

## Continuing Education Units | CEU's

To verify your attendance at this session **Scan in** at the **BEGINNING** and **Scan out** at the **END**

For your **PRINTED CERTIFICATE OF ATTENDANCE**, follow the directions found in the “CEU Procedures” section of the printed Conference Program Book



Stormwater  
Management:  
Map, Monitor and Maintain

November 16, 2023

New Jersey League of Municipalities Conference

Other questions, please consult the *League Staff at the Information Booth on Level 2*



# Stormwater Management: Map, Monitor and Maintain

November 16, 2023

New Jersey League of Municipalities Conference



# Panel Speakers



**Mayor Mark Freda**



**Anne Heasley**



**Tim Ebersberger**



**Michael Pisauro**



**Lindsey Sigmund**

# Audience Poll

- Are you a Stormwater Coordinator?
- involved in *permitting or reviewing* stormwater management plans in your community
- Involved in stormwater *mapping* in your community
- Involved in stormwater *maintenance* in your community
- Do you know *who serves as the Stormwater Coordinator* in your community?





# Princeton Stormwater Management

Mayor Mark Freda





# PRINCETON STORMWATER UTILITY FEASIBILITY STUDY:

*A FOUR PHASE APPROACH*

**PHASE 1- Programmatic Review, Needs, and Data Analysis (CURRENT PHASE)**

**PHASE 2- In-depth Analysis of Costs, Rates, Program Plan, Public Education**

**PHASE 3 - Implementation Plan and Adoption**

**PHASE 4 - Implementation Support/Public Education and Outreach**

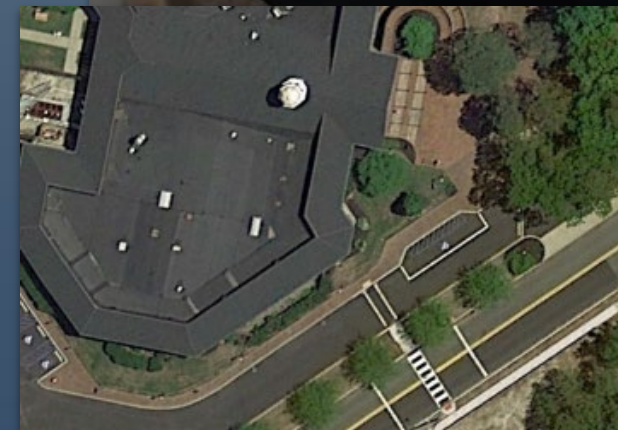


# HOW DOES A STORMWATER UTILITY WORK?

*Impervious Cover is the primary measure of cost distribution*

- Readily measurable with desktop GIS analysis
- Equitable and easy
- Required revenue and total demand for service (impervious cover) are used to set the rate.

$$\text{Rate (\$/SF)} = \frac{\text{Required Revenue (\$)}}{\text{Imp. Coverage (SF)}}$$



Helix Water District



# CURRENT EXPENDITURES

## Current expenditures include:

- Mapping costs - mandate of permit
- Engineering – driven by local regulations
- MS4 permit reporting
- Drainage system reactive maintenance such as blockage removal
- Street Sweeping
- Sewer staff support for pipe cleaning

***Estimate ~ \$760,000/year***  
*(personnel and operating expenditures)*





# POLICY DEVELOPMENT

Focus of Phase I – identify key policies for utility development

- Cost allocation methodology – impervious area
- Rate structure for various land use categories

# IN SUMMARY

- ✓ **Revenue capacity must increase** to address system needs.
- ✓ A **stormwater utility is a more equitable** way for property owners to pay for stormwater use.
- ✓ **Stakeholders engaged** and interested in concept.
- ✓ Phase I is complete.

## Phase II will generate requested info:

- Detailed cost of service + **10-year forecast of future investments** in capital and operations.
- Stormwater Utility **Rate Options** with a draft rate model and impact analysis
- **Robust stakeholder engagement**



