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Impervious Cover Assessment and Reduction Action Plan for Evesham, New Jersey

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Rutgers Cooperative Extension

Rutgers Cooperative Extension (RCE) helps the diverse population of New Jersey adapt to a rapidly changing society and improves their lives through an educational process that uses science-based knowledge.

Water Resources Program

The Water Resources Program is one of many specialty programs under Rutgers Cooperative Extension.

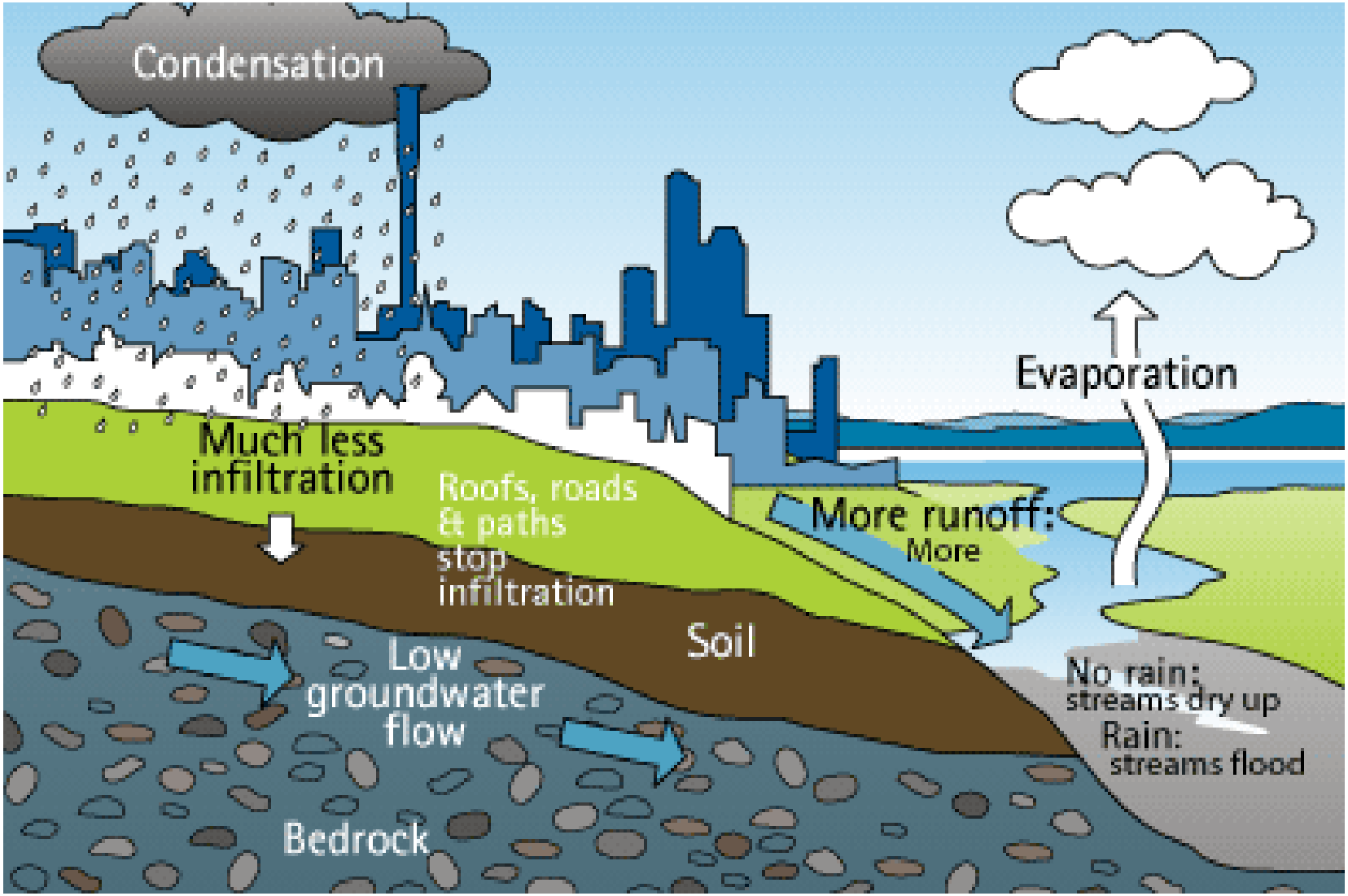
Our Mission is to identify and address community water resources issues using sustainable and practical science-based solutions.

The Water Resources Program serves all of New Jersey, working closely with the County Extension Offices.

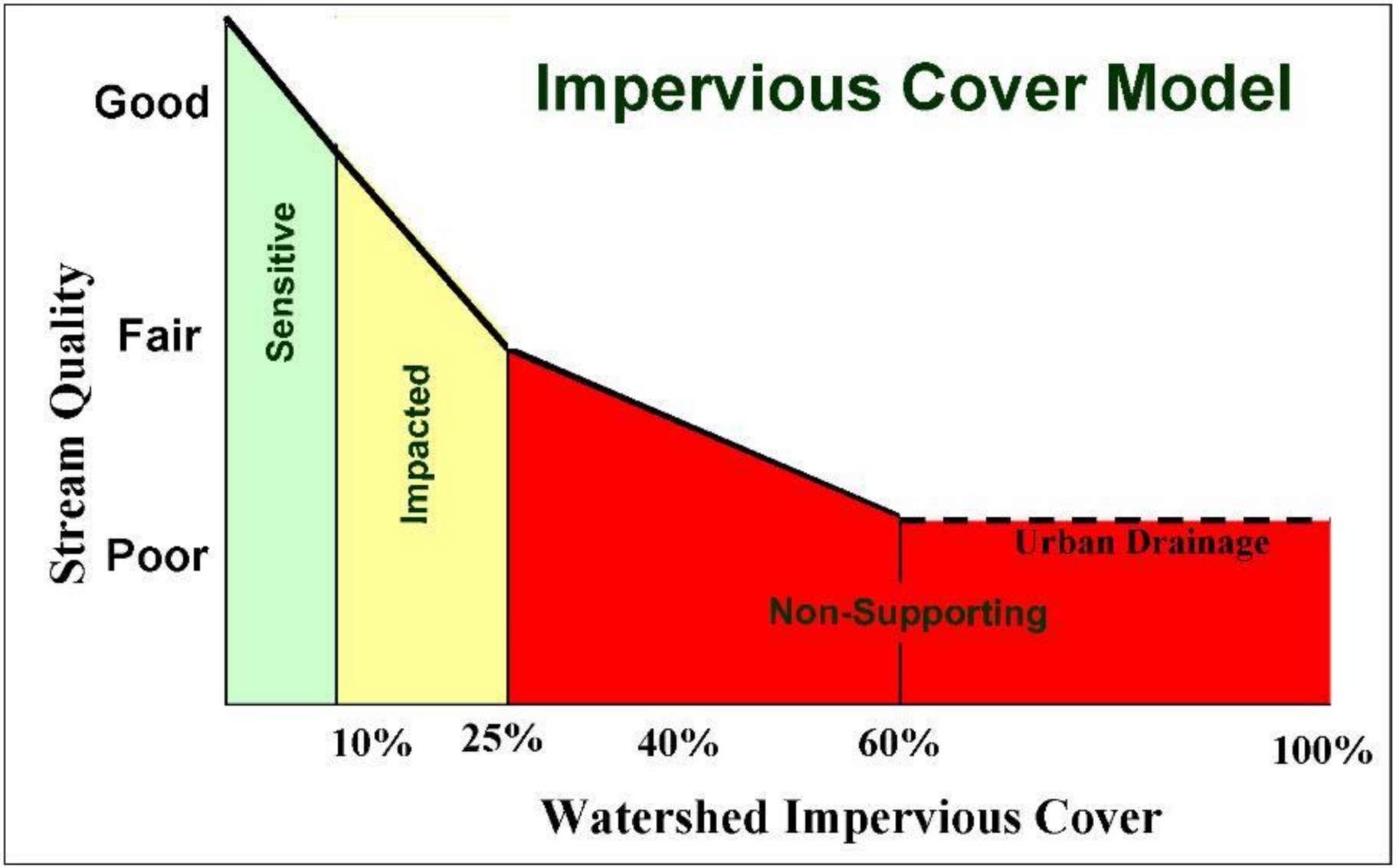
The Impact of Development on Stormwater Runoff

