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Green Infrastructure Planning for Hamilton Township, Atlantic County 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.



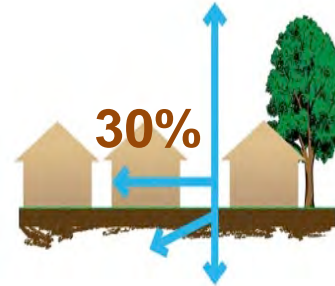
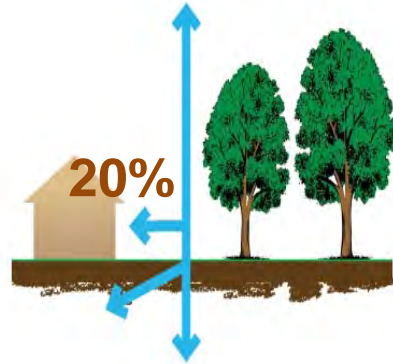
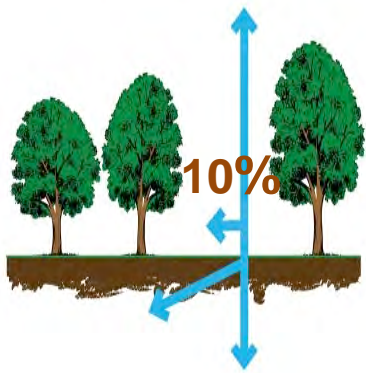
Water Resources Program



Our mission is to identify and address water resources issues by engaging and empowering communities to employ practical science-based solutions to help create a more equitable and sustainable New Jersey.