# Local action for sustainable water management

Anne Heasley, Program Manager for Policy and Planning,  
Sustainable Jersey

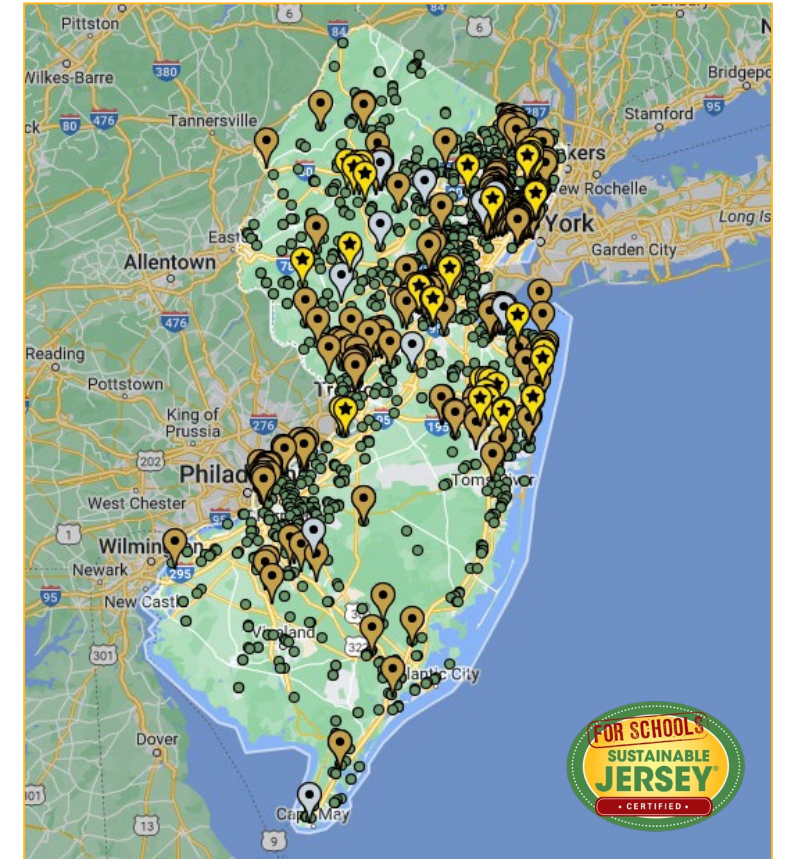


# Statistics

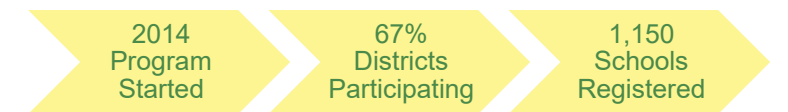
**25,569**  
Actions  
Implemented



Sustainable Jersey



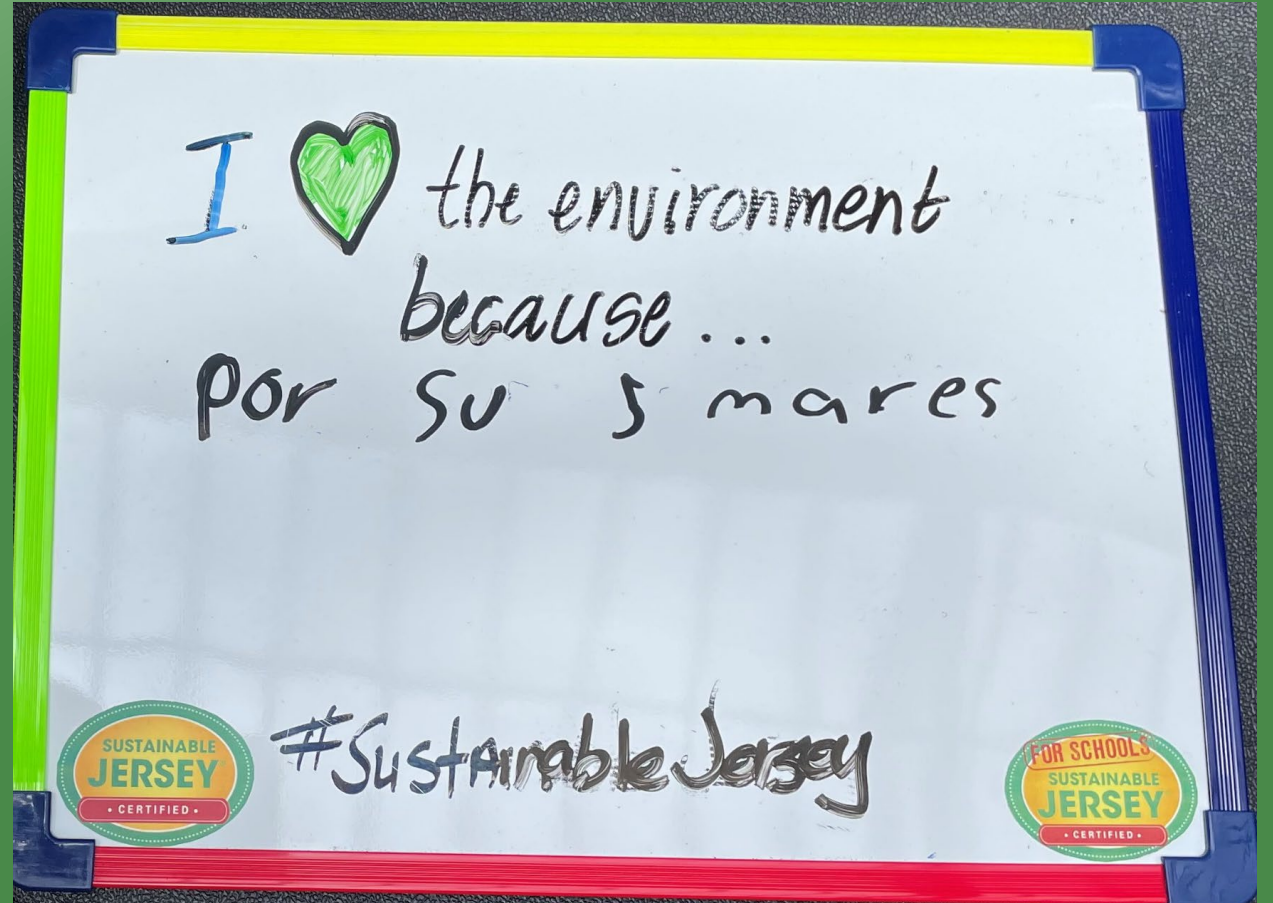
Sustainable Jersey for Schools







What can municipalities do to better manage stormwater?



7 year-old respondent  
NJDEP Earth Day 50<sup>th</sup> Celebration – April 2022

# New & Updated Actions Released!

Winter Best Practices to Reduce Road Salt Impacts *added*  
& Municipal Water Story *updated*

Learn more on the Program Updates page  
<https://www.sustainablejersey.com/actions/program-updates/>





# Winter Best Practices to Reduce Road Salt Impacts action

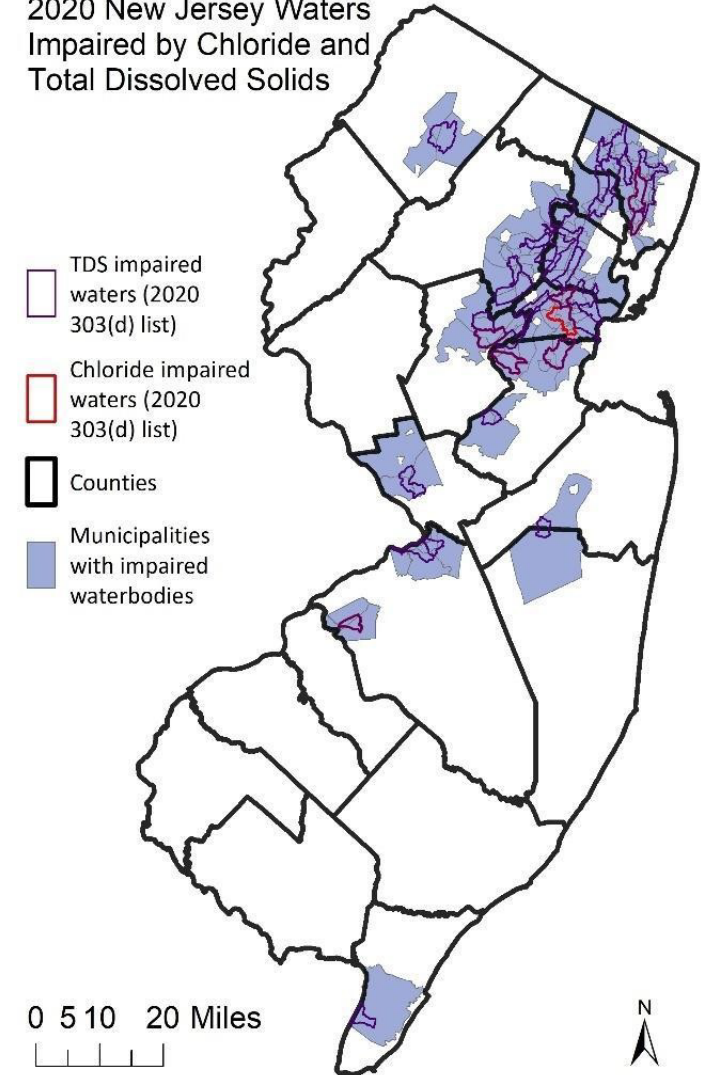
Webinar - online

Tuesday, December 12, 2023

12:00pm to 1:00pm

Register: [sustainablejersey.com/nc/events/](https://sustainablejersey.com/nc/events/)

2020 New Jersey Waters Impaired by Chloride and Total Dissolved Solids











# Enhanced Stormwater Management



ABOUT US

PROTECTING WATER

PROFESSIONAL RESOURCES

PLAN YOUR VISIT

PROGRAMS

ANNUAL EVENTS

PLAN AN EVENT



## Enhanced Stormwater Management Model Ordinance

The Watershed Institute Releases Enhanced



### ENHANCED MODEL STORMWATER ORDINANCE FOR MUNICIPALITIES

Municipalities in New Jersey are required to adopt a Municipal Stormwater Control ordinance reflecting various amendments made to the Stormwater Management Rule (N.J.A.C. 7:8) by the New Jersey Department of Environmental Protection (NJDEP). To assist municipalities in adopting stormwater ordinances, New Jersey Future developed this Enhanced Model Ordinance. It is based on [Appendix D: Model Stormwater Control Ordinance for Municipalities of the NJ Stormwater Best Management Practices Manual](#) provided by NJDEP, and includes modifications beyond the minimum to provide for improved water quality, more widespread implementation of green infrastructure, and greater protection of water resources. This sample ordinance is provided for information purposes only. It is important that amended rules are carefully reviewed before any portion of this draft ordinance is adopted. This ordinance is intended to apply to major and minor developments not pre-empted by the Residential Site Improvement Standards at N.J.A.C. 5:12.

Stormwater management aims to minimize pollution caused by stormwater in order to restore, enhance, and maintain the integrity of waters of the state. Federal, as well as state, water pollution laws permit municipalities to undertake additional actions including ordinances with standards stronger than the statewide minimum requirements N.J.A.C. 7:8-1.5(a). A municipality may choose stronger or additional measures, beyond the minimum standards and expectations set forth in N.J.A.C. 7:8, to improve local water quality, mitigate flood risk, and/or address other environmental or community needs.

New Jersey Future (NJF) recognizes the stormwater challenges faced by municipalities within the state, including water pollution and flooding. [The 2016 New Jersey Integrated Water Quality Assessment](#)

<https://thewatershed.org/the-watershed-institute-releases-enhanced-stormwater-management-model-ordinance/>

<https://gitoolkit.njfuture.org>



# Enhanced Stormwater Management

Home Underlying Science Lessons from Tropical Storm Ida Engagement Sessions New Jersey's Flood Indicator Tool



The banner features a photograph of a flooded residential street with a white house and trees in the background. A circular logo on the left contains a house silhouette and the text "INLAND FLOOD PROTECTION RULE NJDEP". The text "Inland Flood Protection Rule" is centered over the image.

**Inland Flood Protection Rule**

The Inland Flood Protection rule has been adopted, effective July 17, 2023.

Webinar - online  
Tuesday, February 6, 2024  
12:00pm to 1:00pm  
Register:  
[sustainablejersey.com/nc/events/](https://sustainablejersey.com/nc/events/)

# Green Infrastructure



- [Green Infrastructure Planning Action](#)

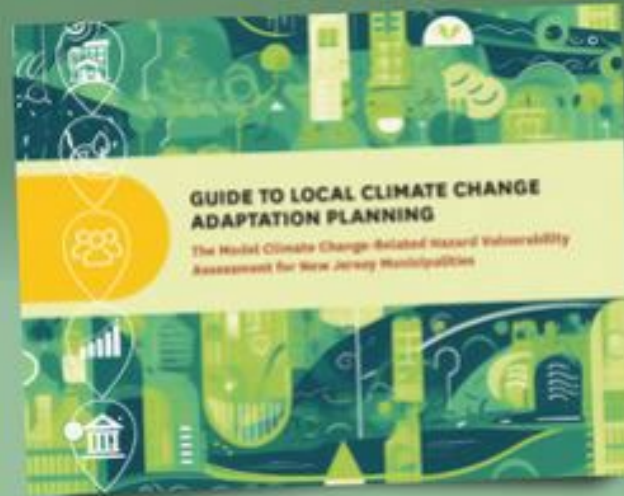
- [Green Infrastructure Implementation Action](#)



# Authoritative Guide for Municipalities

**Municipal Leaders are on the Frontlines  
of Climate Change Adaptation**

**NOW  
AVAILABLE**  
Download the New Guide



Are you ready to take the first crucial step toward protecting and strengthening your community?





