

SUSTAINABILITY
SUMMIT



Let us know
when you're
coming
from!

Planning for Green Infrastructure

May 5, 2023

Agenda

1. Intro to green infrastructure and Planning for GI action
1. Rutgers Water Resources Group
2. GI in Pemberton Township Schools
3. GI in Hawthorne Boro
4. Q&A





198

MUNICIPALITIES CERTIFIED

68

 SILVER
CERTIFIED

130

 BRONZE
CERTIFIED

64%

of NJ public school districts
registered with Sustainable
Jersey for Schools

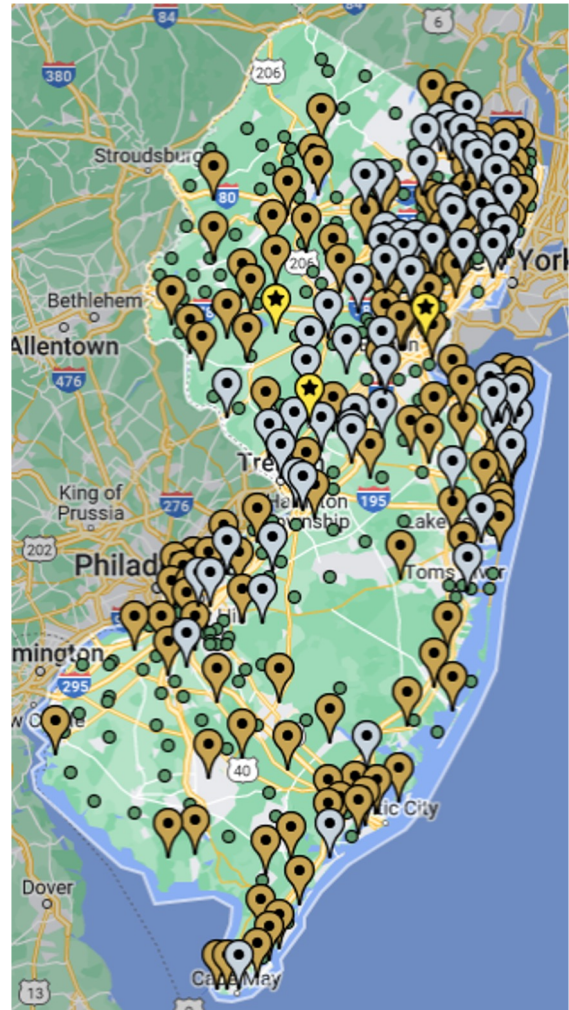
82%

OF MUNICIPALITIES
PARTICIPATING



91%

OF NJ POPULATION LIVES IN A
REGISTERED OR CERTIFIED COMMUNITY



Land Use & Transportation

Green Infrastructure Planning

5 Points

• THIS ACTION HAS VARIABLE POINTS: 5, 10, 20 • THIS ACTION COUNTS TOWARDS A GOLD STAR

Green Infrastructure Implementation

10 Points

• THIS ACTION HAS VARIABLE POINTS: 10, 15, 20 • THIS ACTION COUNTS TOWARDS A GOLD STAR

Land Use & Transportation

Complete and Green Streets for All Policy

10 Points

• THIS ACTION HAS VARIABLE POINTS: 10, 15, 20, 25, 30 • THIS ACTION COUNTS TOWARDS A GOLD STAR

Land Use & Transportation

Bicycle and/or Pedestrian Improvement Projects

10 Points

• THIS ACTION HAS VARIABLE POINTS: 10 — 35 • THIS ACTION COUNTS TOWARDS A GOLD STAR

Green Infrastructure Planning

Tier	Requirements	Points
1	Impervious Cover Assessment: Locate and quantify impervious surfaces, and the runoff volumes associated with these surfaces.	5
2	Tier 2 Green Infrastructure Action Plan: Identify immediate and short-term (i.e., < 5 years) green infrastructure projects to manage stormwater runoff from impervious surfaces.	+5 (10 in total)
3	Green Infrastructure Strategic Plan: Identify long-term (i.e., 5-20 years) green infrastructure projects and policy recommendations for community-wide green infrastructure implementation. [10 points]	+10 (20 in total)

RUTGERS

New Jersey Agricultural
Experiment Station



Planning for Green Infrastructure
presented at the 2023 Sustainable Jersey Summit on May 5, 2023

Christopher C. Obropta, Ph.D., P.E.
Email: obropta@envsci.rutgers.edu



Green Infrastructure

...an approach to stormwater management that is cost-effective, sustainable, and environmentally friendly.

Green Infrastructure projects:

- capture,
- filter,
- absorb, and
- reuse

stormwater to maintain or mimic natural systems and treat runoff as a resource.



