLs
- Primary method = implementation of BMPs
  - New Green Infrastructure like Bioretention Systems
  - Retrofit: Detention Basins -> Bioretention Systems

Table 42: Total Phosphorus Estimated Management Areas (acres)

Subwatershed	HUC14	Pre-1983 Projects (acres)	1983-2004 Retrofits (acres)	Pre-1983 Projects, all Retrofit done (acres)
Miry Run~	2040105240030	868	273^	515
Pond Run*	2040105240040	1198	757^	565
Assunpink Ck*	2040105240060	165	32^	109
Crosswicks Ck*	2040201050050	88^	110^	88^
Crosswicks Ck*	2040201050070	149^	144^	78
Doctors Creek~	2040201060030	550^	402^	550^
Back Creek*	2040201070010	177	238	0
Crosswicks Ck*	2040201070020	454	278^	206
Total		**3,649**	**2,234**	**2,110**

^ = all urban area for HUC managed

How do we find project locations?

- Look at Class 15 Parcels first
- Right of Way areas
- Private sites

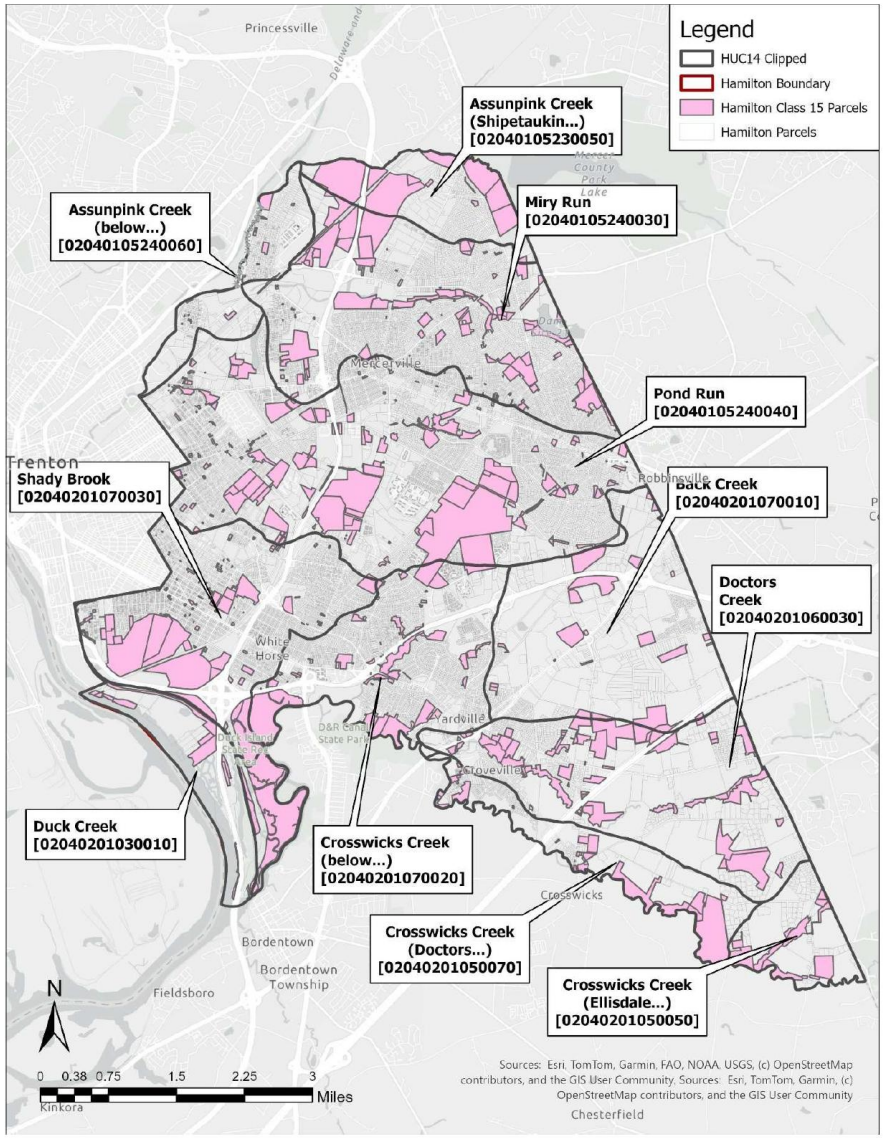


Figure 22: Hamilton Property Class 15 Parcels

Green Infrastructure Practices

Bioretention Systems

- Rain Gardens
- Bioswales
- Stormwater Planters
- Curb Extensions
- Tree Filter Boxes