**Eligible applicants**  
88 municipal governments

**Are you in the Highlands?**



# MS4 grant funding for Highlands municipalities

The New Jersey Highlands Council offers municipal grants to supplement the New Jersey Department of Environmental Protection (DEP) MS4 Permit compliance grants.

- ✓ Noncompetitive
- ✓ No match required
- ✓ No minimum or maximum
- ✓ No application deadlines
- ✓ Reimbursement based
- ✓ Require an approved scope (models provided)
- ✓ Pending availability of funding from treasury
- ✓ Eligible expenses include planning, design, engineering costs

**Highlands Region MS4 grant information**

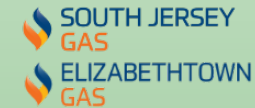


# Sustainable Jersey Underwriters and Sponsors

## Program Underwriters



## Corporate Sponsors



# MS4 Mapping Requirements and Tools

Tim Ebersberger

Bureau of NJPDES Stormwater Permitting and Water Quality Management

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# MS4 Permit Mapping Requirements Overview

## 2018 Tier A and Tier B

- Issued Final on November 9, 2017
- Develop, update and maintain an outfall pipe map showing the location of the end of all MS4 outfall pipes (tidal and non-tidal) owned or operated by the Tier A Municipality which discharge to a surface water body.
- Show the location and name of all surface water bodies receiving discharges from those outfall pipes
- Electronic maps submitted to the Department by December 21, 2020



# MS4 Permit Mapping Requirements Overview

## 2023 Tier A MS4 Permit

- Issued Final on December 1, 2022
- The permittee shall develop, update, and maintain an MS4 Infrastructure Map that delineates the location of the following stormwater features that are owned or operated by the permittee, including their associated attributes noted in parentheses:
- Posted on the permittee's stormwater webpage and included as a weblink within the SPPP
- Submitted electronically to the Department as a georeferenced shapefile, geodatabase, or an AutoCAD file (with all other non-applicable data stripped out). If the DEP Mapping Application is used, then no submittal is required as the data is automatically submitted to the Department via the mapping application
- Electronic mapping data submitted to the Department by January 1, 2026

# MS4 Permit Mapping Requirements Overview

## 2023 Tier A MS4 Permit

- MS4 outfalls (receiving surface water name, type of outfall);
- MS4 ground water discharge points (type);
- MS4 interconnections (type into/from, entity);
- Storm drain inlets (type, catch basin present, label present, retrofitted);
- MS4 manholes;
- MS4 conveyance (type, direction of flow);
- MS4 pump stations;
- Stormwater facilities (type);
- Property boundaries of maintenance yard(s) and other ancillary operations (type)



# MS4 Permit Mapping Requirements Overview

## Purpose of Infrastructure Mapping and Asset Management

- Stormwater Facility Inspections and Maintenance
- Improve Water Quality and Prevent New Impairments





# Current MS4 Infrastructure Mapping

## Purpose of Infrastructure Mapping and Asset Management

- Illicit Discharge Detection and Elimination
- Stream Scouring Detection and Elimination





# MS4 Permit Mapping Requirements Overview

## Purpose of Infrastructure Mapping and Asset Management

- Flooding Prevention and Resilience





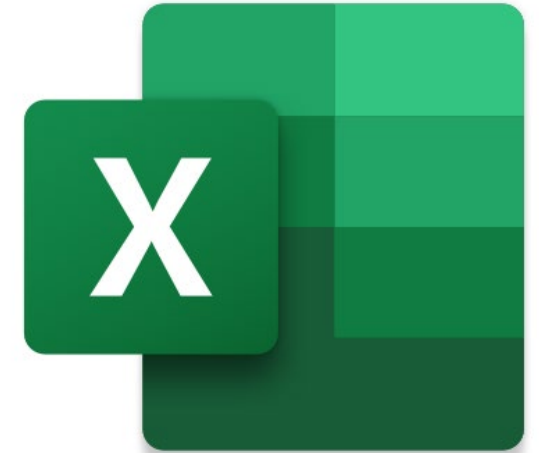
# Current MS4 Infrastructure Mapping

## Purpose of Infrastructure Mapping and Asset Management

- Emergency Response to Spills



## Continued Availability of Templates





## Continued Availability Mapping Tool and Free Licensing



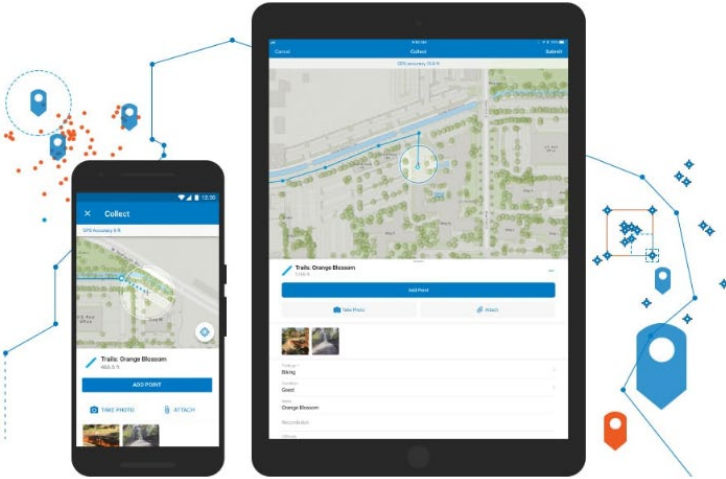


# ArcGIS Online Mapping Tool



Collector  
for ArcGIS

Accurate data collection made easy



ArcGIS Field Maps



# ArcGIS Online Mapping Tool



Field Maps



NJDEP  
Stormwater  
Infrastructure  
Database

# Stormwater Infrastructure Data Flow



Field Maps



NJDEP Stormwater Infrastructure Database



DEP Staff



DEP Staff





# Stormwater Infrastructure Data Flow



NJDEP Stormwater Infrastructure Database



Web Maps?  
Story Maps?  
How and communities  
best use this?  
Additional Data?



# NJDEP Assistance

## Training and In Person Assistance



# NJDEP Assistance

## Funding and Grants





## Funding and Grants

- \$75,000 for Tier B Municipalities to develop MS4 program
  - Portion when application is submitted and the rest after SPPP is done
- \$25,000 for Tier A Municipalities to assist with stormwater infrastructure mapping costs
  - Portion when application is submitted and the rest after the map is complete and submitted

## Engage Your Community!

- Watershed Groups
- Local Youth
- County Based Groups
- Neighboring Municipalities



# How Watershed Organizations Can Assist Towns



Nov. 16, 2023  
NJLM Conference



# Our Mission



Keeping water clean, safe and healthy is the heart of our mission.

We work to protect and restore our water and natural environment in central New Jersey through conservation, advocacy, science and education.

# Our Reserve

**Welcome!**

The Watershed Reserve is open every day from dawn to dusk. Enjoy our nearly 1,000 acres of forest, wetlands, meadow and farmland.

**The Watershed Institute**  
31 Titus Mill Rd, Pennington, NJ 08534  
609-737-5735 • thewatershed.org  
njweather.org/station/3526

@theH2Oshed

Scan code for an online map.

**Map Key**

- Stony Brook Trail 2.2 miles
- Watershed Trail 6 miles
- Farm/History Trail 1.6 miles
- Meadow/Pond Trail 2.5 miles
- Boardwalk Trail (under construction)
- Other Trail
- Elks Trail (FOHVOS)
- Lawrence-Hopewell Trail
- Building
- Parking Lot
- Restroom
- Stony Brook Access

- Watershed Reserve
- Deciduous Forest
- Coniferous Forest
- Old Field
- Wetland
- Boulder Field
- Farm
- Meadow
- Water

Delaware Township, Boss Road, West Amwell Township, Hopewell, Mt Rose, The Watershed Institute, 8 miles, Princeton, Hopewell Township, Pennington, Lawrenceville, Lawrence Township, Ewing Township, Yardley, Grounds For Sculpture, 10 miles, Trenton, Hamilton Township, Robbinsville Twp, Mercer County Park, West Windsor Township, Princeton Junction, Plainsboro Township, Rocky Hill, Montgomery, Ten, Skillman, Hopewell, Rosedale, 206, 1, 295, 31, 32, 29, 33, 532, 332, 295, 1, Sesame Place, NEW JERSEY, PENN.