The Impact of Development on Stormwater Runoff



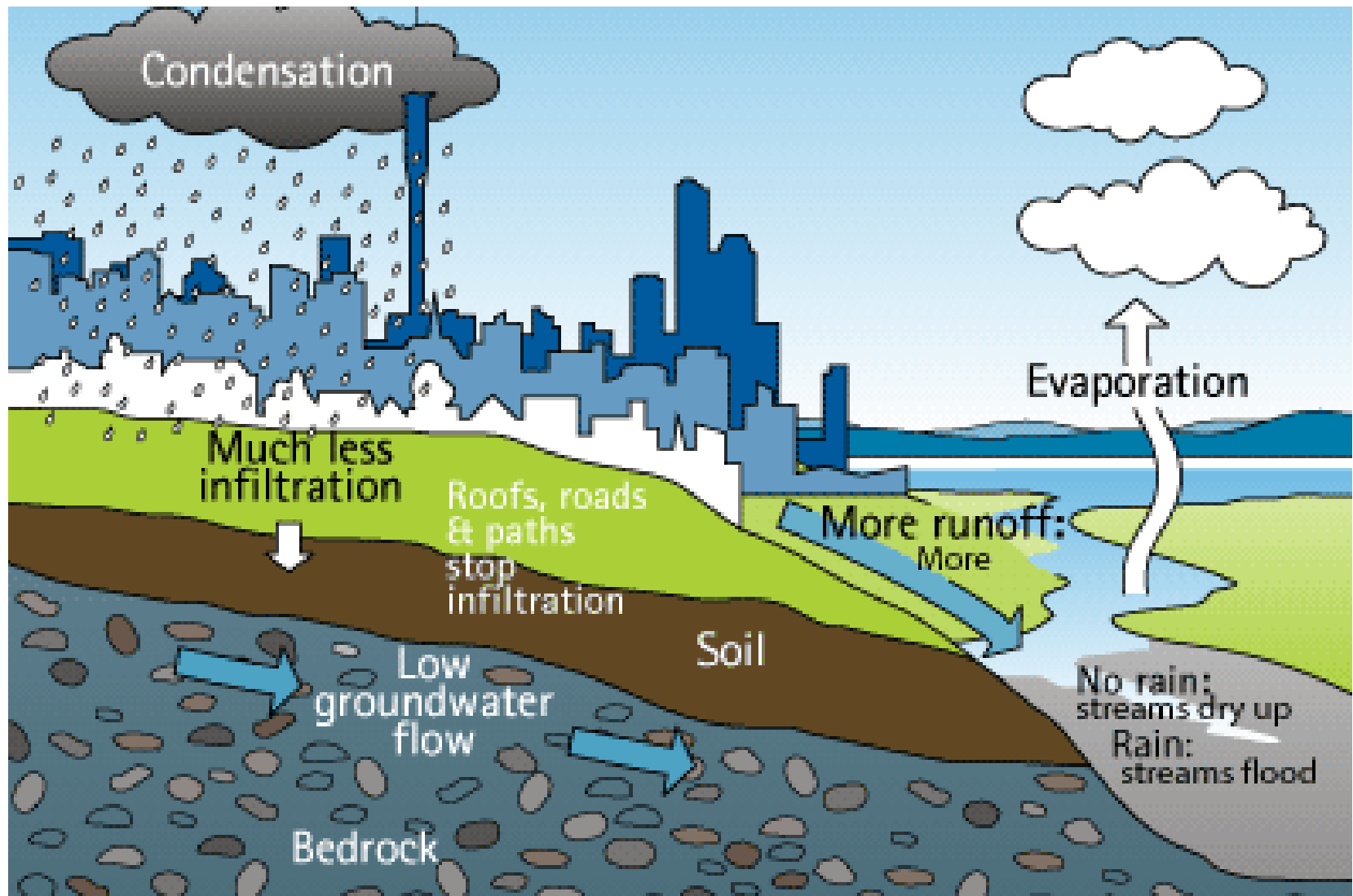
More development

→ *More impervious surfaces* →

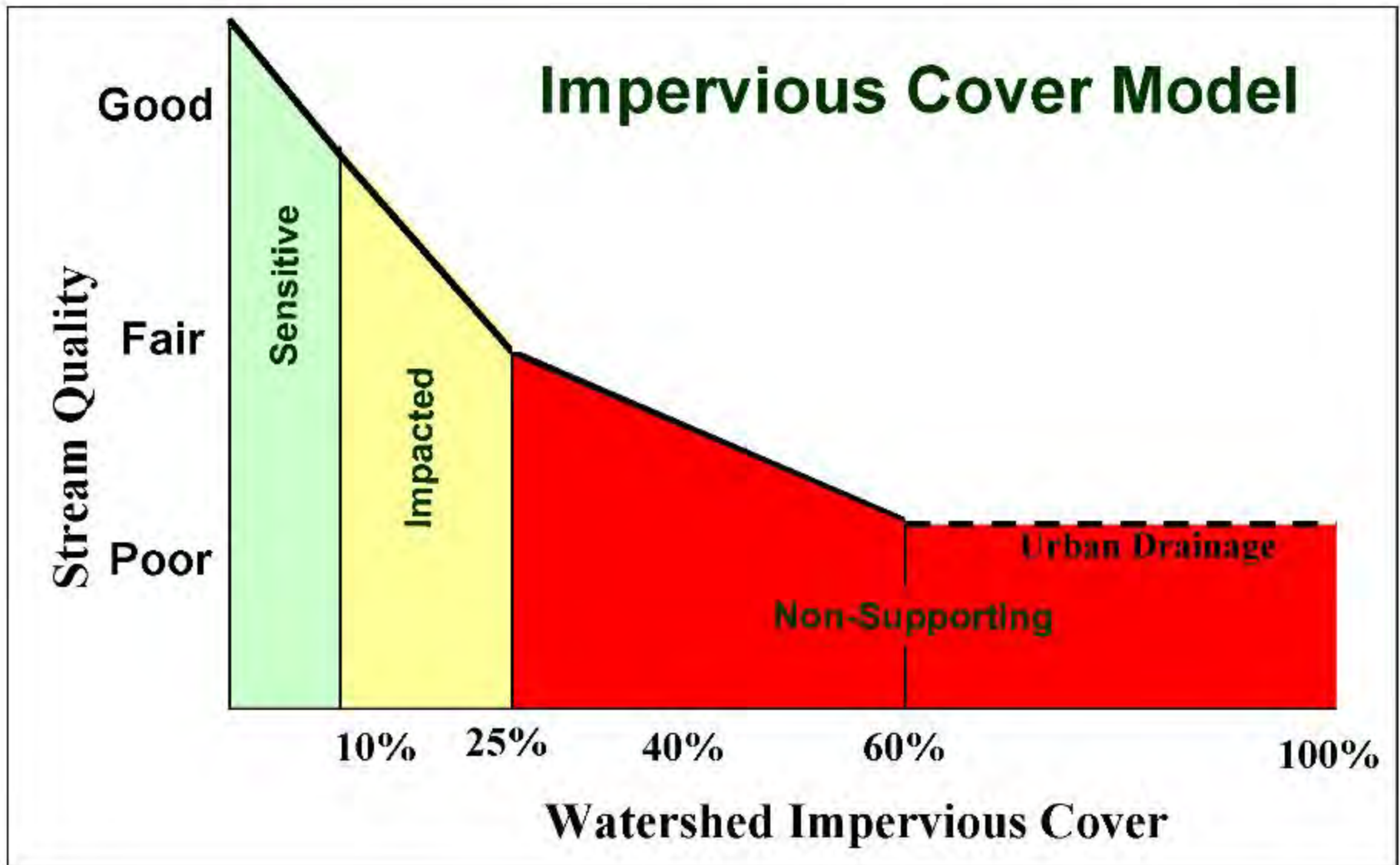
More stormwater runoff



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