More development → *More impervious surfaces* → *More stormwater runoff*

The Urban Hydrologic Cycle



Original ICM developed based on 200+ reports and papers



Reference: Tom Schueler and Lisa Fraley-McNeal, Symposium on Urbanization and Stream Ecology, May 23 and 24, 2008

Green Infrastructure

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

Green Infrastructure projects:

- capture
- filter
- absorb
- reuse

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

Green Infrastructure includes:

- green roofs
- rainwater harvesting
- tree filter/planter boxes
- rain gardens/bioretention systems
- permeable pavements
- vegetated swales or bioswales
- natural retention basins
- trees & urban forestry
- green streets









Parker Urban Greenscapes. 2009.

It’s all about managing impervious surfaces !

Eliminate it !

Change it !

Disconnect it !

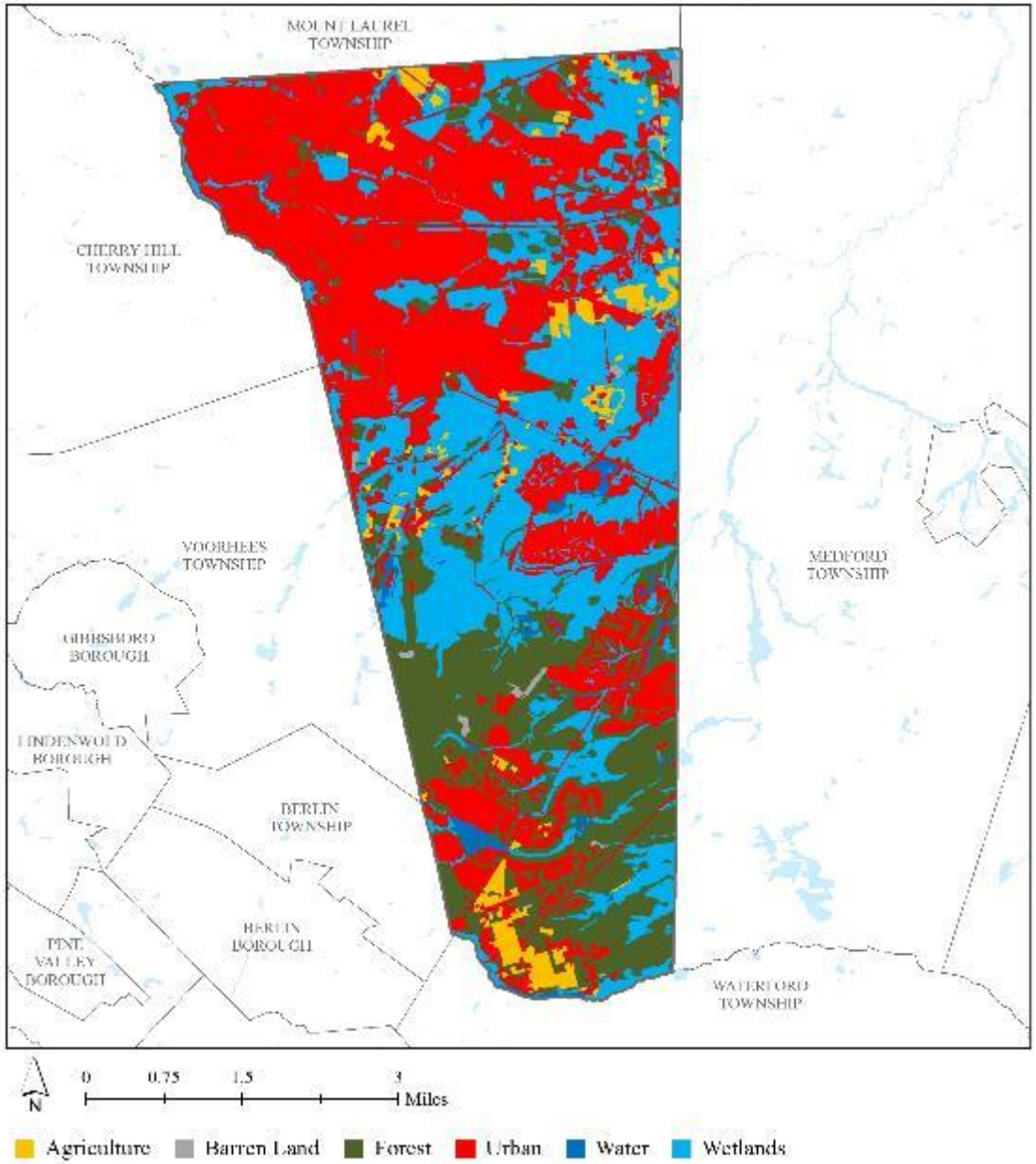
Reuse it !