# Our Home

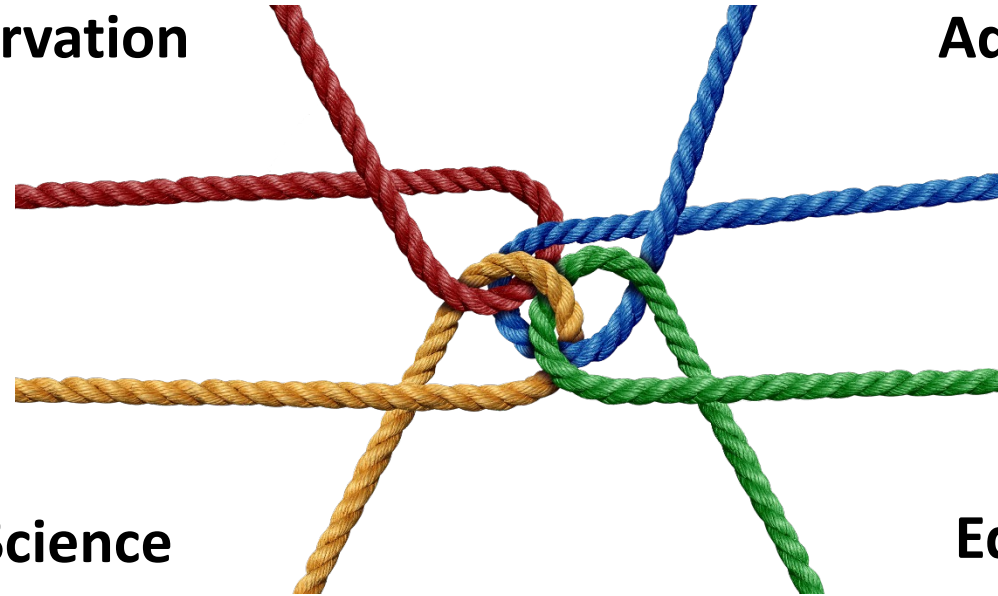




# Our Priorities

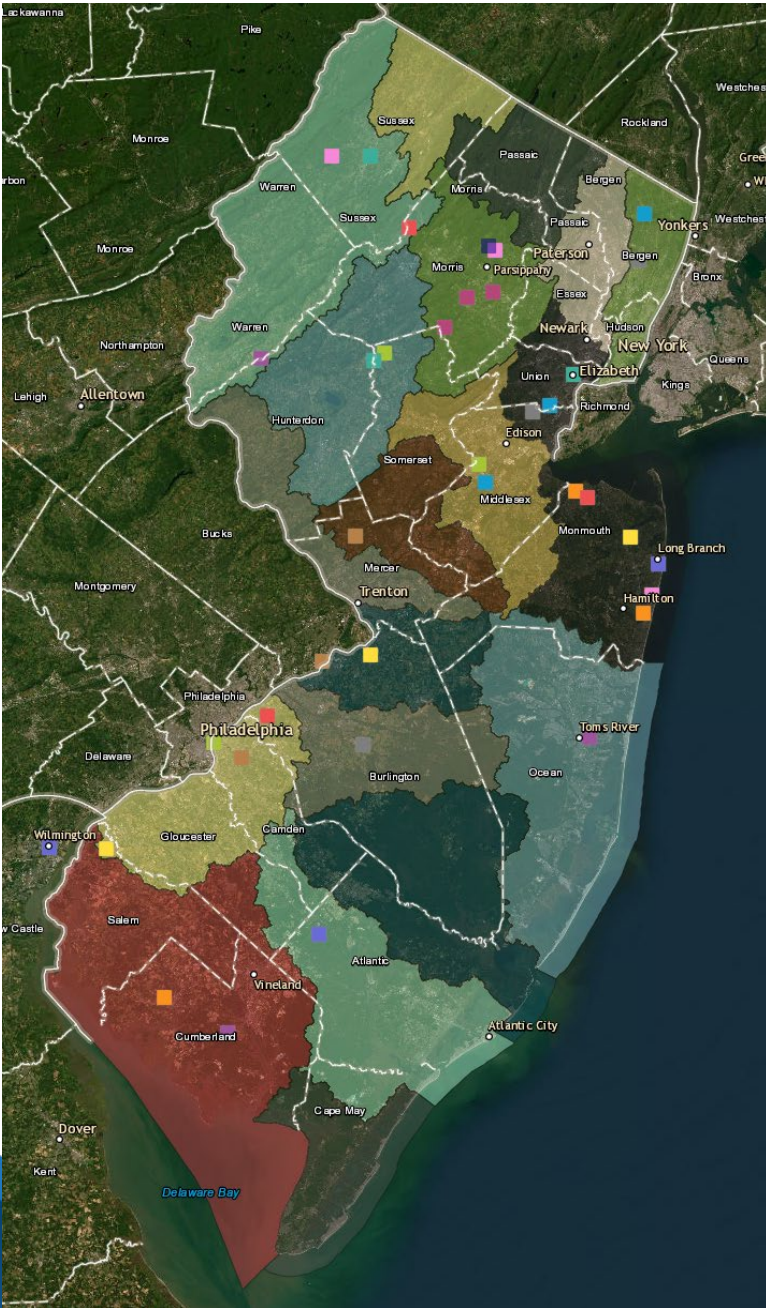
**Conservation**

**Advocacy**



**Science**

**Education**



# Watershed Associations

Local organizations

32+ in the state

Varied capacity

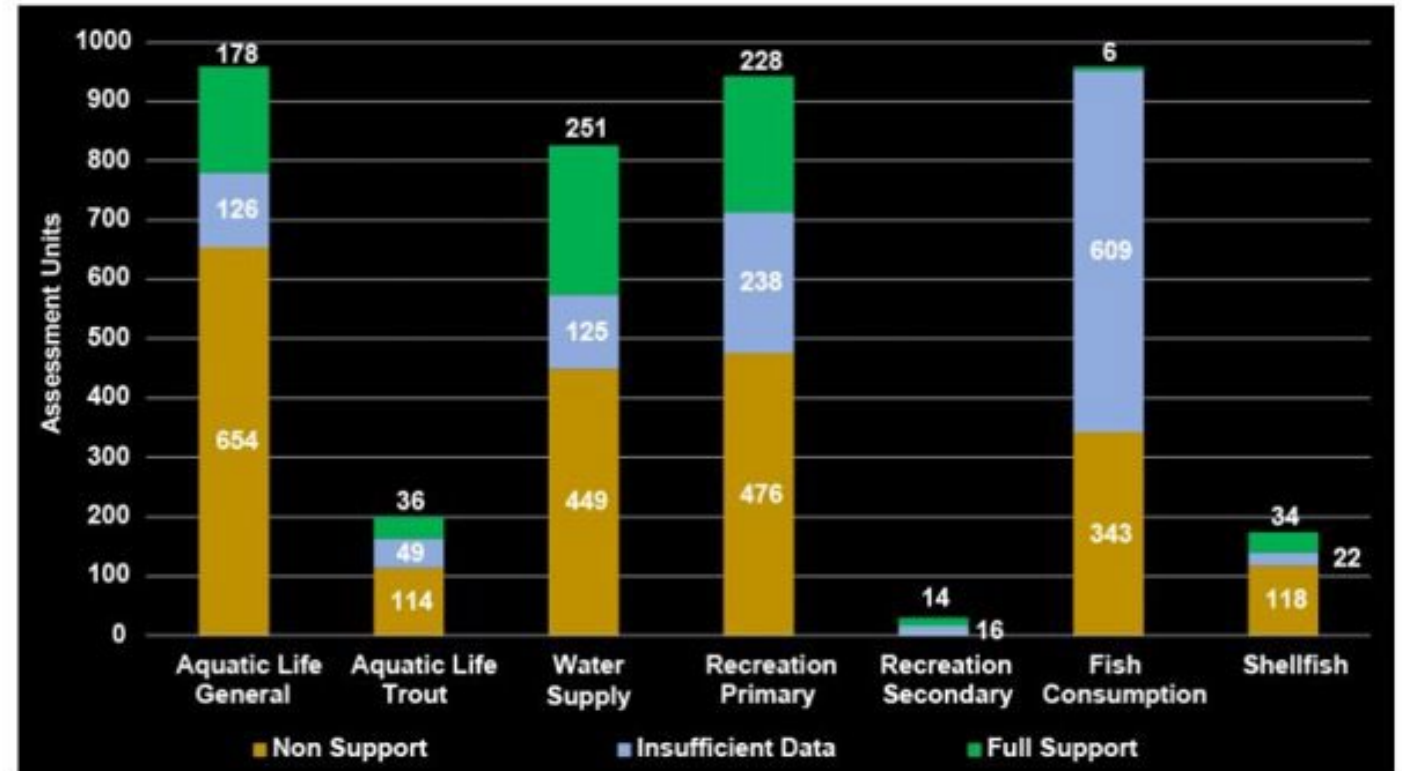
Enthusiastic resources

# Why

It is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by **July 1, 1983**

Clean Water Act

Designated Use Results Statewide



2018/2020 Integrated Report



# Flooding





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## Stormwater Education and Advocacy