- is 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





It is all about
controlling runoff
from impervious
surfaces

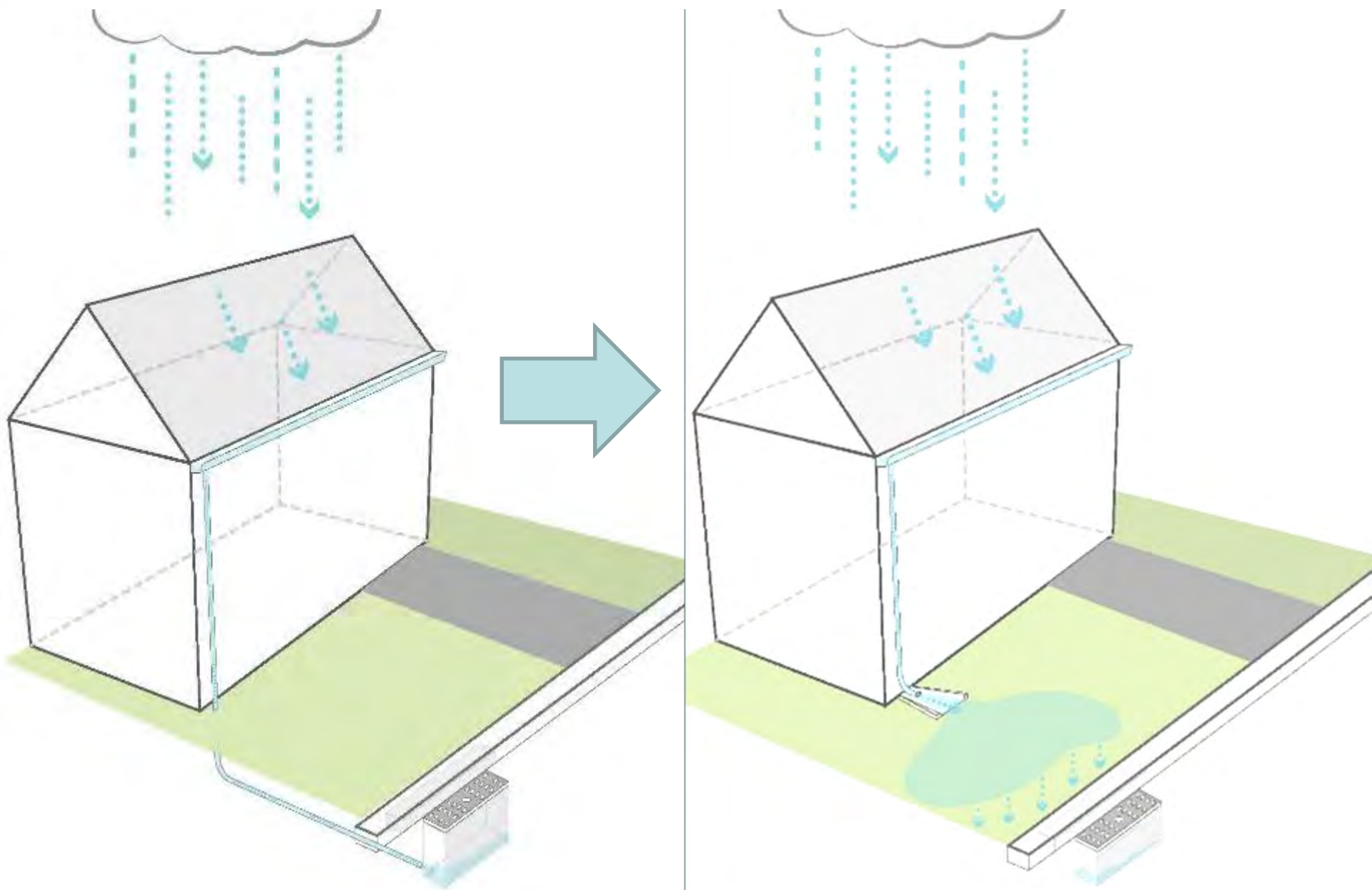




Step 1: Depave

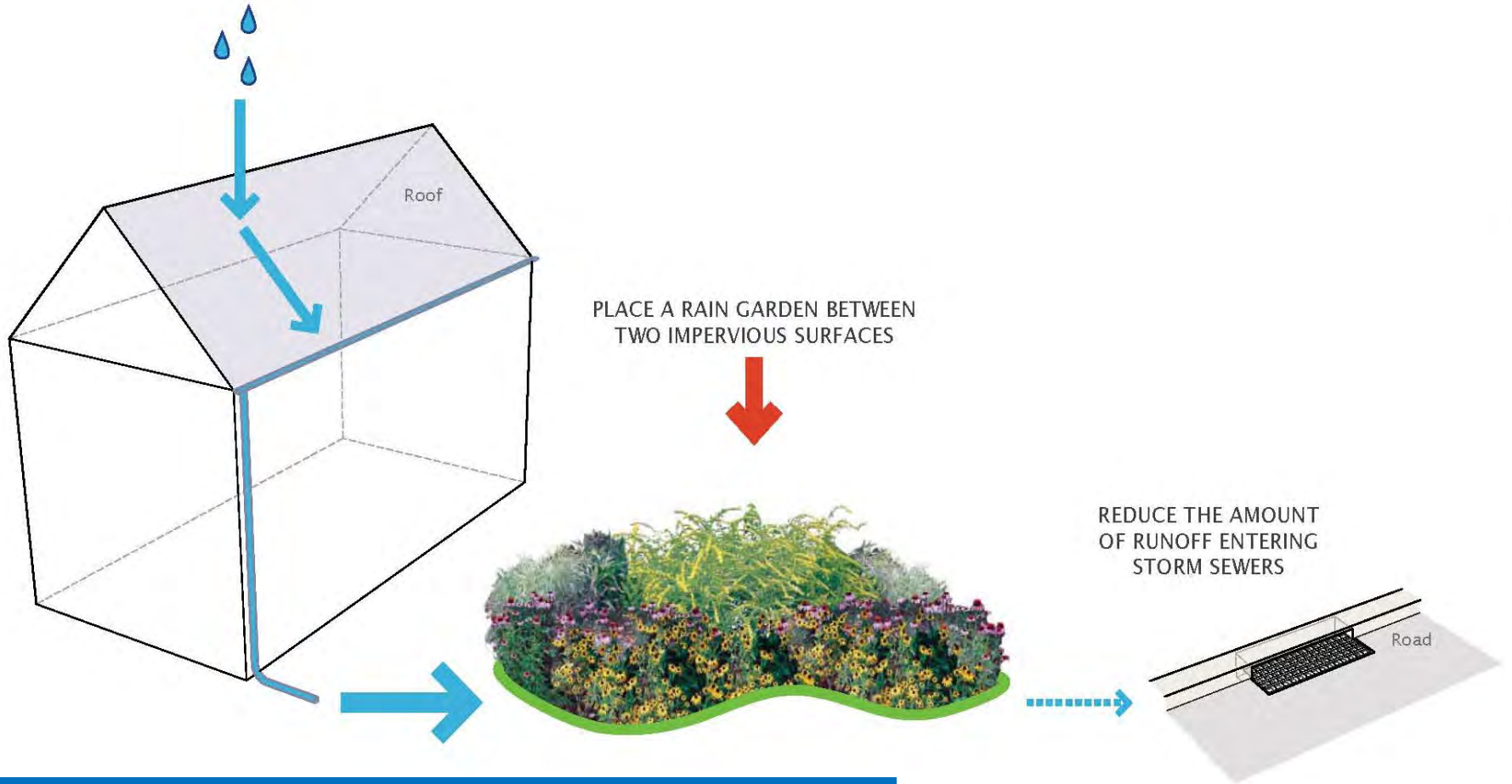