Permeable Pavements

Rainwater Harvesting

- Rain Barrels
- Cisterns

Rooftop Systems

- Green Roofs








GREEN INFRASTRUCTURE RECOMMENDATIONS

Robinson Elementary School

- bioretention system
- pervious pavement
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

0 50' 100'

Other Proposed Management

- Street sweeping & leaf collection improvements
- Septic system maintenance/repair
  - Municipality could require septic systems to be inspected and/or pumped every 3 years or on some other interval
- Review NJPDES Permit list for dischargers to audit
- Education & outreach
  - Education materials can educate the public to reduce pollution from residential and commercial areas

Additional Ideas worth exploring

- End of Pipe solutions
  - Management at outfalls or other discharge points in the MS4 system may be effective strategies
- MTD like devices to filter large volumes of runoff
  - poor water quantity control, but may provide good WQ management
- Revised Stormwater Ordinances to improve redevelopment
- Stormwater utility w/ credits
  - incentivize business/residents to implement projects
- Monitoring/sampling built into plan to check progress at regular intervals

WIP Matrix

Projects	DO (BOD, COD)	E. Coli	Fecal Coliform
Agricultural BMPs	x[19]		
Cluster and Concentrate			
Disconnect/Distribute/Decentralize			
Green Parking			
Housekeeping Practices/Spill Prevention and Cleanup			x[18]
Illicit Connection/Dumping Controls			x[8]
Improved Source Control (Street Sweeping, Pet Waste, Fertilizer, Geese Management)	x[20]		x[8]
Pervious Paving			x[2]
Protect Sensitive and Special Value Resources and Stream Bank Restoration			
Public Education	x[16]	x[16]	x[16]
Rain Gardens/Rain Barrels			
Street/Storm Drain Maintenance			
Tree and Vegetative Planting			

Projects	DO (BOD, COD)	E. Coli	Fecal Coliform
Bioretention Systems		x[24]	35%[32], x[2]
Blue Roofs			
Extended Detention Basins	x[22]		<10%[12], x[1]
Grass Swales			x[2]
Green Roofs			x[2]
Infiltration Basins/Trenches	70-90%[21], x[22]		90-100%[8,12,32], x[2]
Manufactured Treatment Devices (MTDs)			
Retrofitting Basins			
Sand Filters			x[2]
Silt Fences			
Standard Constructed Wetlands	x[22]	x[24]	75%[32], x[2]
Subsurface Gravel Wetlands			
Vegetated Curb Extensions			
Vegetated Filter Strips			x[2]
Wet Ponds		51%[21], x[24]	40-90%[12,32], x[2,8]

Link: Check the footnotes for excellent references!

Recommended Actions by TMDL Parameter

- **Fecal/Total Coliform** (New BMPs, retrofit BMPs, street sweeping, septic management, wildlife management)
- **TP** (New BMPs, retrofit BMPs, street sweeping, septic management, leaf collection, wildlife management)
- **TSS** (New BMPs, retrofit BMPs, street sweeping, erosion management)
- **VOCs** (Review NJPDES permits and audit, education on proper disposal [paints, glues, solvents, fuels, and other chemicals])
- **PCBs** (Review NJPDES permits and audit, education on proper disposal [old electrical transformers, building demolition, and other])

Recommended Actions by Impairment

- **DO** (BOD issue, focus on organics entering stream [Nitrate, TP, TSS])
- **Enterococcus/E. Coli** (Part of Fecal Coliform, see TMDL actions)
- **Lead** (education on proper disposal, review NJPDES permits)
- **Nitrate** (similar sources and actions to TP, see those TMDL actions)
- **PCBs in Fish Tissue** (see TMDL actions)
- **pH** (education on proper disposal of acidic and basic substances)
- **Temperature** (look at potential illicit discharges and create streambank shading)
- **TDS** (Similar to TSS see those actions, special focus on salts used for deicing)
- **Turbidity** (Similar to TSS, see TMDL actions)