- Webinars and workshops
- Presentations to:
  - Governing Body
  - Environmental Commissions
  - Planning Boards
- Meetings with the Public



# 319 Grant Projects – Impervious Cover Assessments and Reduction Action Plans

Impervious Site Assessments\_beta

INTRO TEST PROJECT MAP CRANBURY TWP E WINDSOR TWP HIGHTSTOWN BORO HOPEWELL BORO HOPEWELL TWP LAWRENCE TWP

**PROJECT MAP**

Instructions

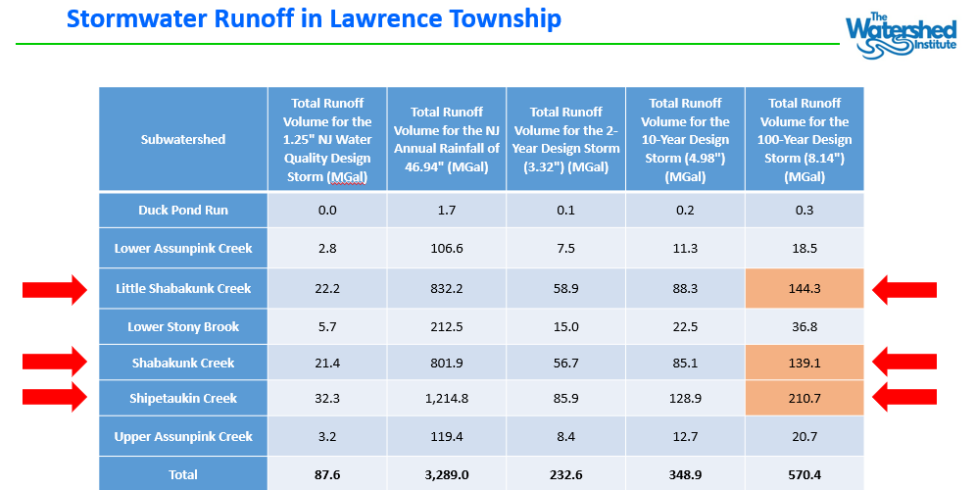
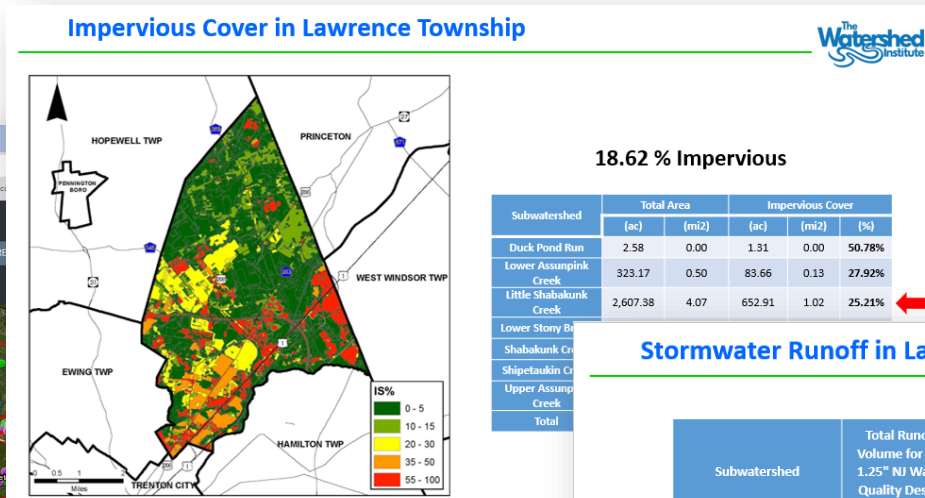
Map exploration:

- Explore the entire project area by dragging the map and zoom to project areas by using your mouse or the map navigational buttons.
- To explore projects of a specific town and to access the Impervious Cover Assessment and Reduction Action Plan reports, click on the tab of the desired town at the top of the page.

What do the site designation mean:

**SITES**

- DESIGN AVAILABLE
- ASSESSMENT ONLY







## Assistance with Watershed Improvement Plan

- 3 phases
  - Watershed Inventory Report- 36 months
  - Watershed Assessment Report- 48 months
  - Final Watershed Improvement Plan Report- 59 months
- Objective
  - Improve water quality by reducing contribution of pollutant parameters found in a Total Maximum Daily Load (TMDL)
  - Improve water quality by reducing contribution of pollutant parameters causing water quality in Integrated Report

## Watershed Inventory Report

- All outfalls
- Drainage areas for each outfall
- Receiving waterbodies for those outfalls
- Water Quality Classification
- Interconnection from municipality into another entity
- Drainage areas for those interconnection
- Interconnection into municipality from another entity
- All storm drain inlets
- Areas associated with each TMDL
- Area associate with each water quality impairment
- Overburdened communities
- Impervious areas
- Location of BMPs



# Why Enhanced Ordinances?

## State Stormwater Management Challenges

- Current program may be **slowing** not stopping the rate at which the stormwater problem is getting worse.
- But only large developments are addressed.
- Program not addressing existing stormwater problems.
- *Current rules do not address volume of runoff.*
- Current rules do not *in practice* address Redevelopment

# Can We Enhanced?

*It is the goal of stormwater management to minimize pollution caused by stormwater in order to restore, enhance and maintain the integrity of waters of the State. Federal, as well as, State water pollution laws permit municipalities to undertake additional actions including ordinances with standards stronger than the statewide minimum requirements.*

-NJDEP Model Stormwater Control Ordinance

# Key Components- Enhanced Ordinance

- Redefine Major Development
- Address smaller developments
- Address Redevelopment
- Low Impact Design
- Incorporate Water Quality
- Capture stormwater onsite
- Enhanced analysis of environmental impacts from development
- Permitting and Reporting Requirements



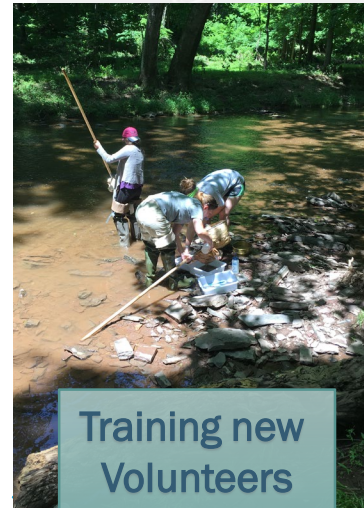
# Monitoring Programs

## STREAMWATCH VOLUNTEER WATER MONITORING PROGRAM

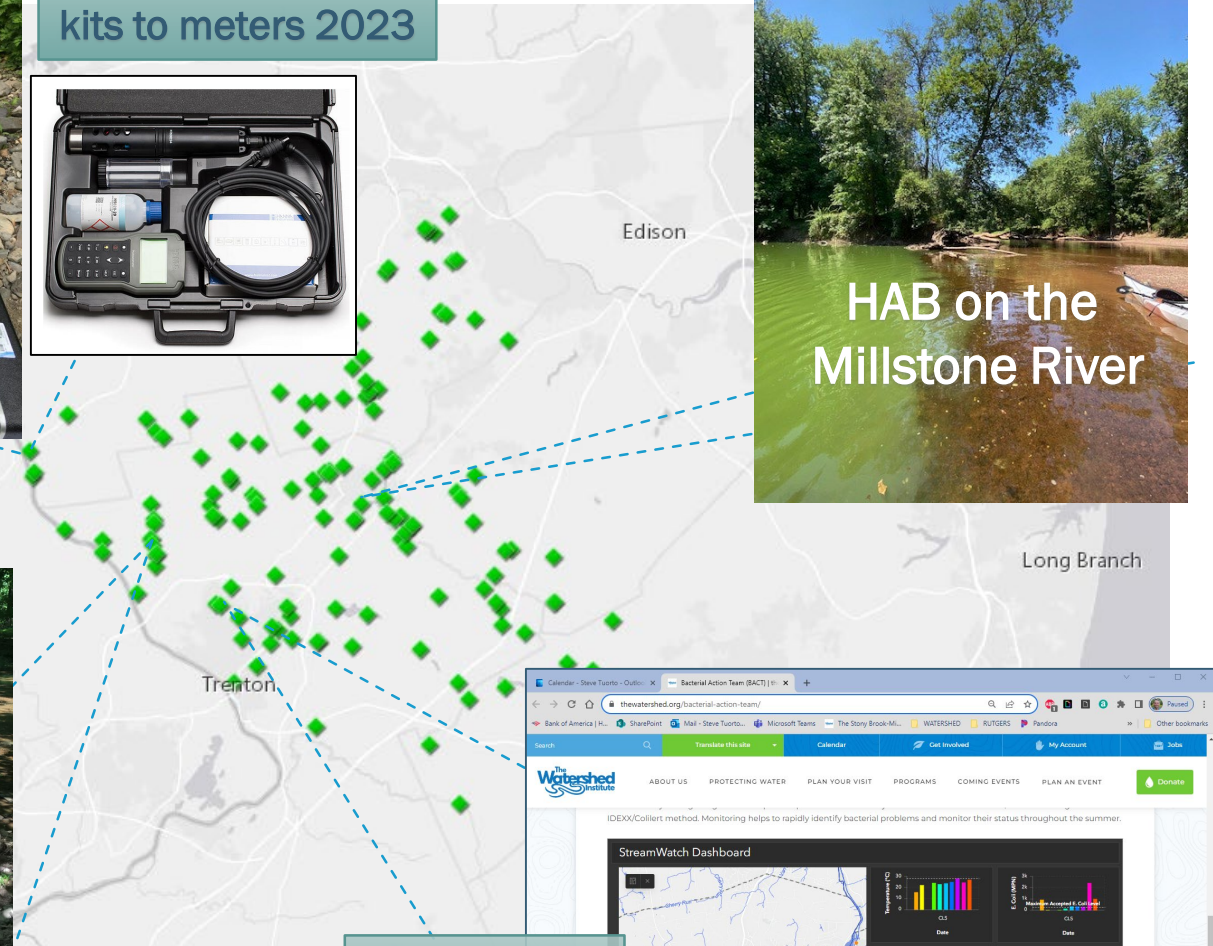
- Chemical Action Team
  - ~40 sites monitored monthly
- Bacterial Action Team
  - ~60 sites monitored weekly this summer
- Biological Action Team
  - 9+ sites monitored twice a year
- Data sharing
  - EPA and DEP – water quality portals
  - Municipalities and community – public dashboards