Step 2: Simple Disconnection



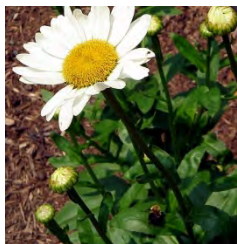
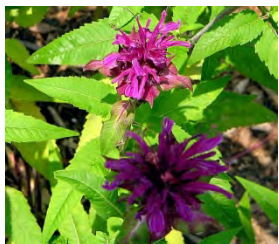
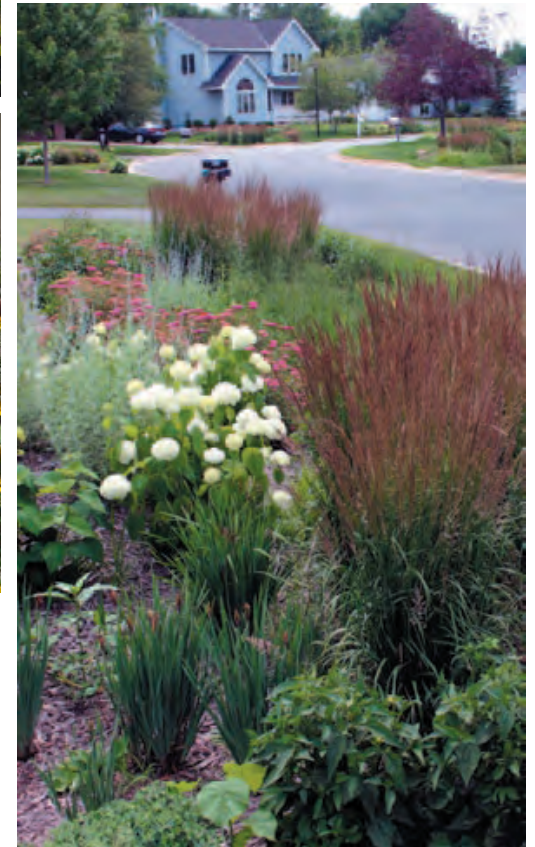


Disconnect to a Rain Garden



Rooftop runoff is now "disconnected" from flowing directly into the storm sewer system

Lots of Rain Gardens



Step 3: Convert to Permeable Pavement

POROUS ASPHALT

It is common to design porous asphalt in the parking stalls of a parking lot. This saves money and reduces wear.