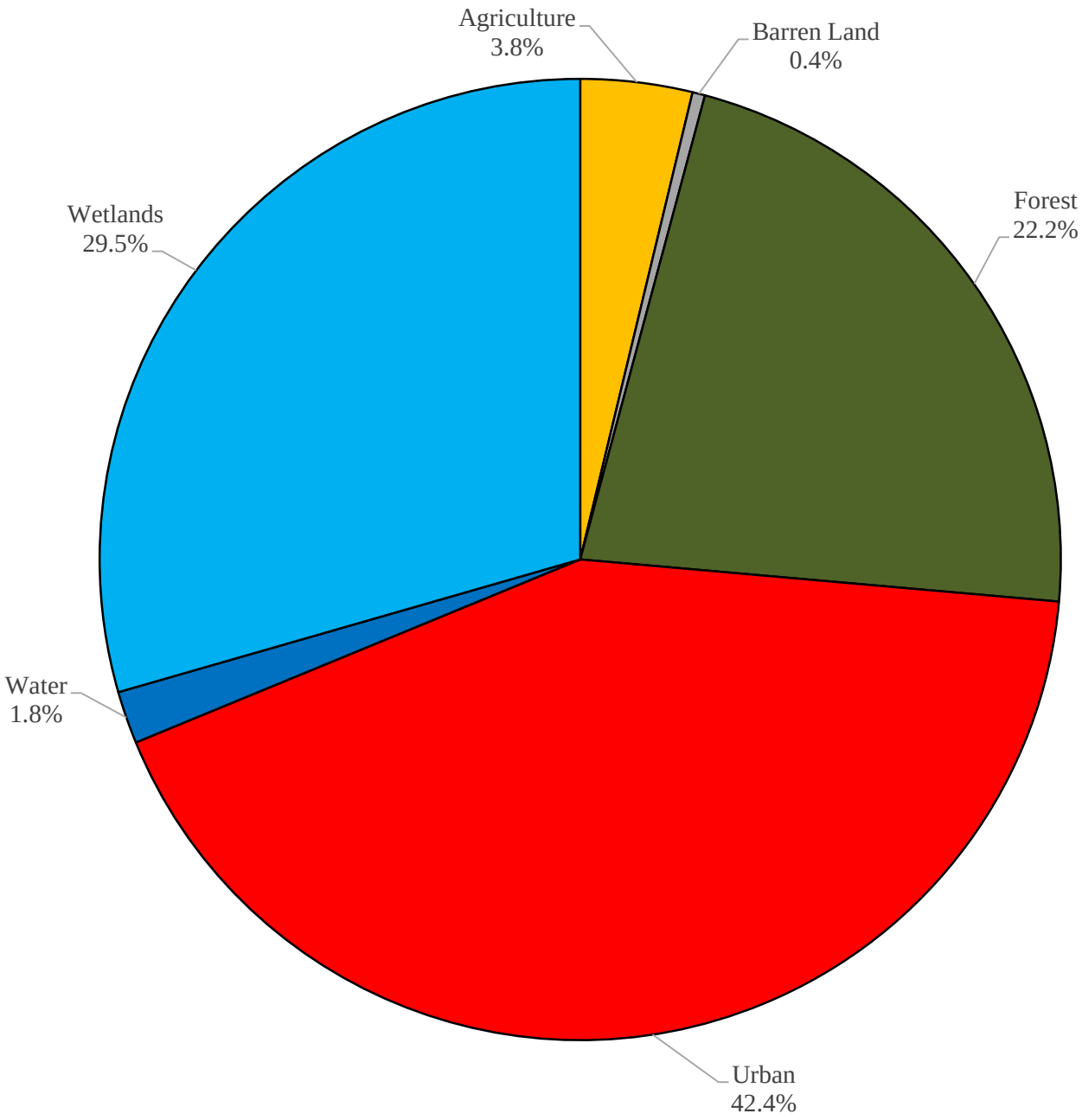
Impervious Cover Assessment

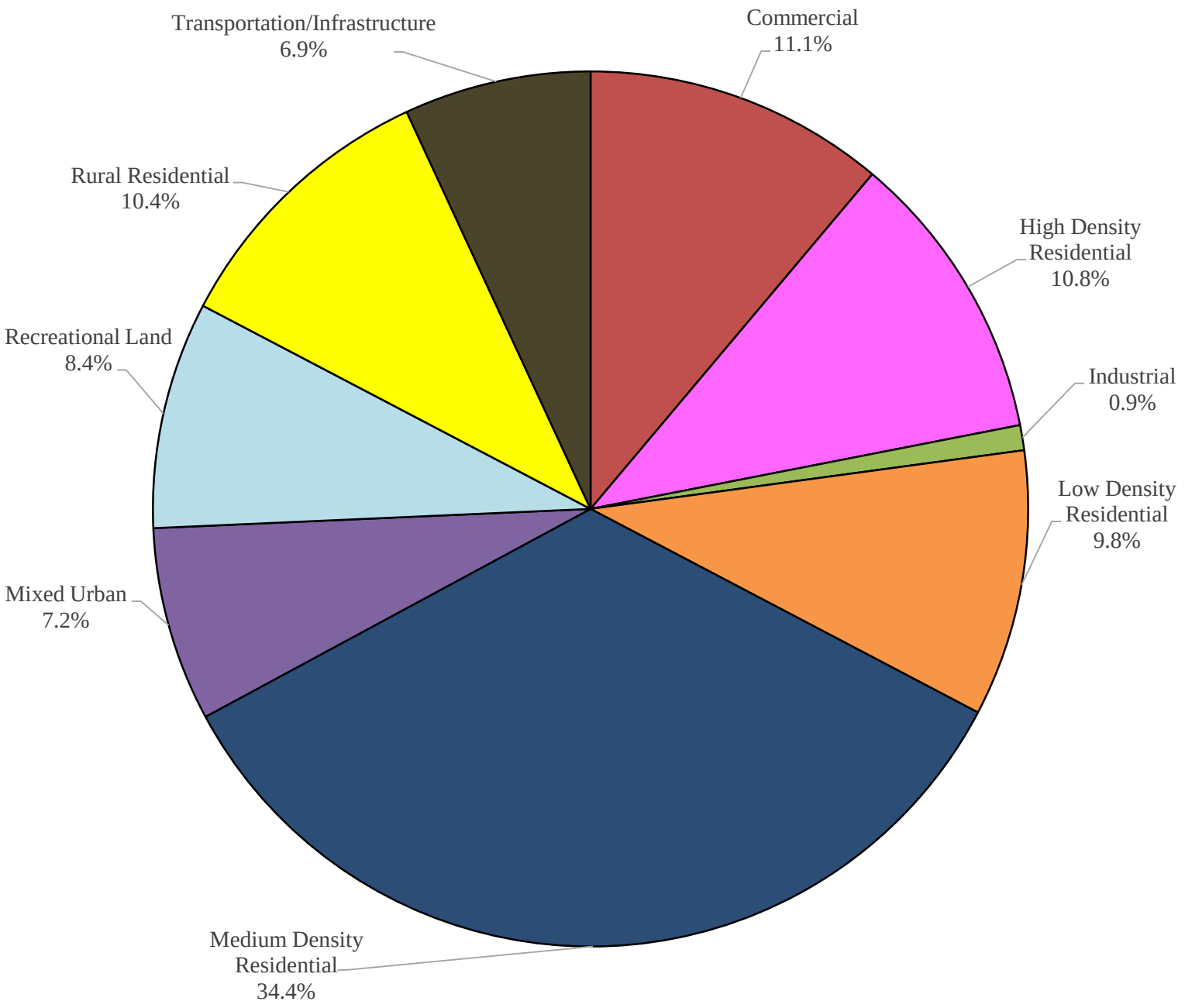
Impervious Cover Assessment

- Analysis completed by watershed and by municipality
- Use 2012 Land Use data to determine impervious cover
- Calculate runoff volumes for water quality, 2, 10 and 100 year design storm and annual rainfall
- Contain three concept designs

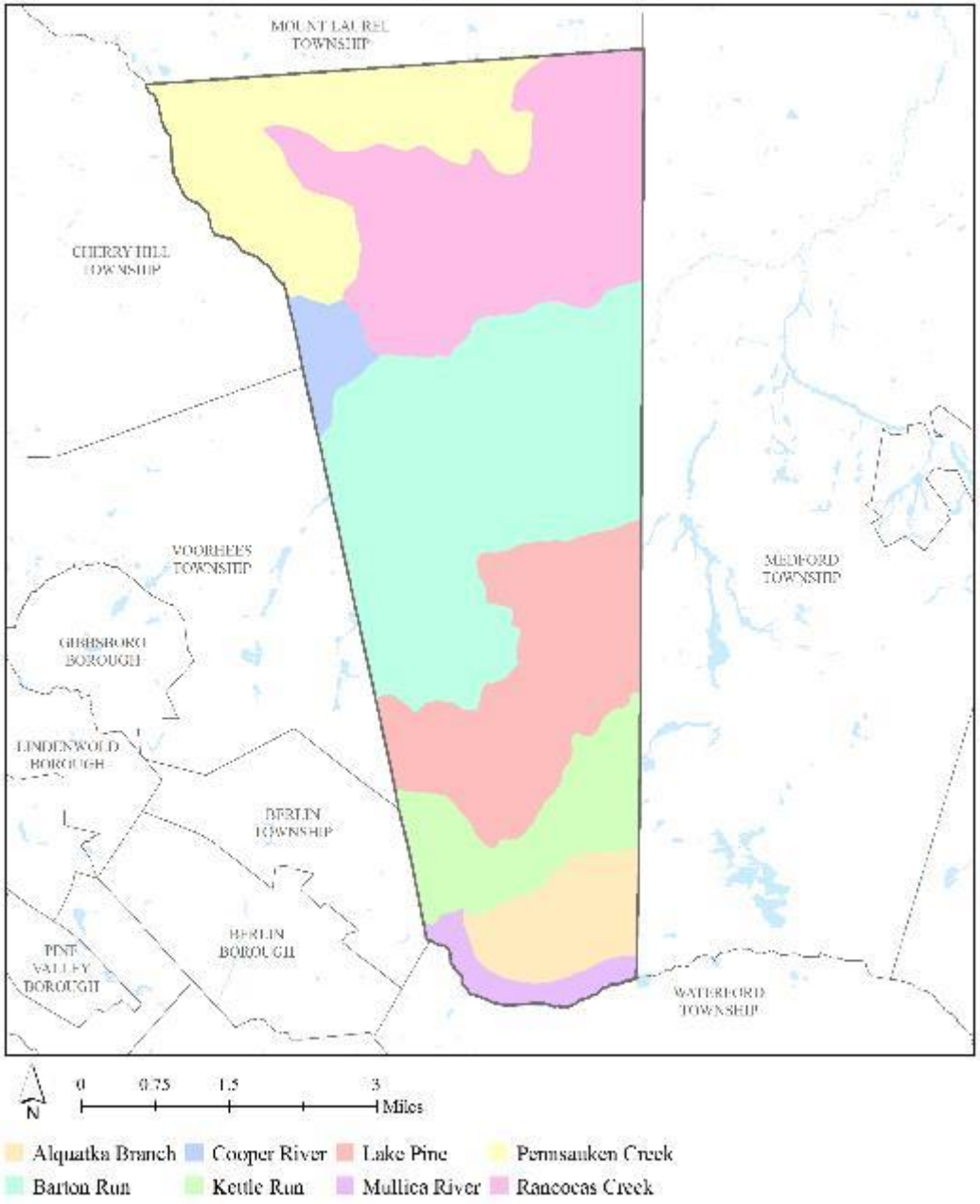
Subwatersheds of Evesham Township




Agriculture
3.8%
Barren Land
0.4%
Forest
22.2%
Wetlands
29.5%
Water
1.8%
Urban
42.4%


Transportation/Infrastructure
6.9%
Commercial
11.1%
Rural Residential
10.4%
High Density
Residential
10.8%
Recreational Land
8.4%
Industrial
0.9%
Low Density
Residential
9.8%
Mixed Urban
7.2%
Medium Density
Residential
34.4%

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 (4.9”) (MGal)	100-Year Design Storm (7.8”) (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

WE LOOK HERE FIRST:

- ✓Schools
- ✓House of Worship
- ✓Libraries
- ✓Municipal Building
- ✓Public Works
- ✓Firehouses
- ✓Post Offices
- ✓Elks or Moose Lodge
- ✓Parks/ Recreational Fields

- 20 to 40 sites are entered into a PowerPoint
- Site visits are conducted

Evesham Township
Impervious Cover Assessment
Kettle Run Fire Rescue, 498 Hopewell Road