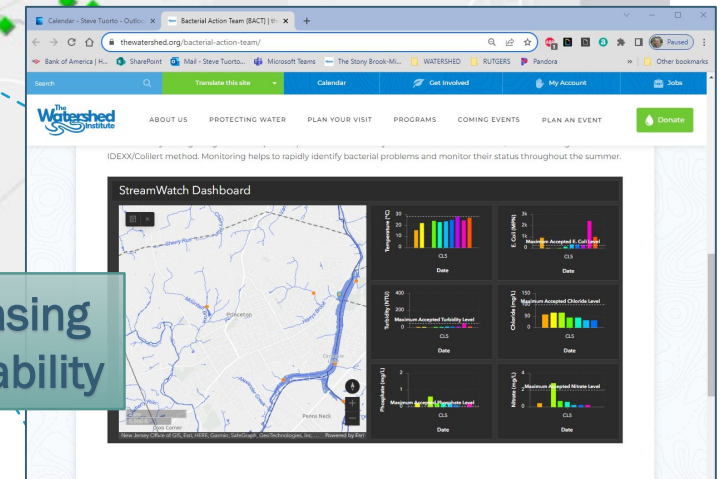
Transitioning from kits to meters 2023



Training new  
Volunteers  
2023



HAB on the  
Millstone River



Increasing  
Shareability



# NEW JERSEY WATERSHED WATCH NETWORK

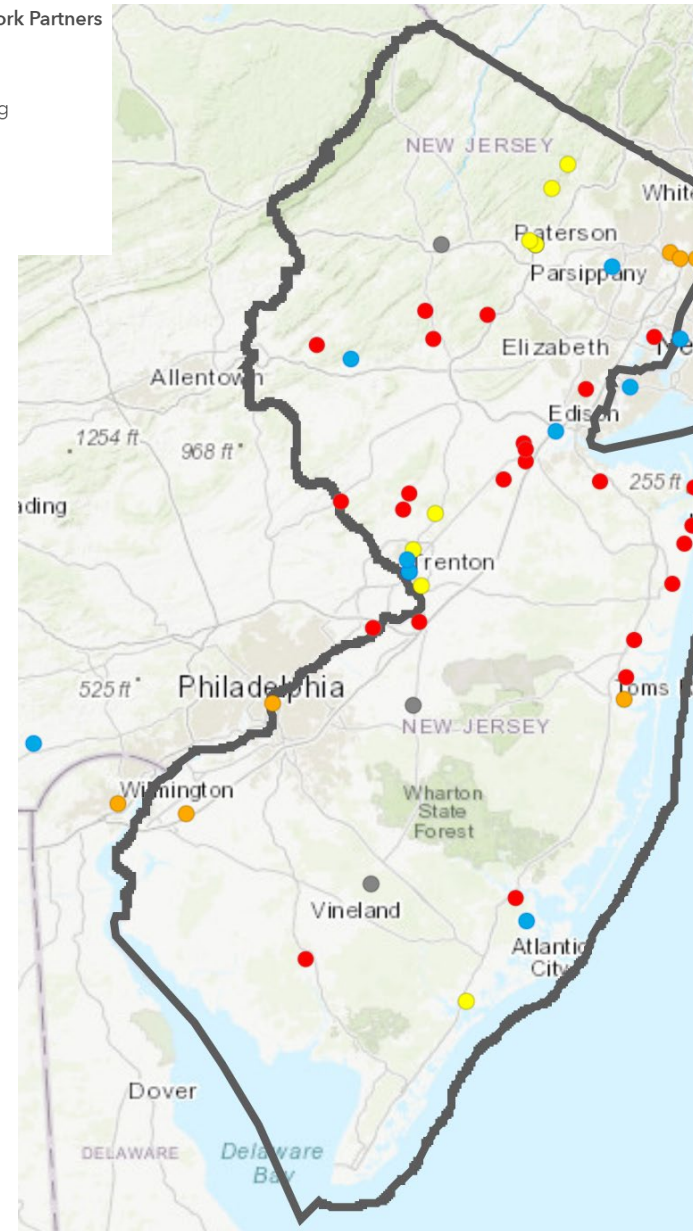
## Providing

- Technical assistance for NJ water monitoring groups
- Volunteer training, accreditation, and testing on behalf of NJDEP
- Guidance documents and standardized methods
- Special monitoring projects
  - NJ Salt Watch
  - Riverways bacterial monitoring in Philadelphia and Camden
- Small grants beginning later this year



## NJ Watershed Watch Network Partners

- Active Monitoring
- Educational Monitoring
- Interested
- Inactive
- Service Provider