Example Summary Table

[HUC14] Subwatershed Name	TMDLs/Impairments	Actions
[2040105230050] Assunpink Ck (Shipetaukin to Trenton Rd)	TMDLs None Impairments PCBs in Fish Tissue E. Coli	• Review NJPDES Permit list for potential emitters [PCB/VOCs] • Review maintenance yard procedures [PCB/VOCs] • New bioretention & basin retrofits [E. Coli] • Street sweeping improvements [E. Coli]
[2040105240030] Miry Run (Assunpink Cr)	TMDLs Fecal Coliform Total Phosphorus Impairments None	• New bioretention & basin retrofits [Fecal Coliform, Total Phosphorus] • Leaf collection improvements [Total Phosphorus] • Street sweeping improvements [Total Phosphorus]

Potential Management Summary

Table 45: Total Phosphorus Potential Management Strategies for TMDLs (lb/yr)

Potential Management Strategy	Potential TP Load Reduction (lb/yr)	
	02040105240030 - Miry Run	02040201060030 - Doctors Creek
Leaf collection	205	29
Street Sweeping (Chesapeake Reduction)	78	37
Green infrastructure for proposed retrofit sites	22.3	0.8
1983-2004 development retrofits	378	139
Pre-1983 development bioretention projects	3,232	368
Septic system replacement (20% reduction of total load assumed)	3	180
TOTAL =	**3,713**	**754**
Total reduction needed (existing management already removed)	**723**	**1515**

Example Cost

Table 47: Costs for Proposed Management Strategies for Phosphorus

Action	Management Strategy	Cost	Cost per lb/yr
1	Leaf collection and street sweeping (Leaf collection procedure to be reviewed to comply and street sweeping to follow. Street sweeping to be increased to twice a week [once every other week] with appropriate technology). This is an annual cost.	$1,090,635 [$259,896]	$3,125 [$891]
3	Bioretention systems for unmanaged areas (~111 acres of BMPs managing water quality storm with one foot of storage) [~$750,000/acre]	$83,250,000	$88,563
4	Converting existing detention basins to bioretention basins (66 basins need to be transformed) [~$40,000 each]	$2,640,000	$5,106
5	Repair and/or replacement of 29 septic systems [~$9,000 each]	$261,000	$1,426
	Total construction cost estimate =	$86,151,000	
	Total annual maintenance cost estimate =	$1,090,635 [$259,896]	

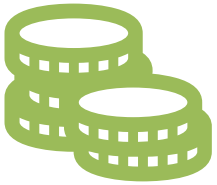
Funding Sources

Grants

Section 319, FEMA BRIC, State Revolving Funds, NFWF

Loans

NJ Water Bank



Stormwater Utility

Potential sustained funding mechanism

Example Schedule

Step	Management Strategy	Time Frame
1	Review leaf collection and street sweeping program. The township should begin soliciting grant funding for advanced street sweepers as needed.	0 to 6 months
2	Develop and deliver the educational programming, particularly focusing on encouraging residents to adopt pollution reduction strategies, build rain gardens, and install rainwater harvesting systems to help reduce stormwater flows to the waterways; seek funding to support rain garden installation by private property owners.	6 to 18 months
3	Develop detention basin retrofit designs that can be submitted for grant funding to implement.	6 to 18 months
4	Prepare designs for green infrastructure projects and submit these designs for funding.	6 to 24 months
5	Adopt a septic system registration program where homeowners must inspect and pump their systems on a regular basis (once every three years).	12 to 24 months
6	Continue developing retrofit designs and green infrastructure projects on a regular basis trying to achieve a certain amount each year to reach target reductions in a reasonable timeframe.	24 months+
7	Implement a sampling plan to establish effectiveness of implementation efforts	24 months+

What about flooding?

- Flooding is not explicitly required to be addressed by WAR, intended focus is on TMDLs and impairments

- Many actions taken to address water quality may also reduce flooding, particularly implementation of new stormwater facilities

Do we really need to do ALL this?

- Goal is to create a plan, it is not required to be implemented *yet*
- May not need to do everything to meet TMDL
  - Continuous monitoring plan should be done to evaluate impact of actions over time
- Only way we restore our rivers and streams to fishable, swimmable, and safe for wildlife
- Most actions taken to address water quality will also help reduce flooding

Where do we start with implementation?

- Focus on areas with TMDLs
  - Those with multiple or highest severity first
- Implement the most cost-effective strategies first
- Continue to implement and monitor until WQ criteria are achieved

What's Next?