DRAINAGE AREA

The drainage area of the porous asphalt system is the conventional asphalt cartway and the porous asphalt in the parking spaces. Runoff from the conventional asphalt flows into the porous asphalt parking spaces.



SUBGRADE

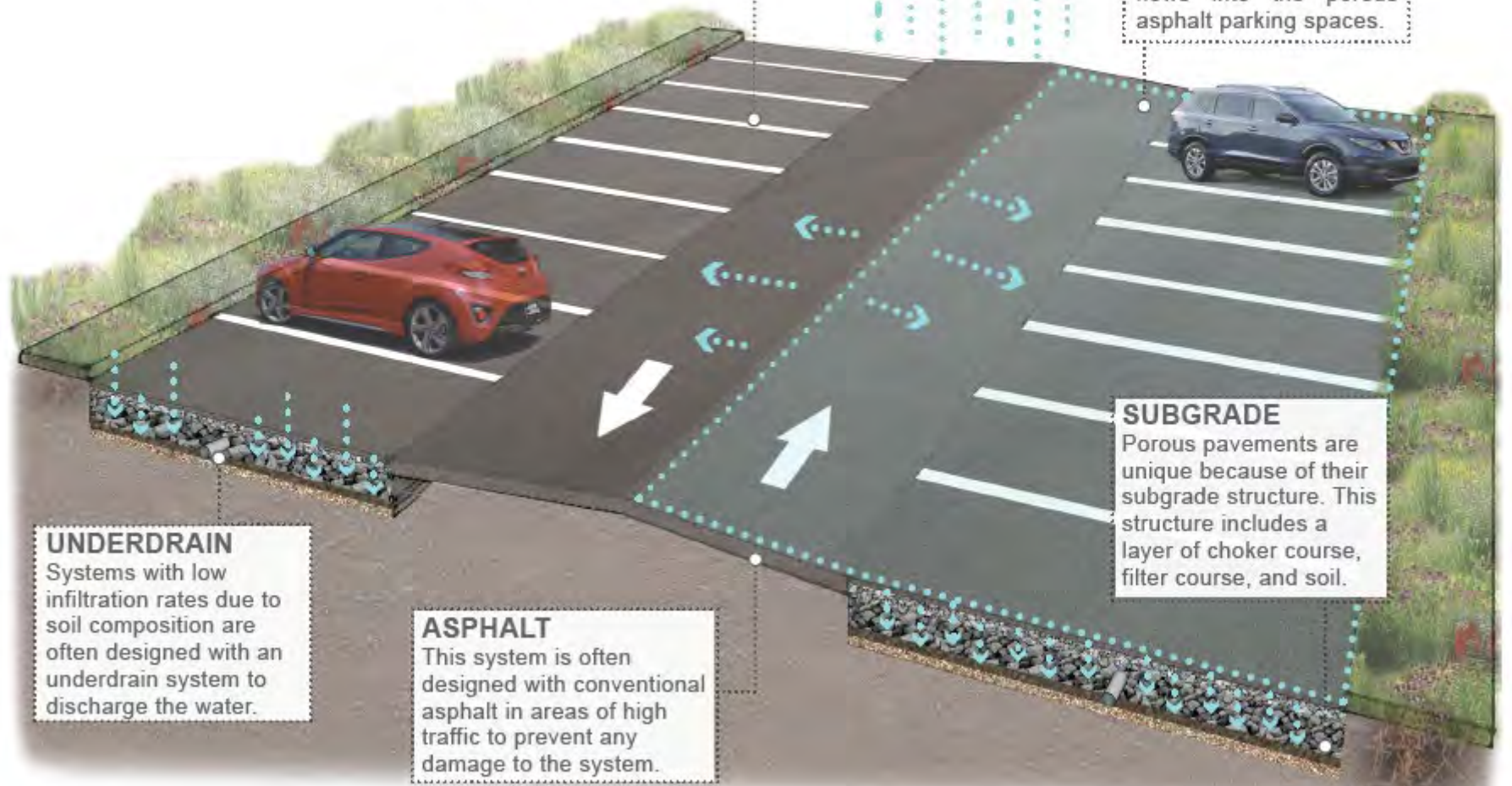
Porous pavements are unique because of their subgrade structure. This structure includes a layer of choker course, filter course, and soil.