Green Infrastructure Practices

Bioretention Systems

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



Permeable Pavements

Rainwater Harvesting

- Rain Barrels
- Cisterns



Dry Wells

Rooftop Systems

- Green Roofs
- Blue Roofs

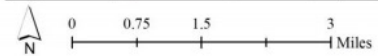
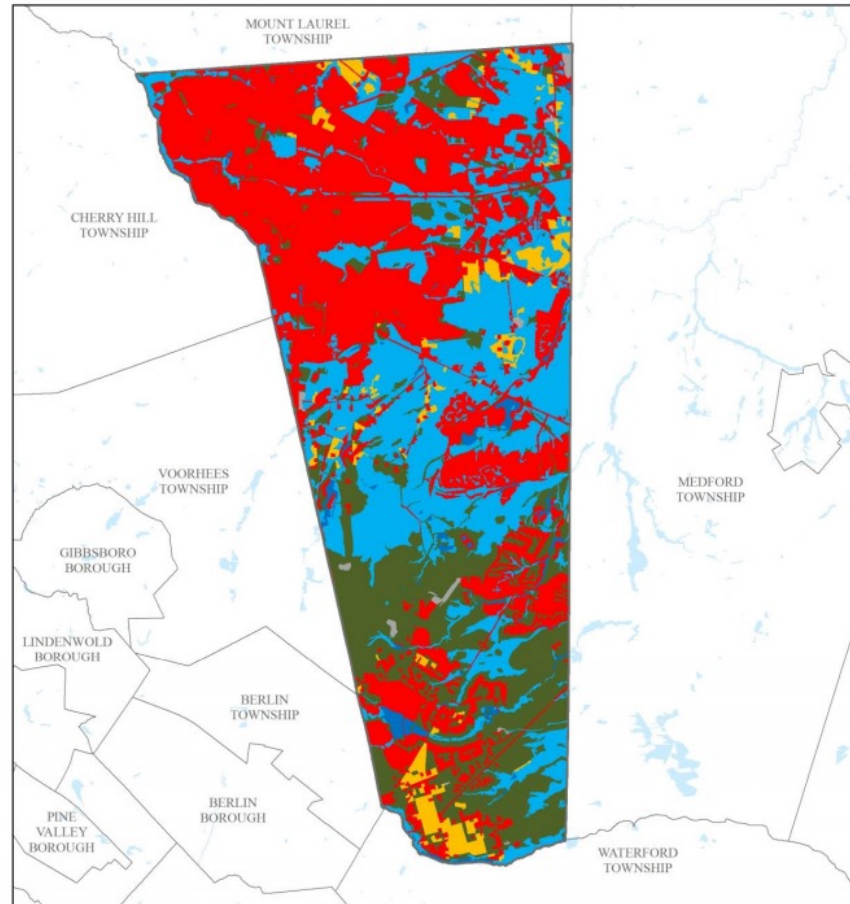


IMPERVIOUS COVER ASSESSMENT (ICA)

Impervious Cover Assessment

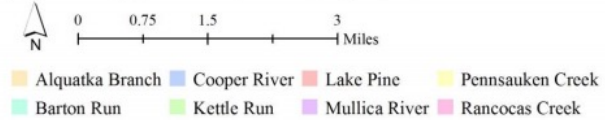
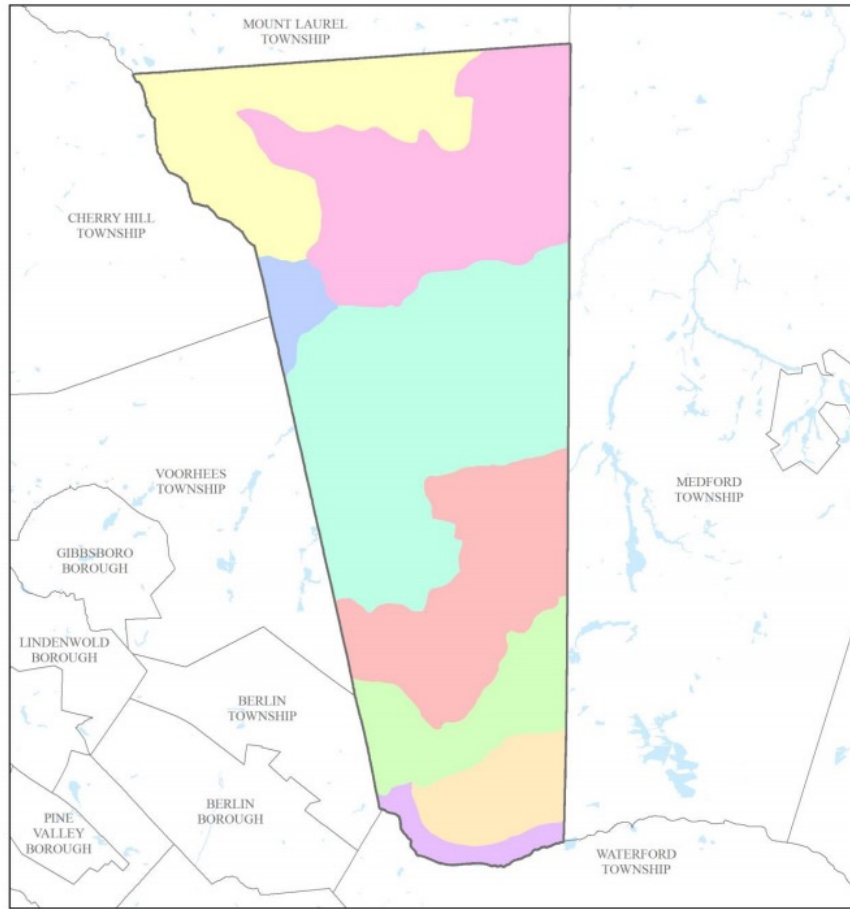
- Analysis completed by watershed and by municipality
- Use 2015 land use data layer to determine impervious cover or use the 2015 impervious cover layer
- Calculate runoff volumes for water quality, 2, 10 and 100 year design storm and annual rainfall
- Contain three concept designs