Phase 3 –Watershed Improvement Plan Report

Report shall prepare and submit a Watershed Improvement Plan Report (Due December 1, 2027) that includes:

i. A summary of **proposed locations** and **load reductions of water quality improvement projects**, both **public and private**, to be implemented

ii. A **summary of the public comments** received, and the changes made to the Final Plan

iii. A summary of how the projects will be coordinated with **other regulatory requirements**, such as:

- flood protection
- endangered habitat/species
- surface & ground drinking water protection
- climate change/resiliency
- green infrastructure/SWM requirements
- wildlife corridors
- green acres
- environmental justice
- Combined Sewer Overflow Long Term Control Plans
- wetlands
- riparian buffers
- forest corridors
- related ongoing projects
- Pinelands Commission
- Highlands Council
- Delaware River Basin Commission

iv. The proposed **implementation schedule** for the water quality improvement projects

v. A **schedule of the public information sessions** to be held

vi. Problems identified that are **outside the jurisdiction of the permittee**, if any. These can be related to pollutant loading due to agricultural properties, or other lands not under the jurisdiction of the municipality, and opportunities to address them

vii. Costs, broken down by project and year, the funding opportunities that will be sought

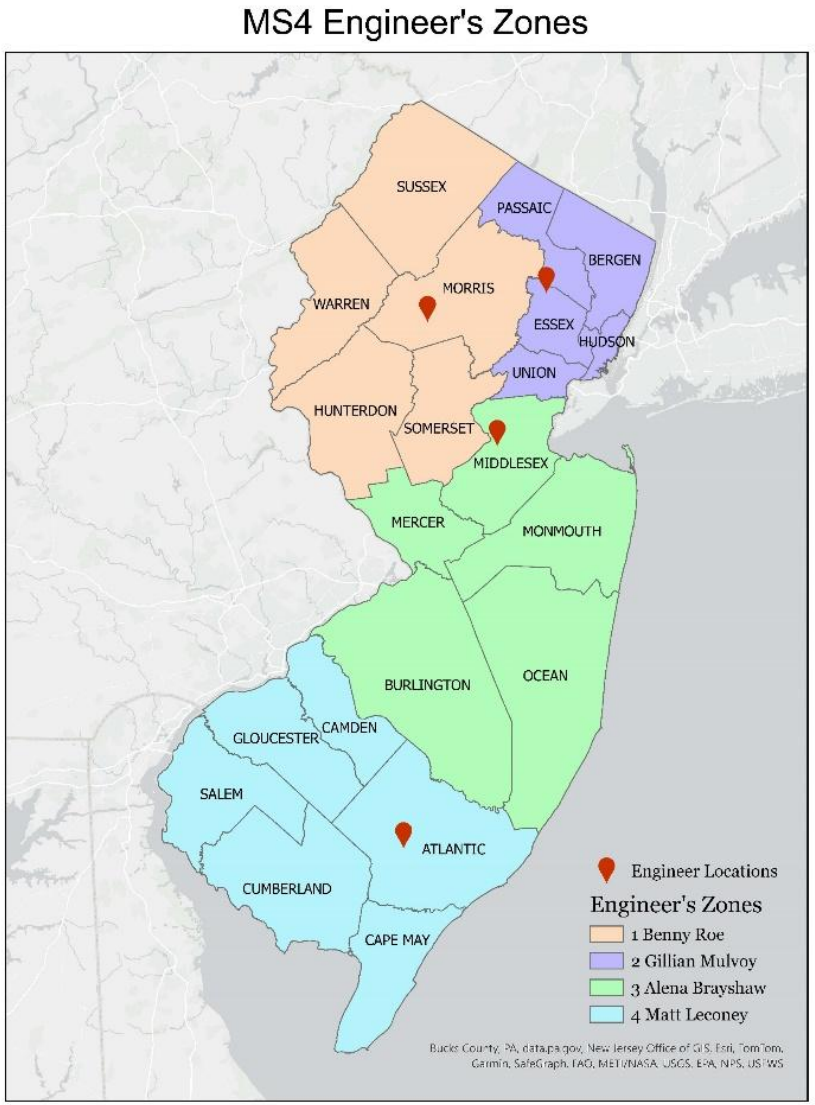
viii. This plan shall describe how **stormwater related problems in overburdened communities** have been **prioritized**.

So wait, what's the difference?