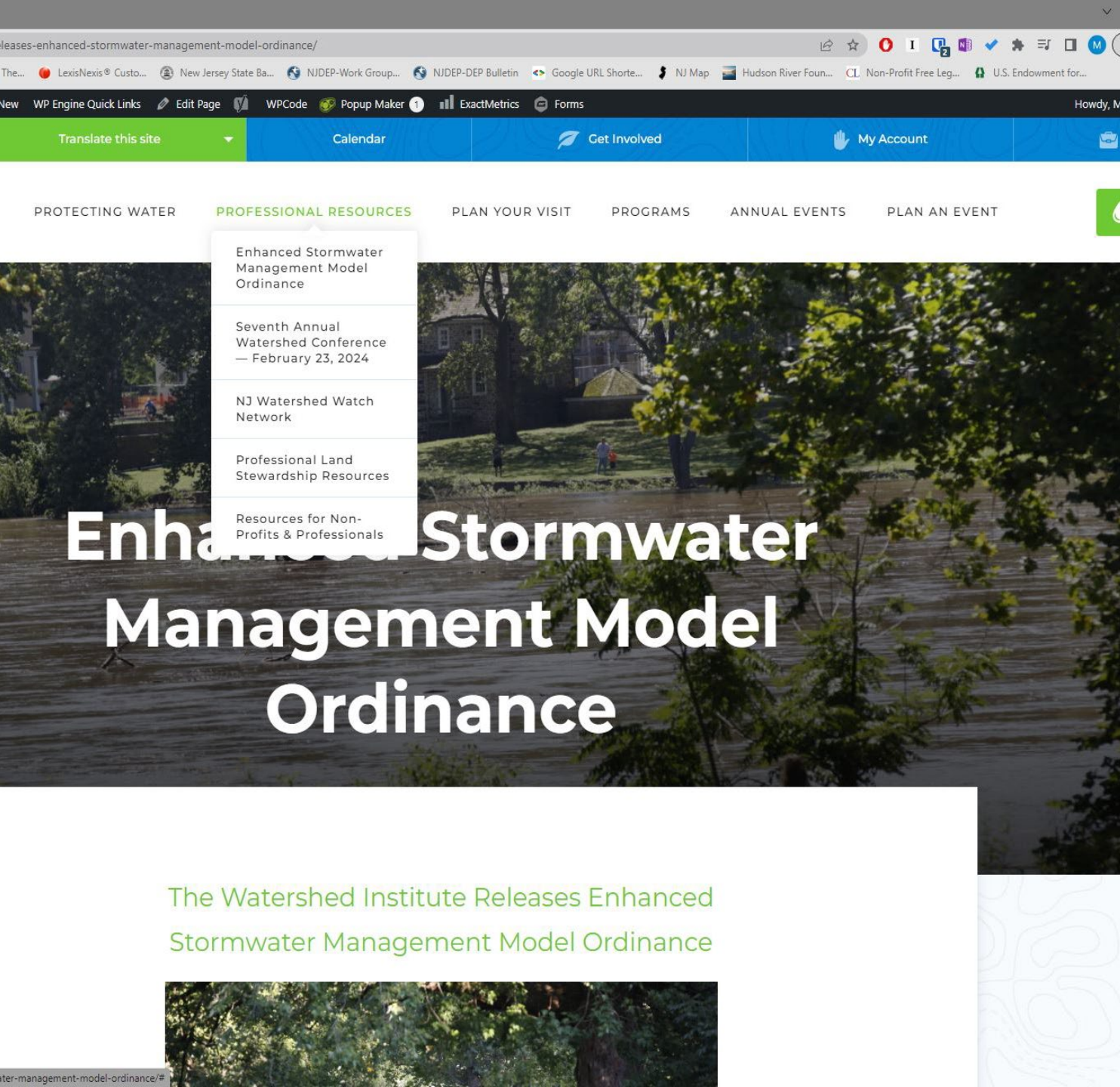


## STATEWIDE Program ~49 Organizations Participating

### Including

- ✓ Raritan Headwaters
- ✓ Sourland Conservancy
- ✓ American Littoral Society – Bayshore
- ✓ Musconetcong Watershed Association
- ✓ The Nature Conservancy
- ✓ Shark River Cleanup Coalition
- ✓ Rahway River Association
- ✓ Clean Ocean Action
- ✓ Foodshed Alliance
- ✓ South Jersey Land and Water Trust





## Resources

- Enhanced Stormwater Management Model Ordinance
- NJ Watershed Watch Network
- Technical Friday Webinars  
<https://tinyurl.com/54adsueb>
- Watershed Institute Stream Watch  
<https://tinyurl.com/4bc7c3wv>
- Watershed Conference



# How Watershed Organizations Can Assist Towns

Michael L. Pisauro, Jr. Esq.  
Policy Director

Learn more at [thewatershed.org](https://thewatershed.org)

Stay in touch: 609-737 3735 | [mpisauro@thewatershed.org](mailto:mpisauro@thewatershed.org)



theH2Oshed



theh2oshed



TheWatershedInstitute



# FILLING IN THE GAPS: FROM THE NEW MS4 PERMIT TO STORMWATER BEST MANAGEMENT PRACTICES



**Lindsey Sigmund, PP, AICP**  
Program Manager  
New Jersey Future

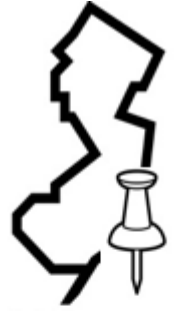
**NEW JERSEY**  
  
**FUTURE**





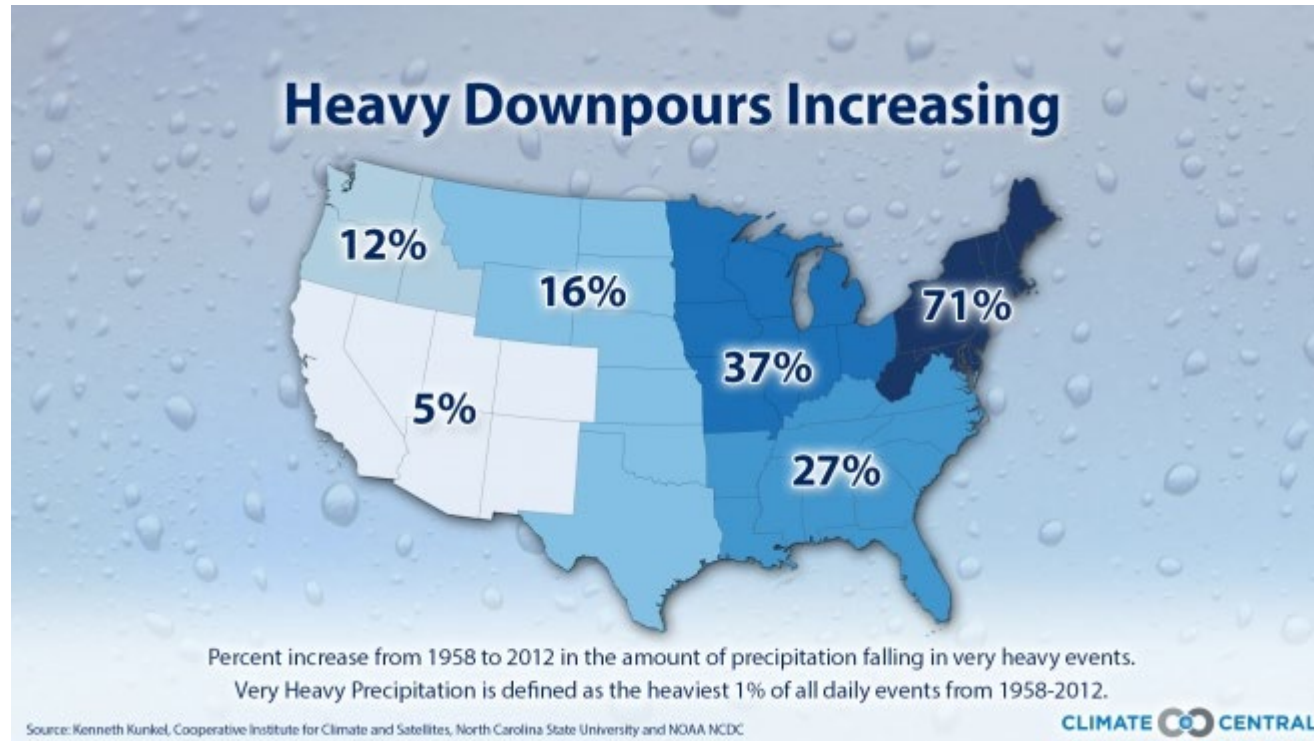
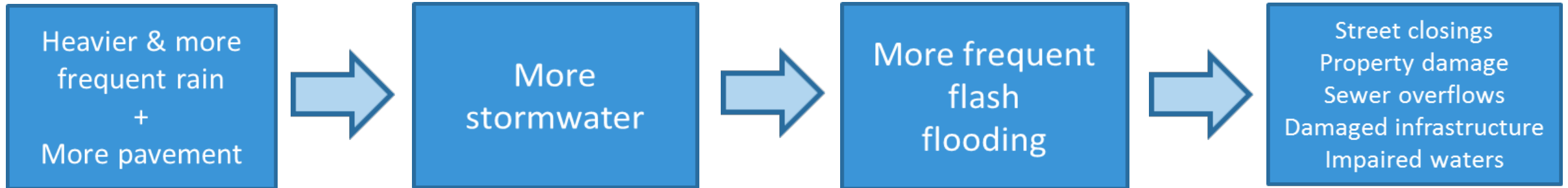
# MAINSTREAMING GREEN INFRASTRUCTURE

*A program of New Jersey Future*





# STORMWATER: A GROWING PROBLEM





# WHAT COULD GREEN INFRASTRUCTURE LOOK LIKE?

## RAIN GARDEN



## PERMEABLE PAVEMENT



## GREEN ROOF



## CISTERN/RAIN BARREL



## GREEN STREETS





# GREEN INFRASTRUCTURE MUNICIPAL TOOLKIT

STORMWATER CAUSES FLOODING AND WATER POLLUTION.  
GREEN INFRASTRUCTURE CAN HELP!