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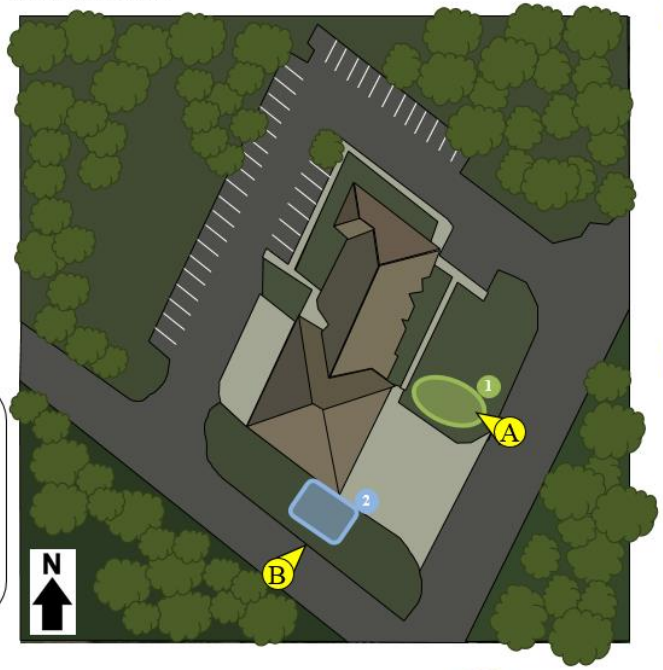
New Jersey Agricultural Experiment Station

PROJECT LOCATION:

SITE PLAN:



A

B

1. **BIORETENTION SYSTEM:** A rain garden can be used to capture, treat, and infiltrate runoff from the roof of the building. These systems can easily be incorporated into existing landscapes, improving aesthetics and creating wildlife habitat while managing stormwater .

2. **RAINWATER HARVESTING SYSTEM:** A cistern can capture stormwater that drains from the building's rooftop. Connecting the downspouts to the cistern will allow the stormwater to be harvested and used for cleaning fire trucks.

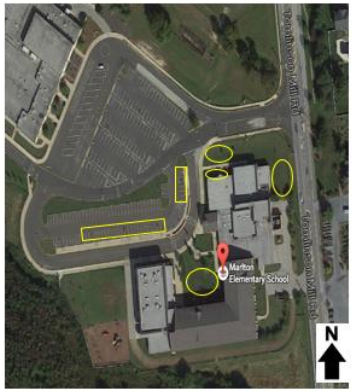
1 BIORETENTION SYSTEM

2 RAINWATER HARVESTING SYSTEM

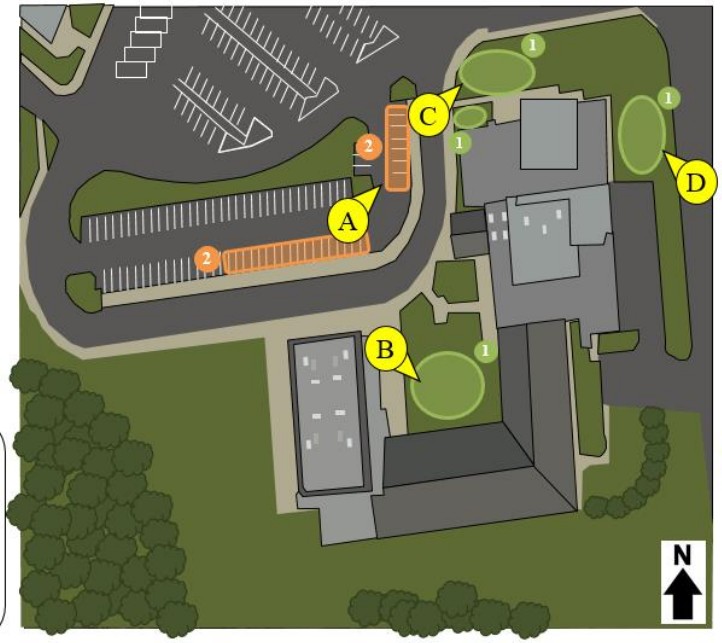
Evesham Township
Impervious Cover Assessment
Marlton Elementary School, 190 Tomlinson Mill Road

RUTGERS
New Jersey Agricultural Experiment Station

PROJECT LOCATION:



SITE PLAN:

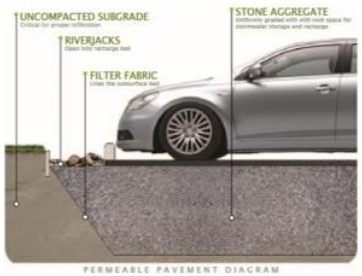


1 **BIORETENTION SYSTEM:** On this property rain gardens can be used to reduce sediment and nutrient loading to the local waterway and increase groundwater recharge. There are opportunities to install rain gardens near entrances to the school.

2 **POROUS PAVEMENT:** Porous pavement promotes groundwater recharge and filters stormwater. The parking spots close to the school can be retrofitted with porous pavement.

1 BIORETENTION SYSTEM

2 POROUS PAVEMENT



A

B

C

D

Evesham Township
Impervious Cover Assessment
Barton Run Swim Club, 100 Lakeside Drive

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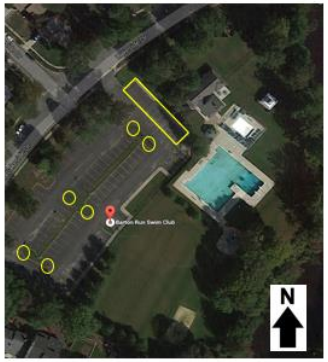
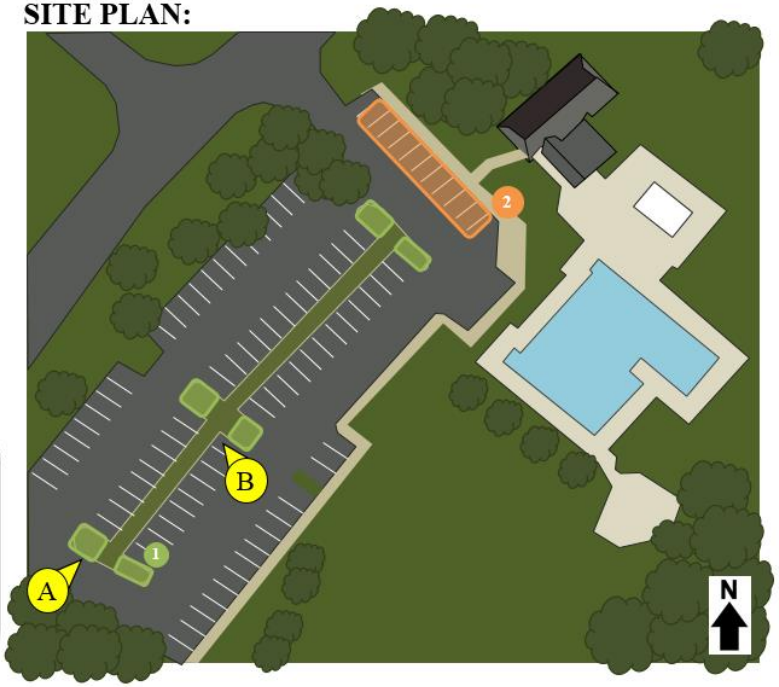
PROJECT LOCATION:



SITE PLAN:



1 **BIORETENTION SYSTEM:** On this property rain gardens can be used to reduce sediment and nutrient loading on local waterways by retrofitting the parking islands. The rain gardens will capture, treat, and infiltrate runoff from the parking lot.