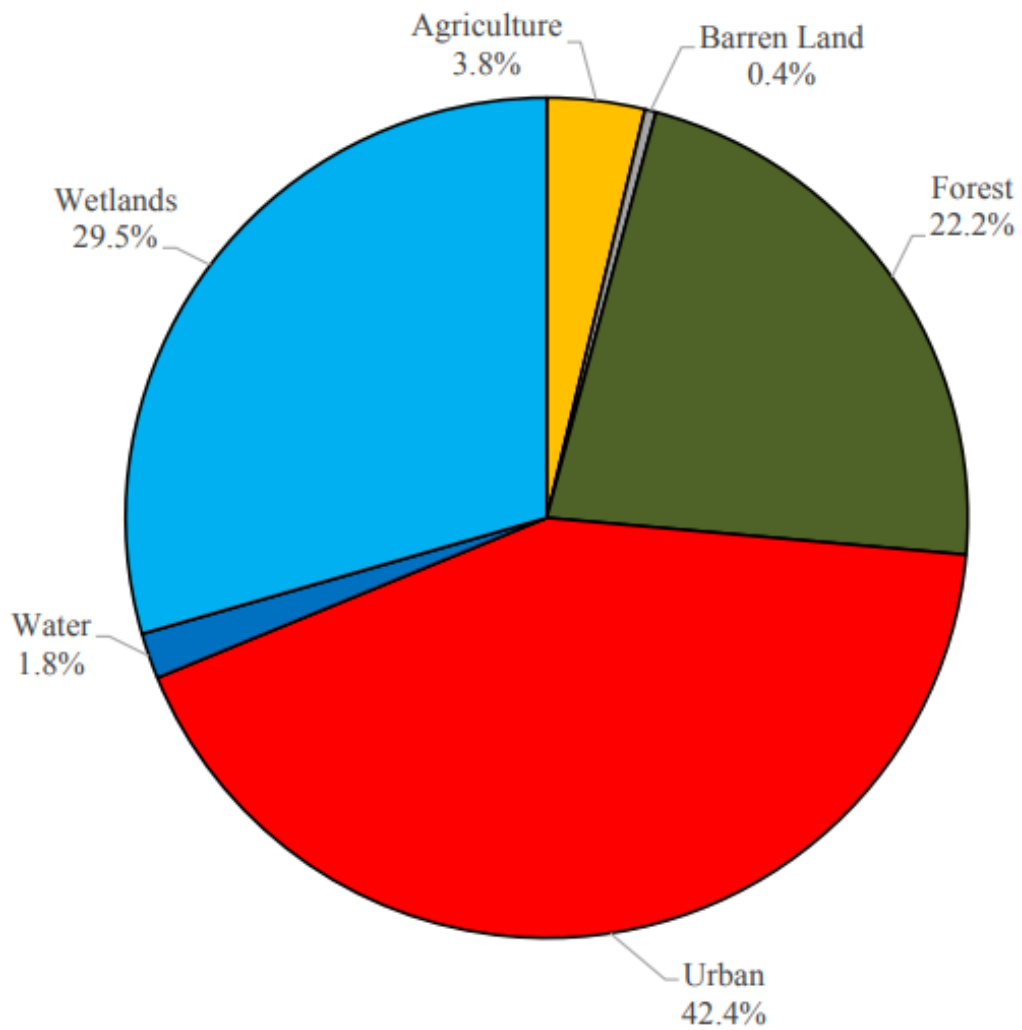
Subwatersheds of Evesham Township

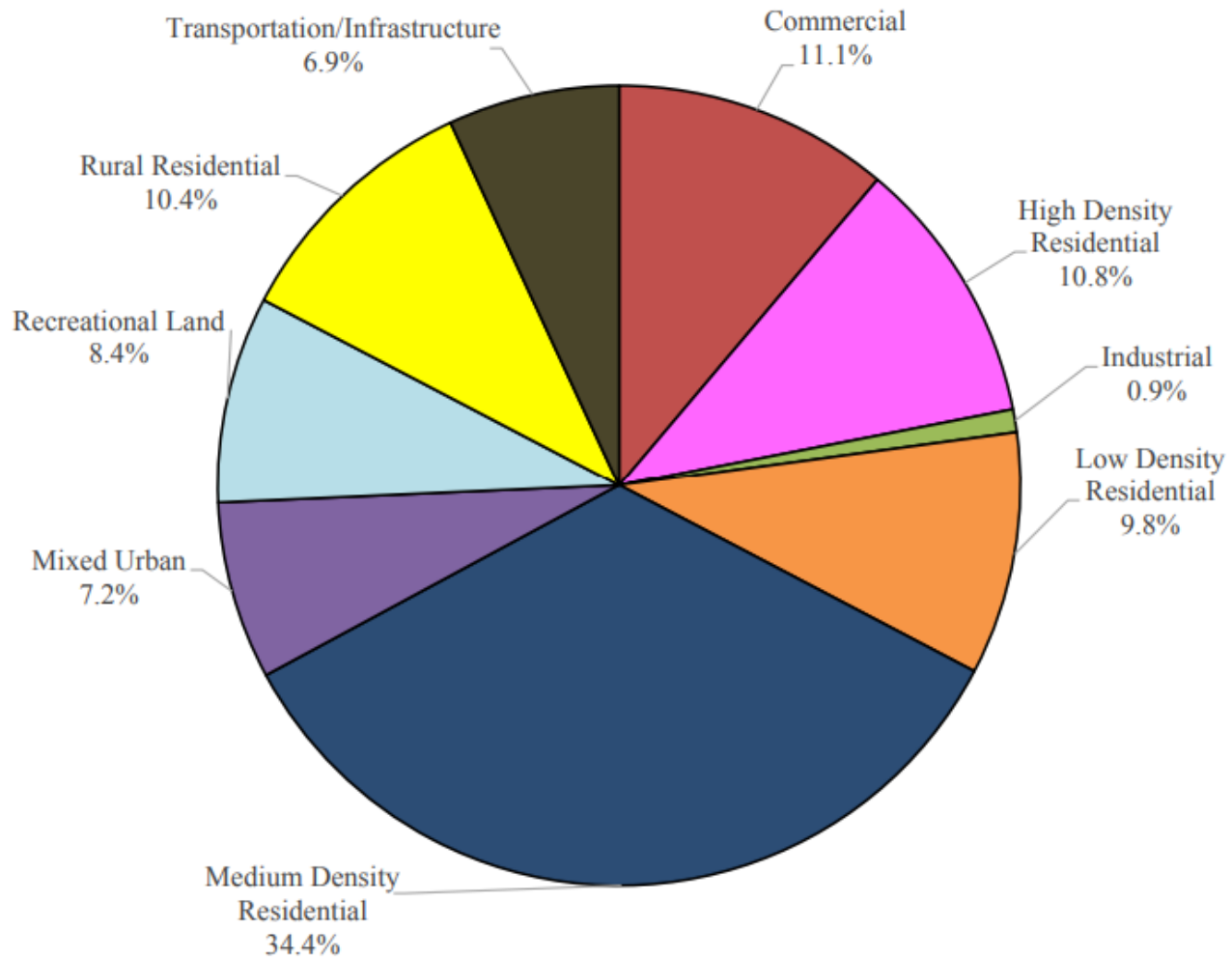


■ Agriculture ■ Barren Land ■ Forest ■ Urban ■ Water ■ Wetlands

Subwatersheds of Evesham Township







Watershed	Total Area (ac)	Impervious Cover (ac)	%
Alquatka Branch	1,026.8	14.3	1.4%
Barton Run	5,669.5	515.6	9.3%
Cooper River	415.0	184.5	45.0%
Kettle Run	1,509.0	99.5	6.9%
Lake Pine	2,857.2	180.9	6.4%
Mullica River	383.2	16.8	4.5%
Pennsauken Creek	2,951.5	1,025.8	35.1%
Rancocas Creek	4,116.9	846.9	20.7%
Total	18,929.1	2,884.3	15.5%