**Stormwater Control  
Ordinances: What You  
Need to Know**



**Plan**



**Implement**



**Maintain**



# UNDERSTANDING THE NEW MS4 PERMIT

## UNDERSTANDING THE NEW MS4 PERMIT

A PRIMER FOR NEW JERSEY MUNICIPALITIES



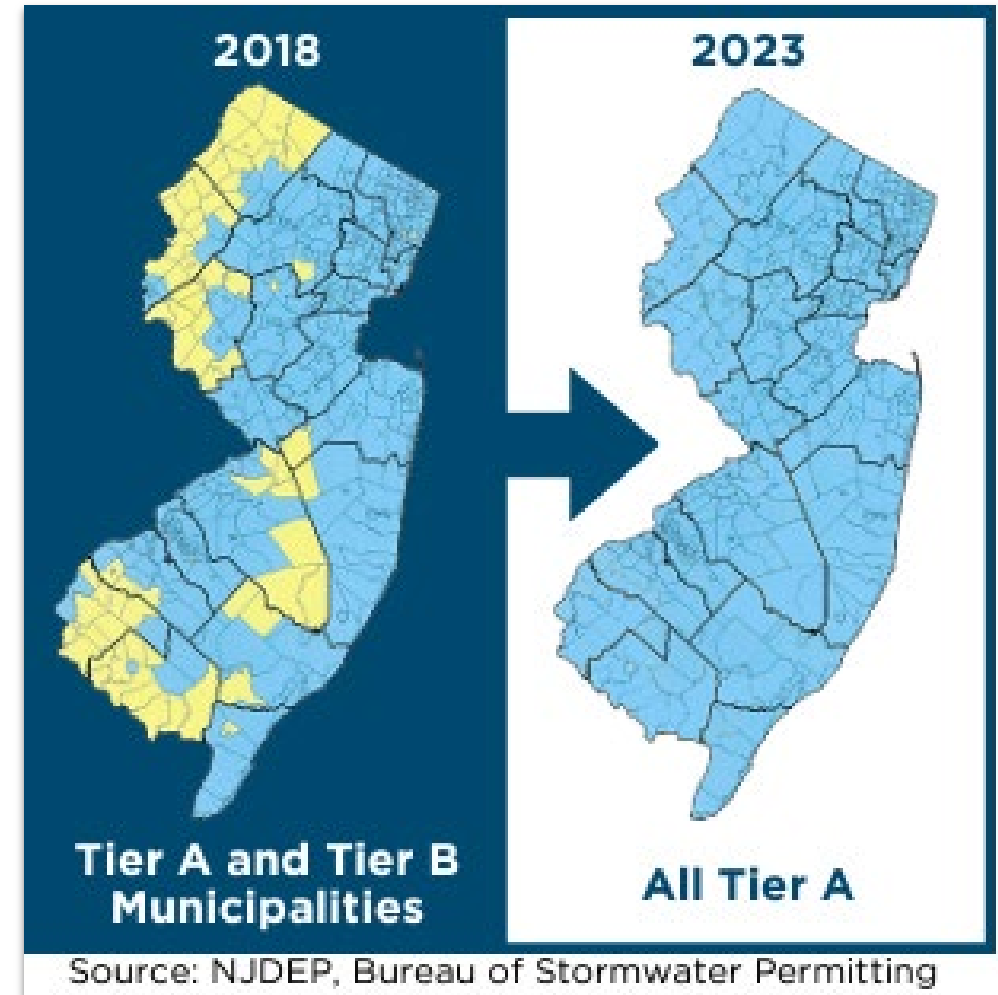
IN COLLABORATION WITH  
**ONE WATER**  
CONSULTING LLC



A guide for New Jersey municipalities to understand the changes to the MS4 Permit and to improve their municipal stormwater programs to meet the new requirements.

# THE SIGNIFICANCE OF THE MS4 PERMIT

- 101 Municipalities are now considered Tier A
- The former Tier B permittees will require significant upgrades
- NJDEP released approximately \$19 million in grants
- \$25,000 grants available to original Tier A
- \$75,000 grants available to previous Tier B



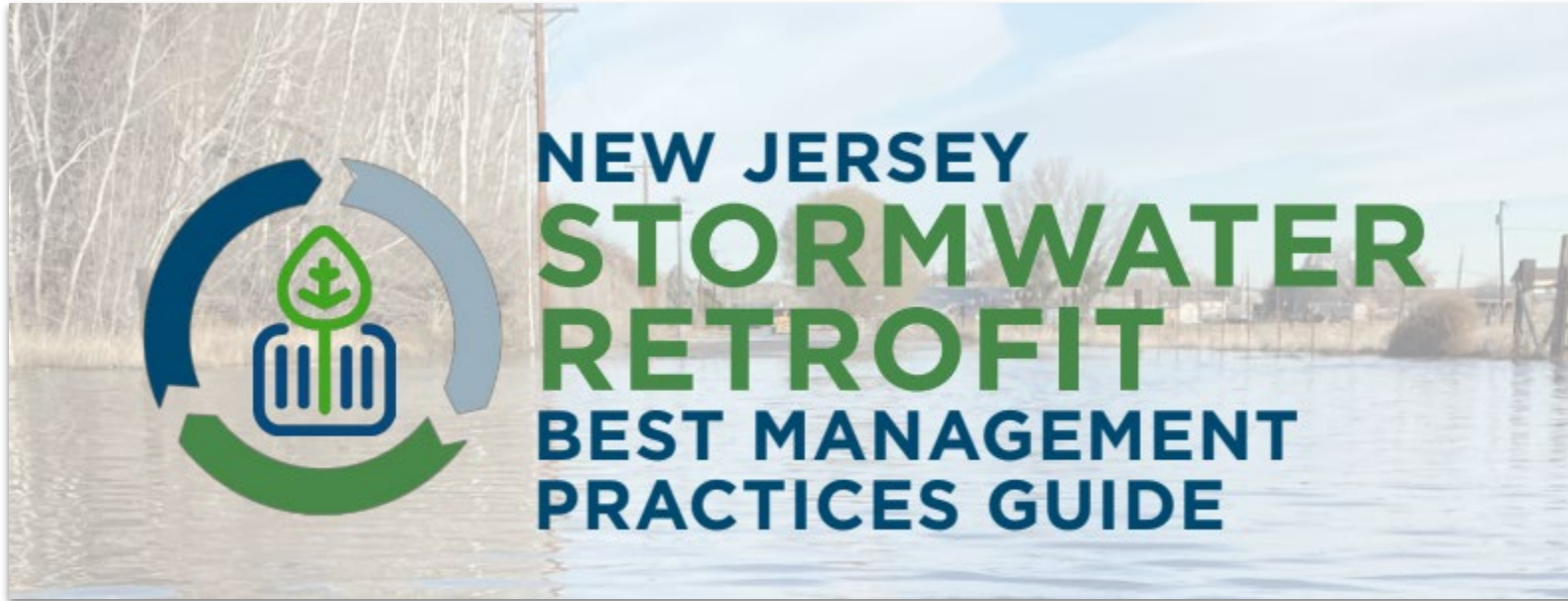


# WATERSHED IMPROVEMENT PLAN (WIP) TIMELINE AND REQUIREMENTS



- Improve water quality in water bodies that have total maximum daily loads (TMDLs)
- Improve water quality in water bodies listed as impaired
- Reduce or eliminate flooding

# STORMWATER RETROFIT BEST MANAGEMENT PRACTICES GUIDE



Provides municipalities, counties, nonprofit organizations, developers, and property owners the tools to identify opportunities to **retrofit existing stormwater BMPs** and install new stormwater BMPs in built-out environments.





# STORMWATER RETROFIT BEST MANAGEMENT PRACTICES GUIDE

## Framework

- Shift in Land Use in New Jersey
- MS4 Permit update and move toward holistic watershed management
- Stormwater Utilities exploration





# STORMWATER RETROFIT BEST MANAGEMENT PRACTICES GUIDE

**Table 1: Applicability Matrix**

Retrofit Option	Peak Flow Control	Water Quality	Groundwater Recharge	Habitat Restoration	Cost
Detention Basin Naturalization		X	X	X	\$
Bioretention Basin	X	X	X	X	\$\$\$
Infiltration Basin	X	X	X		\$\$\$
Subsurface Gravel Wetland		X			\$\$\$
Wet Pond Retrofit		X		X	\$\$
Constructed Wetlands	X	X		X	\$\$\$
Porous Pavement	X	X	X		\$\$
Removal of Impervious Cover	X	X	X		\$
Downspout Retrofits	X	X	X		\$
Inlet/Traffic Island Bioretention		X	X		\$\$
Inlet MTD		X			\$\$
Grass Swales		X			\$
Streambank Stabilization		X		X	\$\$
Floodplain Reconnection	X	X	X	X	\$\$



Manalapan Brook  
Watershed Case  
Study

# THANK YOU!



## MAINSTREAMING GREEN INFRASTRUCTURE

*A program of New Jersey Future*



Lindsey Sigmund, PP, AICP

lsigmund@njfuture.org

Program Manager

New Jersey Future

MS4 Primer



Retrofit Guide





# Questions & Discussion

- Mark Freda, Mayor of Princeton, [mfreda@princetonnj.gov](mailto:mfreda@princetonnj.gov)
- Tim Ebersberger, Environmental Engineer, NJDEP Stormwater Permitting and Water Quality Management, [Timothy.Ebersberger@dep.nj.gov](mailto:Timothy.Ebersberger@dep.nj.gov)
- Michael Pisauro, Policy Director, Watershed Institute, [mpisauro@thewatershed.org](mailto:mpisauro@thewatershed.org)
- Lindsey Sigmund, Program Manager, New Jersey Future,, [lsigmund@njfuture.org](mailto:lsigmund@njfuture.org)
- Anne Heasly, Program Manager for Policy and Planning, [heaslya@tcnj.edu](mailto:heaslya@tcnj.edu)



# Thank You

<https://www.sustainablejersey.com/resources/presentations/njlm-conference/>





**SUSTAINABLE  
JERSEY<sup>®</sup>**

**• CERTIFIED •**