WAR	Final WIP
• Generalized projects by subwatershed w/ load reductions	• *Specific* projects locations w/ load reductions
• Generalized Schedule	• Schedule broken down by project and year
• Generalized Cost Breakdown by project type	• Costs broken down by project and year with associated funding opportunities
• Public feedback from public sessions (should be held semiannual [2 times per year])	• Public feedback from public sessions & required 60-day comment period for WAR
	Additional Elements • Coordination w/ regulatory requirements • Schedule of public information sessions • Problems outside the jurisdiction of the permittee (agricultural or otherwise) • Overburdened communities prioritized within report

How can we help?

- Three-year agreement w/ NJDEP to support MS4 communities statewide (currently ends June 2027)
- Four Regional Engineers
- Provide technical support to all municipalities
  - Prioritization of former Tier B municipalities
  - Expand to existing Tier A as capacity is available



Primary Support Tasks

1. **Preparation of the Watershed Inventory Report/ MS4 Infrastructure Map (Due January 1, 2026)**
2. **Preparation of the Watershed Assessment Plan (Due January 1, 2027)**
3. Preparation of the Watershed Improvement Plan (Due December 1, 2027)
4. Inspections of stormwater management facilities, inlets, catch basins, pipes, outfall
5. Implementation of an Illicit Discharge Detection and Elimination program
6. Other MS4 Compliance
7. Other tasks upon request

Watershed Assessment Report Tasks

- Land Use by HUC14 and Loading analysis for TN, TP, TSS, and Fecal Coliform
- Impervious cover analysis
- Provide additional loading analysis suggestions depending on the municipal land use
- Create load reductions targets based on loadings and TMDL criteria

Watershed Assessment Report Tasks

- Estimate existing development reductions from management practices based on regulatory eras
- Prepare chart showing how existing MS4 Permit Actions are addressing pollutants of concern
- Estimate the amount of load reductions possible with BMPs
- Provide protocol and training for developing green infrastructure concept plans and examples

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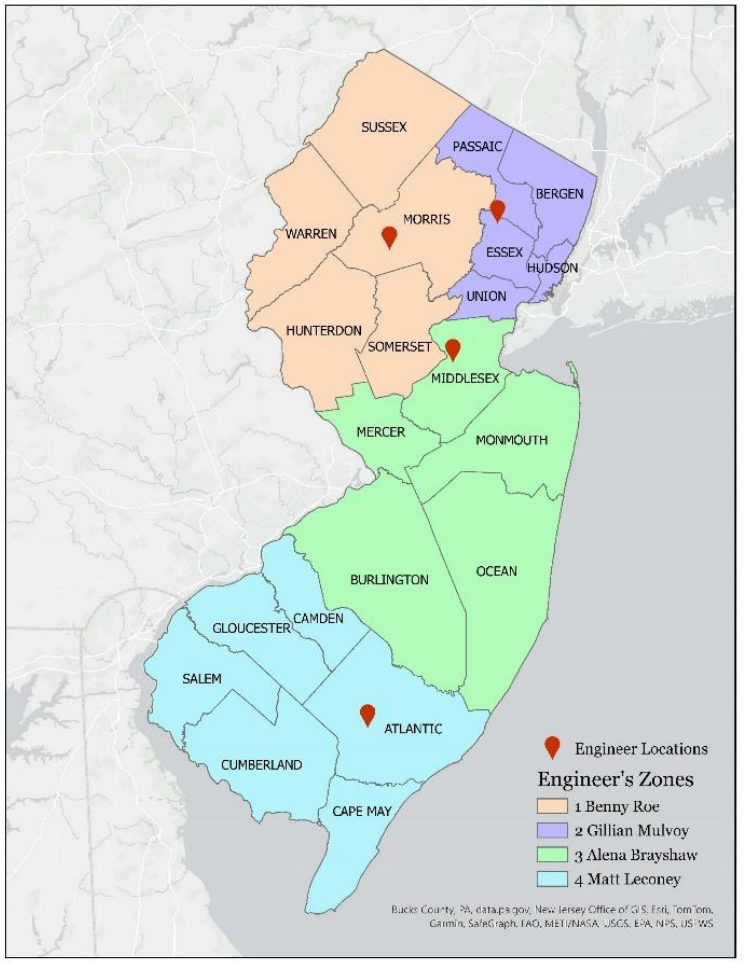
http://water.rutgers.edu/Projects/MS4/MS4.html

MS4 Engineer's Zones



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