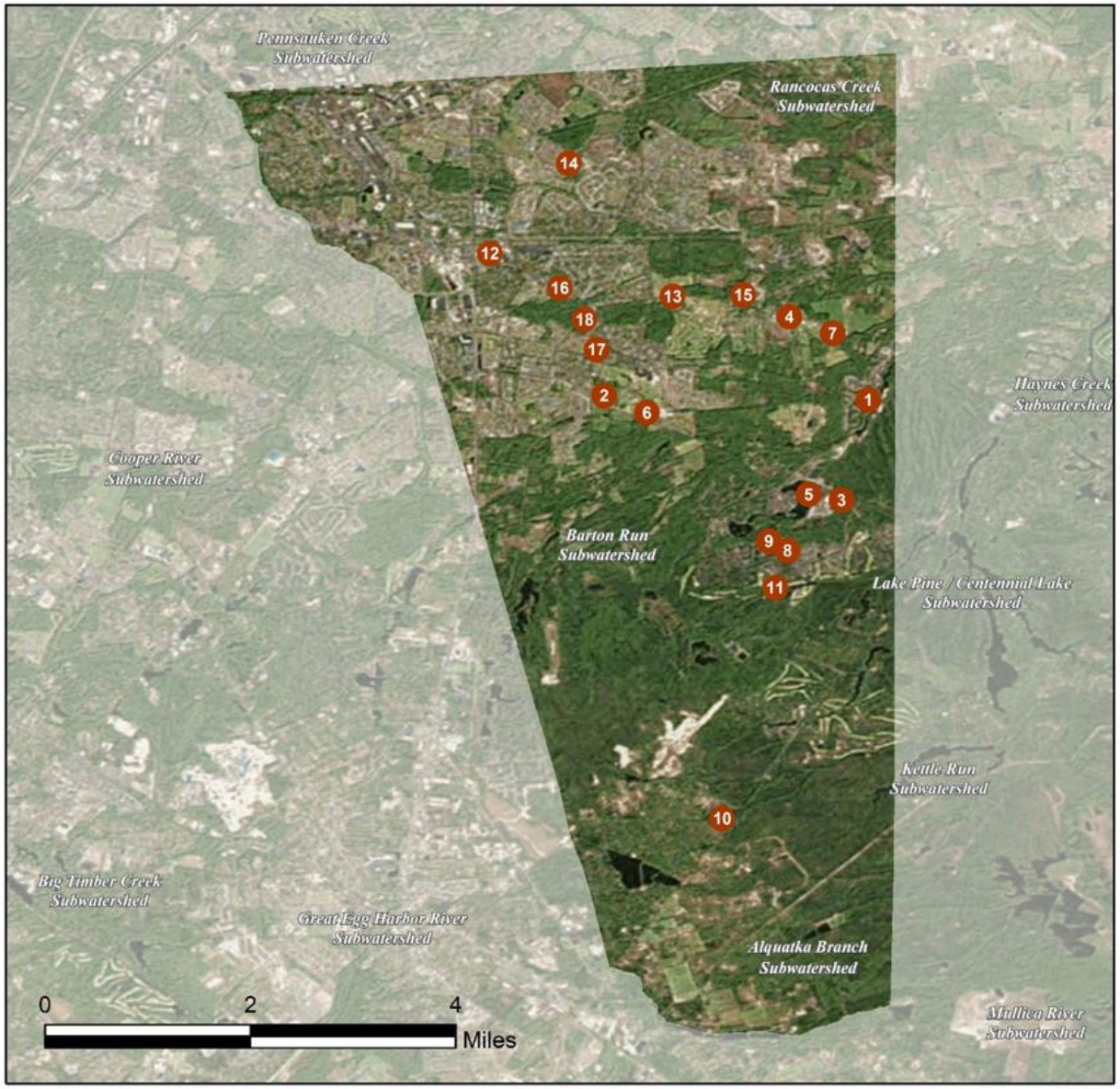
2 **POROUS PAVEMENT:** Parking spaces close to the pool house can be converted to porous asphalt. Porous pavement promotes groundwater recharge and filters stormwater.

1 BIORETENTION SYSTEM

2 POROUS PAVEMENT

Impervious Cover Reduction Action Plan

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 RANCOCAS 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

BARTON RUN SWIM CLUB

Subwatershed: Barton Run

Site Area: 169,977 sq. ft.

Address: 100 Lakeside Drive
Marlton, NJ 08053

Block and Lot: Block 44.3, Lot 16

Stormwater is currently directed to an existing catch basin. Installing rain gardens in the parking lot islands can capture, treat, and infiltrate stormwater runoff from the parking lot. Replacing parking spaces with porous pavement can capture and infiltrate runoff from the other side of the parking lot. A preliminary soil assessment suggests that more soil testing would be required before determining the soil's suitability 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"
30	51,770	2.5	26.1	237.7	0.040	1.42

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	0.288	48	21,834	0.82	2,765	$13,825
Pervious pavement	0.352	59	26,651	1.00	2,410	$60,250

GREEN INFRASTRUCTURE RECOMMENDATIONS

Barton Run Swim Club

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

0 50' 100'

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

0 50' 100'

KETTLE RUN FIRE/RESCUE 225/228

Subwatershed: Lake Pine

Site Area: 94,922 sq. ft.