Subwatershed	NJ Water Quality Storm (MGal)	Annual Rainfall of 44" (MGal)	2-Year Design Storm (3.3") (MGal)	10-Year Design Storm (5.0") (MGal)	100-Year Design Storm (8.2") (MGal)
Alquatka Branch	0.5	17.0	1.4	2.0	3.2
Barton Run	17.5	616.0	49.0	72.8	116.2
Cooper River	6.3	220.4	17.5	26.1	41.6
Kettle Run	3.4	118.9	9.5	14.0	22.4
Lake Pine	6.1	216.1	17.2	25.5	40.8
Mullica River	0.6	20.1	1.6	2.4	3.8
Pennsauken Creek	34.8	1,225.5	97.5	144.8	231.2
Rancocas Creek	28.7	1,011.8	80.5	119.6	190.9
Total	97.9	3,445.9	274.1	407.2	650.0

GREEN INFRASTRUCTURE ACTION PLAN

Green Infrastructure Action Plan

ICA (Tier1) + the following:

- Community engagement
- Potential green infrastructure sites
- Site level analysis including concept plans, information sheets, and costs
- Short-term 5-year goal

Identify project sites but what makes a good site?

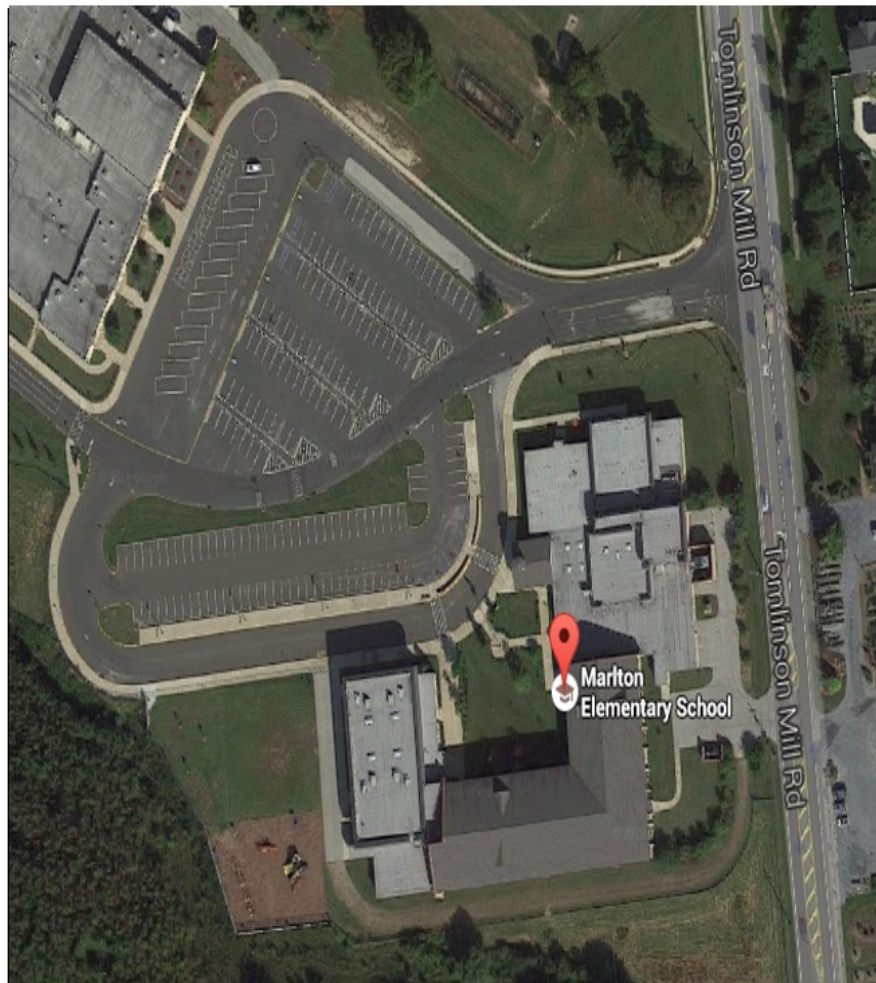
- Sites with impervious surfaces that are directly connected
- Sites with a lawn area that can be converted to accept stormwater runoff
- Sites with high visibility – good educational opportunities
- Sites in impaired watersheds
- Sites on municipal owned land/public land
- Sites that provide partnership opportunities

Let's get started! Download aerial photograph of “Look Here First Sites”?

- Go to Google or Bing Maps
- Type in address
- Aerial or birds eye view
- “Snip It”
- Insert into Powerpoint
- “Crop It”
- Schools
- House of Worship
- Libraries
- Municipal Building
- Public Works
- Firehouses
- Post Offices
- Elks or Moose Lodge
- Parks/ Rec Fields