UNDERDRAIN

Systems with low infiltration rates due to soil composition are often designed with an underdrain system to discharge the water.

ASPHALT

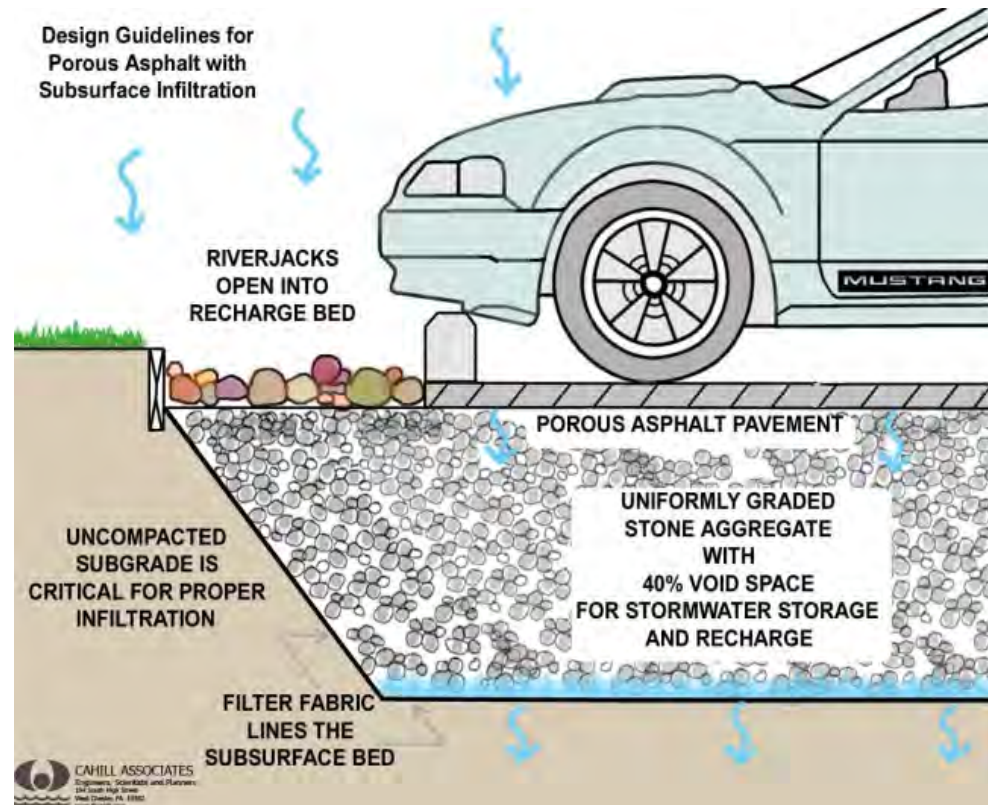
This system is often designed with conventional asphalt in areas of high traffic to prevent any damage to the system.



ADVANTAGES

- Manage stormwater runoff
- Minimize site disturbance
- Promote groundwater recharge
- Low life cycle costs, alternative to costly traditional stormwater management methods
- Mitigation of urban heat island effect
- Contaminant removal as water moves through layers of system