Address: 498 Hopewell Road
Marlton, NJ 08053

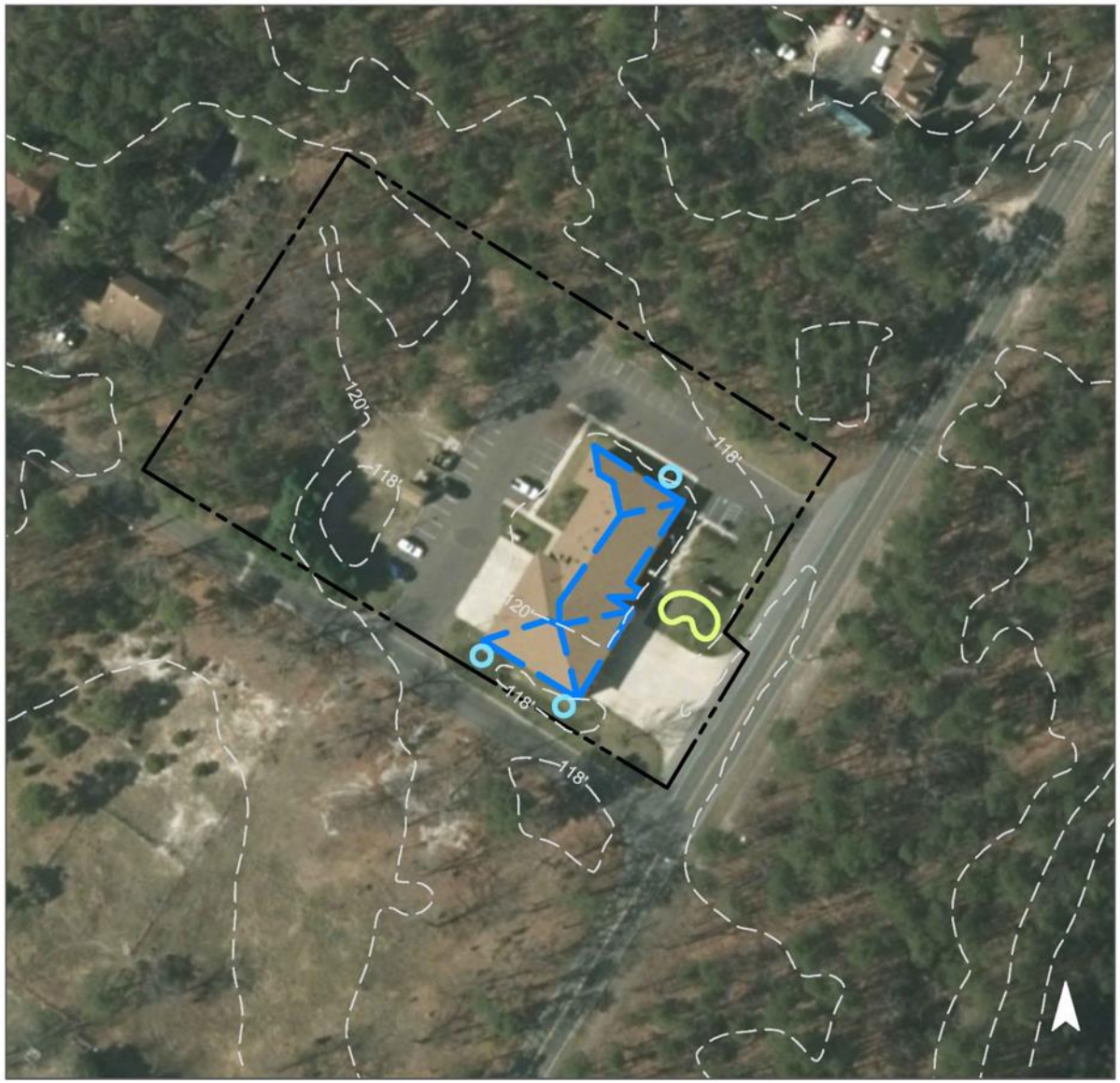
Block and Lot: Block 66.01, Lot 3, 4

Stormwater is currently directed to an existing detention basin. Cisterns adjacent to the building can harvest roof runoff to be used for washing department vehicles. Installing a rain garden on the east side of the building can capture, treat, and infiltrate roof additional runoff. 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"
45	42,532	2.1	21.5	195.3	0.033	1.17

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 system	0.071	12	5,348	0.20	680	$3,400
Rainwater harvesting	0.094	16	7,099	0.27	2,800 (gal)	$5,600

GREEN INFRASTRUCTURE RECOMMENDATIONS



Kettle Run Fire/Rescue 225/228

- bioretention system
- rainwater harvesting
- drainage area
- property line
- 2015 Aerial: NJOIT, OGIS

0 50' 100'

www.water.rutgers.edu/Projects/William_Penn/Evesham/index.html

Evesham

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ALL SITES | BARTON RUN | LAKE PINE | PENNSAUKEN CREEK | RANCOCAS CREEK