Marlton Elementary School

190 Tomlinson Mill Rd,
Evesham Township, NJ 08053



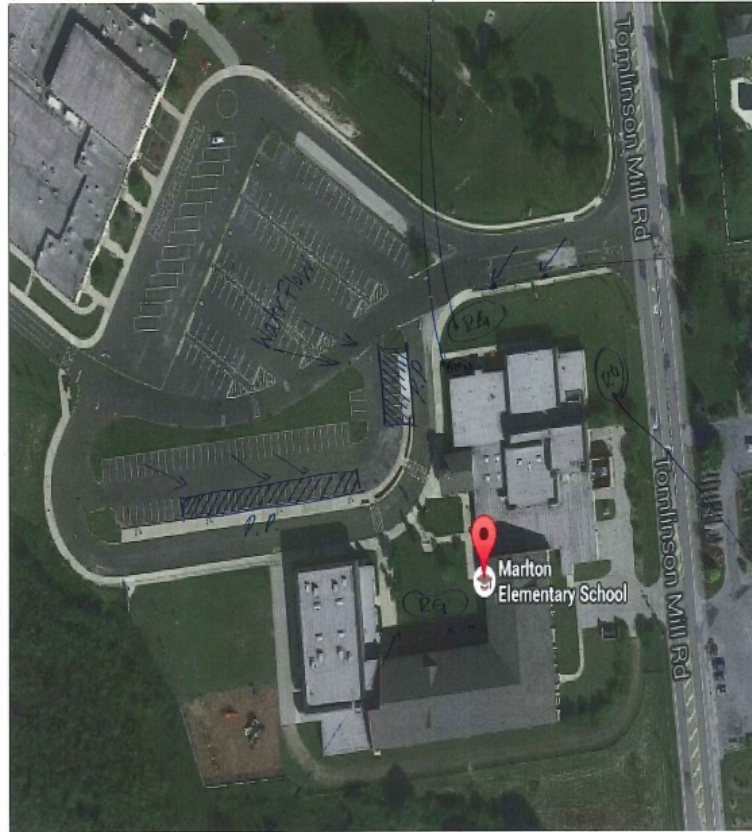
Marlton Elementary School

190 Tomlinson Mill Rd,
Evesham Township, NJ 08053

P.P. = Porous Pavement

RG. = Rain Garden

P.P. Look at contours for
parking lots to see flow
of run off



Disconnect downspouts
to go into Rain Garden

Marlton Elementary School

190 Tomlinson Mill Rd,
Evesham Township, NJ 08053

- 1) Porous pavement?
- 2) Rain Gardens
- 3) Red arrow (Water Flow)



MARLTON ELEMENTARY SCHOOL



Subwatershed: Barton Run

Site Area: 2,037,458 sq. ft.

Address: 190 Tomlinson Mill Road
Evesham, NJ 08053

Block and Lot: Block 39, Lot 1.01, 1.02



Stormwater is currently directed to existing catch basins. Parking spots by the north and west buildings can be replaced with porous asphalt to capture and infiltrate stormwater runoff from the parking lot. Rain gardens adjacent to the building can capture, treat, and infiltrate roof runoff before it reaches the existing catch basin. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.






Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	For the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
26	526,875	25.4	266.1	2,419.1	0.411	14.45

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	TSS Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu. ft./second)	Estimated Size (sq. ft.)	Estimated Cost
Bioretention systems	0.516	86	39,068	1.47	4,950	\$24,750
Pervious pavement	0.651	109	49,331	1.85	4,465	\$111,625

GREEN INFRASTRUCTURE RECOMMENDATIONS

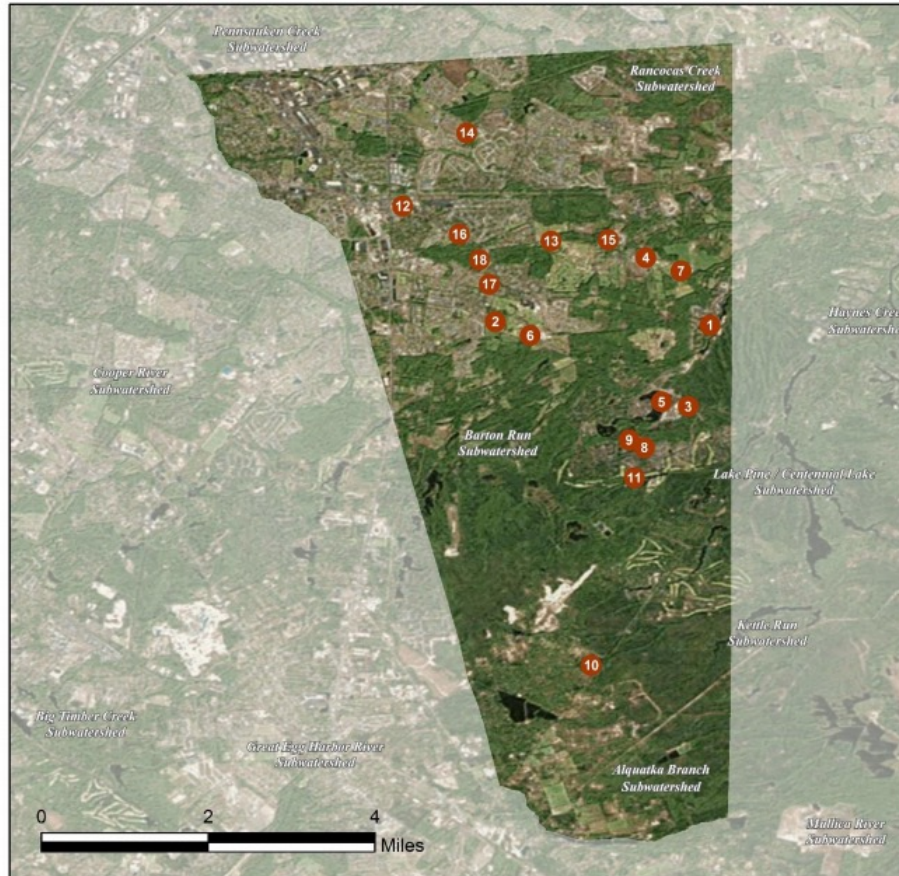


Marlton Elementary School

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



EVESHAM TOWNSHIP: GREEN INFRASTRUCTURE SITES



SITES WITHIN THE BARTON RUN SUBWATERSHED:

1. Barton Run Swim Club
2. Cherokee High School
3. Evesham Fire/Rescue 223/227
4. Evesham Township Municipal Court
5. King's Grant Community Room
6. Marlton Elementary School
7. Memorial Park
8. Richard L. Rice Elementary School
9. Villa Royal Association

SITES WITHIN THE LAKE PINE SUBWATERSHED:

10. Kettle Run Fire/Rescue 225/228
11. Links Golf Course

SITES WITHIN THE PENNSAUKEN CREEK SUBWATERSHED:

12. Evesham Fire/Rescue 221/229

SITES WITHIN THE RANOCAS CREEK SUBWATERSHED:

13. Christ Presbyterian Church
14. Frances S. DeMasi Elementary School
15. Marlton Assembly of God
16. Marlton Post Office
17. Robert B. Jaggard Elementary School
18. St. Joan of Arc Parish and School

Evesham

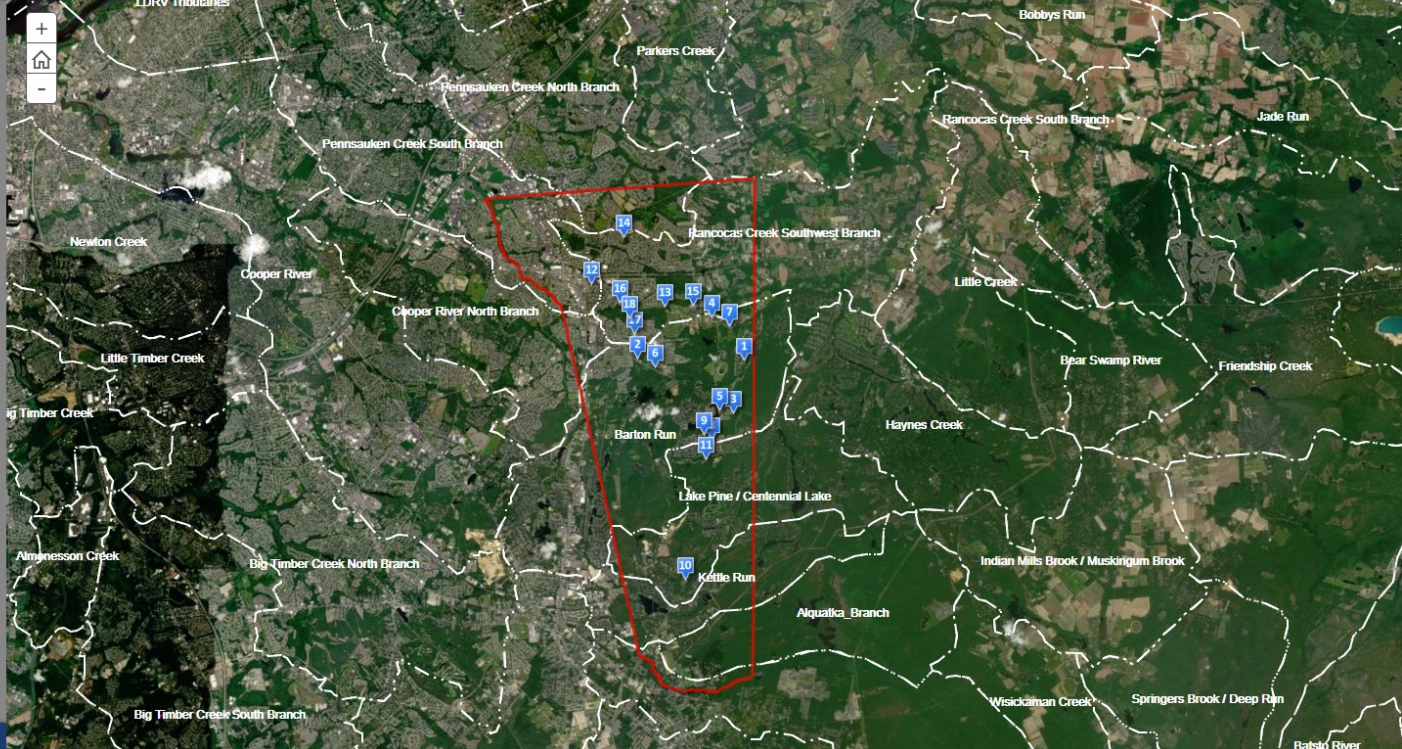
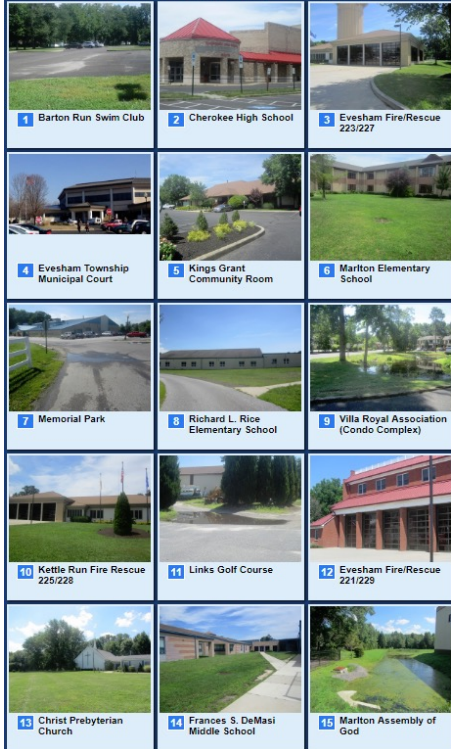
ALL SITES

BARTON RUN

LAKE PINE

PENNSAUKEN CREEK

RANCOCAS CREEK



Short term (5 years) goal

Existing Municipal Impervious Cover	Recommended Short Term (less than 5 years) Impervious Cover Management Goal (%)	Recommended Short Term Impervious Cover Management Goal (acres)
0% to 10%	1%	10 acres
10.1% to 25%	2%	15 acres
>25%	5%	20 acres

GREEN INFRASTRUCTURE STRATEGIC PLAN

Green Infrastructure Strategic Plan

ICA (Tier 1) and GI Action Plan (Tier 2) + the following:

- Additional green infrastructure sites
- Policy recommendations
- Water quality and quantify benefits
- Implementation agenda
- Long-term 5-20 year goals

CURRENT CONDITION

42



BARTON RUN SWIM CLUB

100 Lakeside Drive
Marlton, NJ 08053

CONCEPT DESIGN



43

BARTON RUN SWIM CLUB

100 Lakeside Drive
Marlton, NJ 08053

Policy Recommendations

- Update stormwater management plan and stormwater control ordinance to incorporate green infrastructure requirements
- Update municipal master plan
- Update zoning ordinance to eliminate barriers for green infrastructure
- Use Center for Watershed Protection “The Code and Ordinance Worksheet” to assess your local code/ordinances
(<https://owl.cwp.org/mdocs-posts/better-site-design-code-and-ordinance-cow-worksheet-2017-update/>)

Long term (5 to 20 years) goal

Existing Municipal Impervious Cover	Recommended Long Term (5 to 20 years) Impervious Cover Management Goal (%)	Recommended Long Term Impervious Cover Management Goal (acres)
0% to 10%	2%	25 acres
10.1% to 25%	5%	50 acres
>25%	10%	80 acres



Busansky Elementary's Rain Garden

School District's Demographics



Pemberton School District is located in Burlington County, New Jersey. It serves Pemberton and Browns Mills.



Ethnically diverse:
White 57%
Black 25%
Hispanic 15%
Asian 3%



Median household income is 70,874 per year.



Many military families reside in Pemberton and Browns Mills.

Green infrastructure



Busansky's rain garden was created during the 2021-2022 school year. The goal of this service project was to improve ground water quality around the school and a nearby creek by filtering pollutants from a parking lot.

National Elementary Honor Society students helped plant and maintain the garden.



Environmental Coalition



National Elementary Honor Society Students worked with Pinelands Preservation Alliance and Rutgers University's Water Resources Program under the direction of Dr. Obropta.

Pinelands Preservation Alliance provided the funds for this project and worked closely with students to teach them about nonpoint source pollution and natural surface water filters.

Rutgers University engineered the plans for the garden and completed initial construction. National elementary students helped plant over 300 plants to create the garden under the guidance of the Pineland Preservation Alliance and Rutgers University faculty and staff.

Nothing like a day of work in the garden!



Ribbon Cutting Ceremony

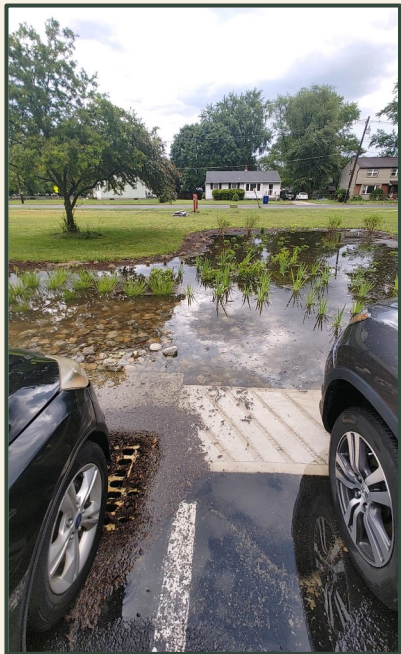


Ribbon cutting ceremony for the garden was held on June 3rd, 2022.

Beautiful rain garden sign was provided by Pinelands Preservation Alliance!

The Garden at Work

After a
thunderstorm on
June 3rd, 2022





Spring Cleaning

This year's
NEHS
students were
estatic to get
out and tend to
the garden last
week.

Benefits of the Rain Garden

The garden has provided many benefits to our school.

- Reducing rainwater runoff from the surrounding impervious surface.
- Provides a habitat for pollinators and other wildlife.
- Provides enriching lessons and experiences.
- It's beautiful!!





THANK YOU

To Pinelands Preservation
Alliance and Rutgers
University for all you have
done!



**“Gateway to the Passaic
River”
Project
Borough of Hawthorne**

May 5,
2023

“Gateway to the Passaic River” Project

- Sustainable Jersey Grant funded by PSEG Foundation - **\$20,000**
- ANJEC 2018 Open Space Grant - **\$1,500**
- No matching funds required from the Borough

Grand Total of \$21,500

Property of Borough of Hawthorne



Red Square Properties owned by Borough of Hawthorne except for Boulevard Body & Fender and Scully's Ice R & L properties.

“Gateway to the Passaic River” Project

- Enhanced an existing walkway to access the Passaic River
- Designed and Installed two (2) Rain gardens
- River Clean Up Day
- Installed (13) Nesting Boxes
- Create a Trail map and Trail Sign
- Tree tags

Stormwater Management – Green Infrastructure

- Objective – capture stormwater runoff from parking lot
- Designed: Rain Garden with native plants
 - Installed two rain gardens - 200 square foot and 400 square foot
- Removed decaying vegetation and rubbish

Designed by Rutgers Cooperative Extension (RCE) Water
Resources Program Program Manager: Matthew
Leconey

Rain Garden System



Photo:
(<http://www.3riverswater.org/green/green-solution-rain-garden>)

“Gateway to the Passaic River”



“Gateway to the Passaic River”



River Clean Up & Nesting Boxes Installation



Members of the Boy Scout Troop 30



Hawthorne Resident

River Clean Up & Nesting Boxes Installation



Scout Leaders of Hawthorne's Boy Scout Troop 30

River Clean Up & Nesting Boxes Installation



Members of the Hawthorne Boy Scout Troop 30, Hawthorne Environmental Commissioners, Hawthorne Green Team members, and Hawthorne Residents

Development of the Gateway Trail Map



Members of the Hawthorne Environmental Commission

Gateway to the Passaic River Trail Map



RAIN GARDENS

What is a Rain Garden?

A rain garden is designed to capture and filter water that flows off hard surfaces like roadways, driveways, parking lots and rooftops. A shallow basin is planted with deep-rooted native wildflowers, grasses and shrubs that filter and absorb stormwater runoff and the pollutants it carries. Their extensive root system filter stormwater runoff by removing nutrients, sediments and pollutants before it enters our groundwater and waterways.

Why Plant Natives?

In addition to helping prevent erosion and improving water quality, native plants provide essential food and habitat for local wildlife. Their seeds and nectar provide a valuable food source for birds, butterflies and other insects as well as a place to lay their eggs. Native are well adapted to local conditions, require very little care once they are established, and add beauty to the landscape.

How Can You Help?

- Keep leaves and grass out of storm drains.
- Redirect your gutter downspouts from driveways or alleys onto lawn or garden areas.
- Clean up after your pets.
- Never pour anything down a storm drain.