1 Barton Run Swim Club


2 Cherokee High School


3 Evesham Fire/Rescue 223/227


4 Evesham Township Municipal Court


5 Kings Grant Community Room


6 Marlton Elementary School


7 Memorial Park


8 Richard L. Rice Elementary School


9 Villa Royal Association (Condo Complex)


10 Kettle Run Fire Rescue 225/228

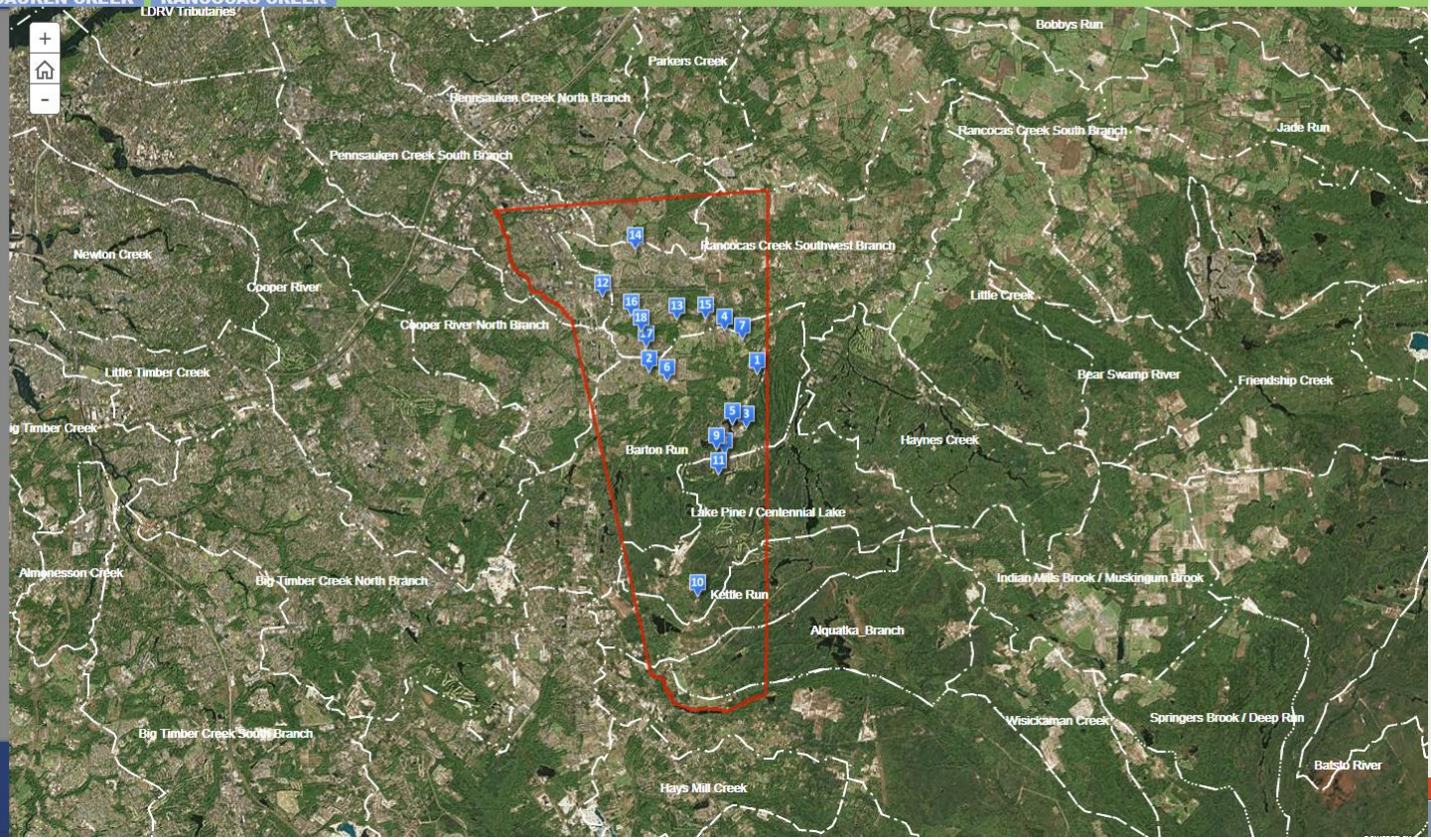

11 Links Golf Course


12 Evesham Fire/Rescue 221/229


13 Christ Prebyterian Church


14 Frances S. DeMasi Middle School


15 Marlton Assembly of God



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Evesham

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ALL SITES | BARTON RUN | LAKE PINE | PENNSAUKEN CREEK | RANCOCAS CREEK


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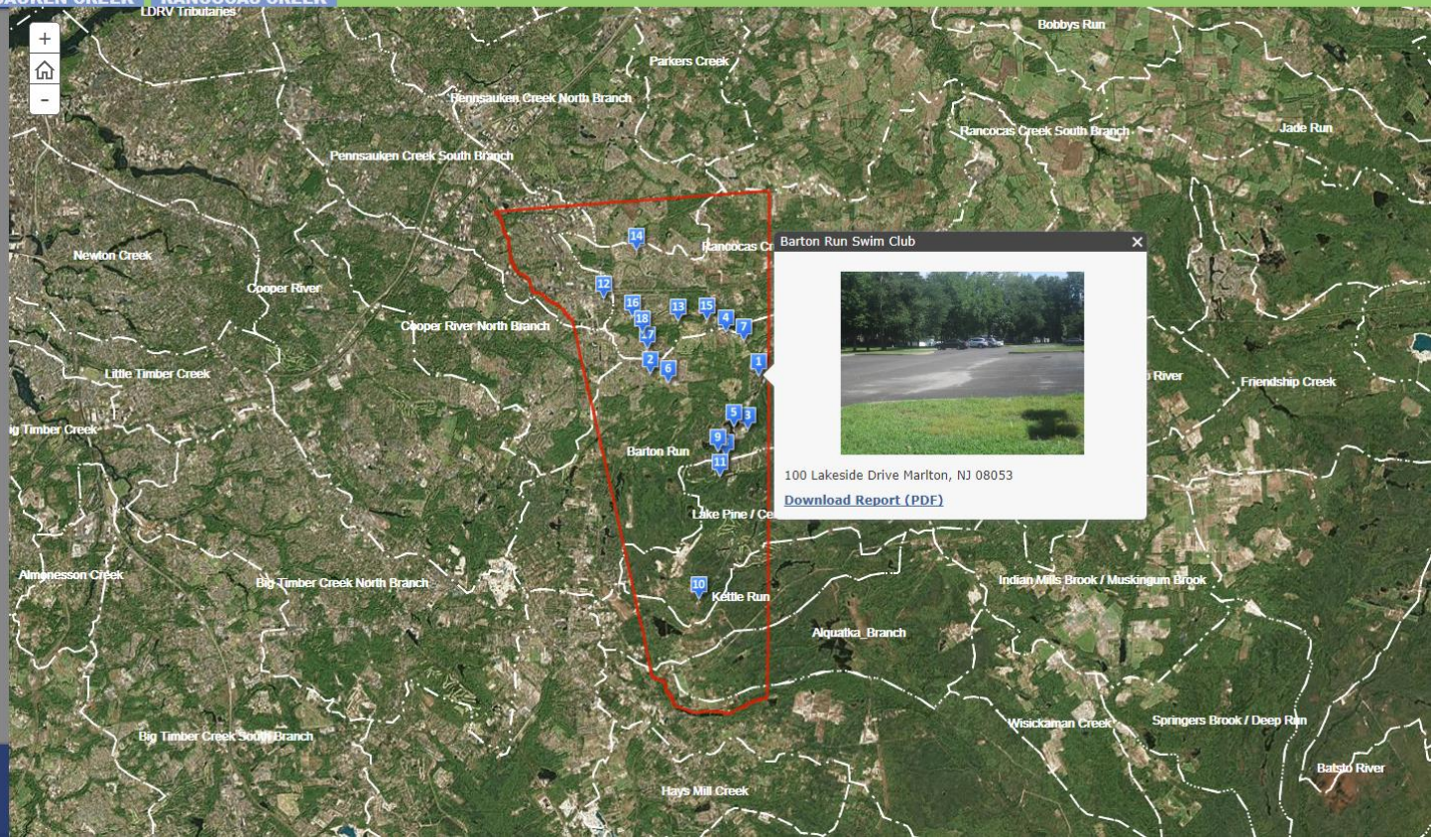

ICA/RAP Final Thoughts

- Plans promote action
- Plans are a conduit for funding
- Impervious cover reduction action plan provide sites for developers to offset impacts
- Wide range in cost of projects (Eagle Scout projects to economic stimulus money projects)
- Foundation for stormwater utilities, watershed restoration plans, stormwater mitigation plan, and/or integrated water quality plans

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Final Thoughts

- Planning needs to be quick, simple and inexpensive
- Plans are conduits for funding
- All opportunities need to be field verified
- Local champions are needed to get projects in the ground
- It takes time to develop relationships

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Questions?