Designed by the Hawthorne Environmental Commission

Rain Gardens



Designed by Rutgers Cooperative Extension (RCE) Water Resources Program

Rain Gardens



Designed by Rutgers Cooperative Extension (RCE) Water Resources Program

Rain Garden – Native Plants

**BLUEFLAG
IRIS**



**CARDINAL
FLOWER**



**SWEET
PEPPERBUSH**



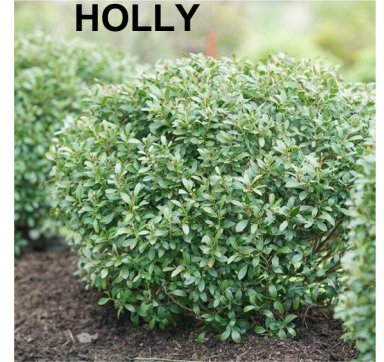
**OSTRICH
FERN**



**GRAY
SEDGE**



**INKBERRY
HOLLY**



**WOOD
GERANIUM**



Gateway to the Passaic River



Member of the Hawthorne Environmental Commission & Hawthorne Resident who installed Caution Poison Ivy Signs and Downes installed the Tree Tags Identified along the Walking Path to

Gateway to the Passaic River



Member of the Hawthorne Environmental Commission & Hawthorne Resident who built and installed the Trail Sign

Gateway to the Passaic River

Grand Opening August 15, 2020



Member of the Hawthorne Environmental Commission & Hawthorne Residents

Gateway to the Passaic River

Grand Opening August 15, 2020



Gateway to the Passaic River Ribbon Cutting



Members of the Hawthorne Environmental Commission, Hawthorne Green Team, Downes Tree Service who built the Rain Gardens, & Rutgers who designed and oversaw implementation of the Rain Gardens

Gateway to the Passaic River Walking Path



Gateway to the Passaic River Unveiling of the Trail



Richard S. Goldberg, Mayor of Hawthorne & Rayna Laiosa, Hawthorne Environmental Commission/Green Team –

Unveiling of the Rain Garden Sign



Richard S. Goldberg, Mayor of Hawthorne & Rayna Laiosa, Hawthorne Environmental Commission/Green Team –

“Gateway to the Passaic River”

Partnerships

- Rutgers Cooperative Extension Water Resources
- Hawthorne Department of Public Works
- Downes Tree Service
- Hawthorne Shade Tree Commission
- Boy Scouts
- Members of the Community

“Gateway to the Passaic River”

- Provides an opportunity to enhance and promote Hawthorne’s waterfront open space; the importance of utilizing native plants of New Jersey; and increasing Hawthorne’s biodiversity
- Promote the aesthetics of the Passaic River and provide current and future generations the opportunity to enjoy fishing and water recreation activities

Credit for the Photos!

- Hawthorne Environmental Commissioners
- TapInto Net Hawthorne - Jessica Ellis

SUSTAINABILITY
SUMMIT



Thank You

Session slides will be available on sustainablejersey.com by 5/12.

Sustainable Jersey Underwriters and Sponsors

PROGRAM UNDERWRITERS



GRANTS PROGRAM



CORPORATE SPONSORS



*Digital Schools Sponsor

Upcoming Events and Opportunities

FREE ENERGY TECHNICAL ASSISTANCE FOR SCHOOLS AND MUNICIPALITIES IN ELIZABETHTOWN GAS, NEW JERSEY NATURAL GAS, AND SOUTH JERSEY GAS SERVICE TERRITORIES

Free technical assistance to identify and apply for utility incentives and New Jersey's Clean Energy Program (NJCEP) incentives for energy efficiency audits and facility upgrades. This technical assistance is funded by Elizabethtown Gas, New Jersey Natural Gas, and South Jersey Gas.

For more information please visit: bit.ly/EnergyTAforMunisandSchools

2023 MUNICIPAL CERTIFICATION CYCLE

The next deadline to apply for certification is **May 12, 2023**. The final application deadline is **July 27, 2023**. View the full cycle timeline on the 2023 Certification Cycle page.

For more information please visit: bit.ly/MuniCertCycle

2023 SUSTAINABLE COMMUNITIES GRANT PROGRAM

Atlantic City Electric and Sustainable Jersey are pleased to offer **\$50,000** to support municipal environmental stewardship and resiliency projects in Atlantic City Electric's service territory. Municipalities are encouraged to work with local organizations on applications, which are due **June 29, 2023**. An informational webinar will be held on **May 15, 2023 from 1:00pm - 2:00pm**.

For more information please visit:
<http://www.bit.ly/SustainableCommunitiesGrantProgram>

TRI-COUNTY SUSTAINABILITY GENERAL MEETINGS

This Sustainable Jersey Regional Hub will host virtual meetings on a variety of sustainability topics throughout the year. The next meeting is **May 31, 2023 from 7:00pm - 8:00pm**.

For more information please visit: <http://www.bit.ly/Tri-CountySustainability>

2023 SCHOOL CERTIFICATION CYCLE

The final deadline to apply for certification and Digital Schools Star Recognition is **June 15, 2023**. View the full cycle timeline on the 2023 Certification Cycle page.

For more information please visit: <http://www.bit.ly/SchoolsCertCycle>

TREES FOR SCHOOLS PROGRAM, TREE-PLANTING GRANTS FOR NJ PUBLIC SCHOOLS, COLLEGES AND UNIVERSITIES

The Trees for Schools program will provide **\$2.5 million** in grants to New Jersey public school districts, county colleges and state colleges and universities to fund the planting of trees on campuses across New Jersey. Competitive grants of **\$10,000 to \$500,000** will fund costs associated with planning, site preparation, trees, planting, watering, monitoring and related expenses over a three-year period. Applications are due on **July 13, 2023**, for spring 2024 plantings. An informational webinar will be held on **May 18, 2023 from 3:00pm - 4:30pm**. The Trees for Schools program is a collaboration of the New Jersey Department of Environmental Protection, The College of New Jersey and Sustainable Jersey.

For more information please visit: bit.ly/TreesforSchools

SUSTAINABILITY SUMMIT