COMPONENTS





Porous Asphalt





Grass Pavers



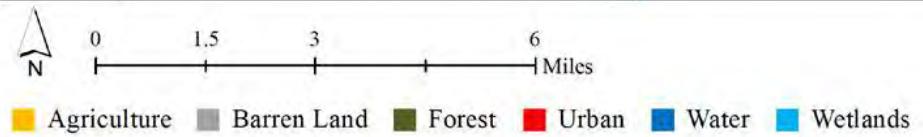
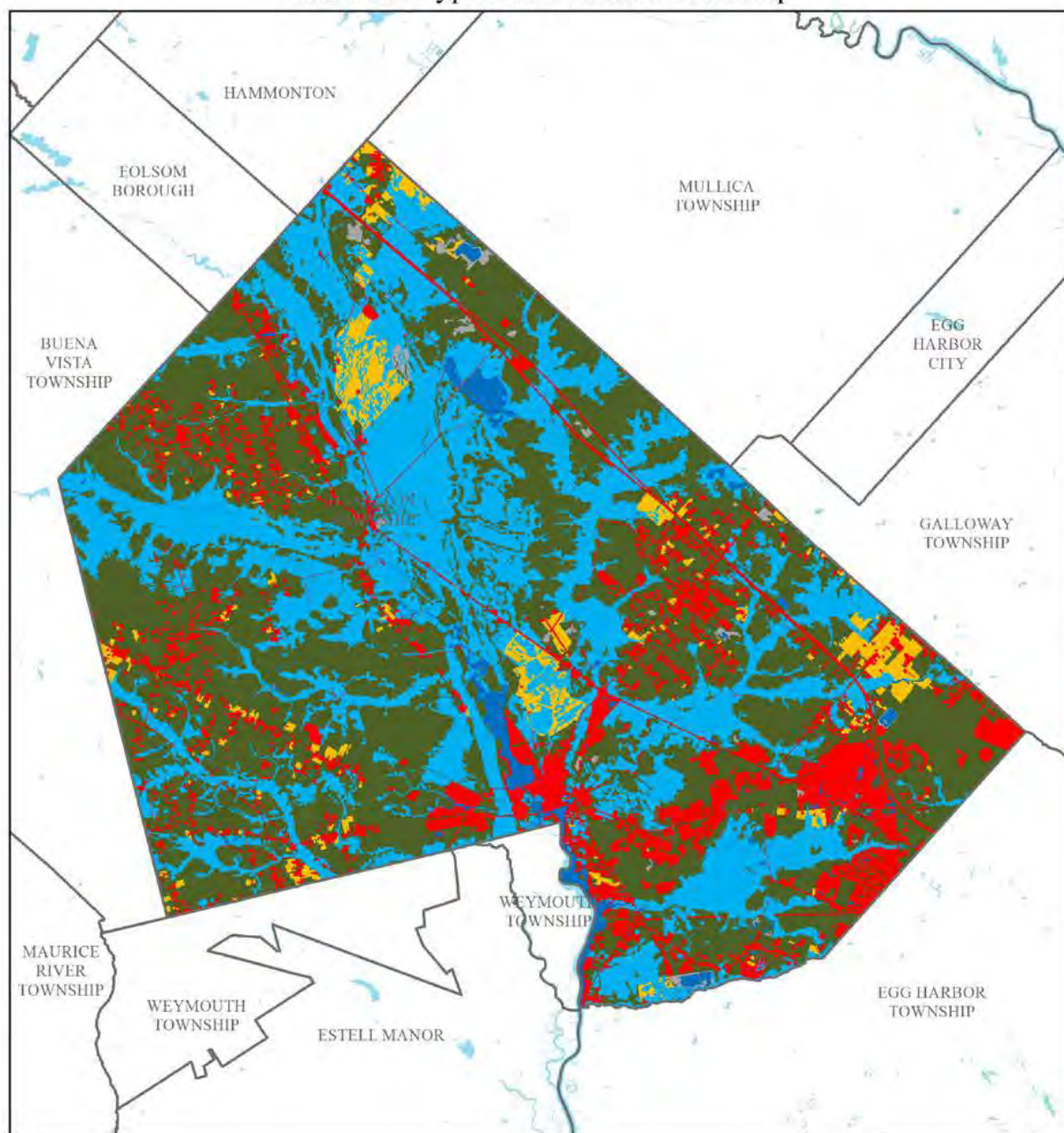
Impervious Cover Assessment Figures/Charts

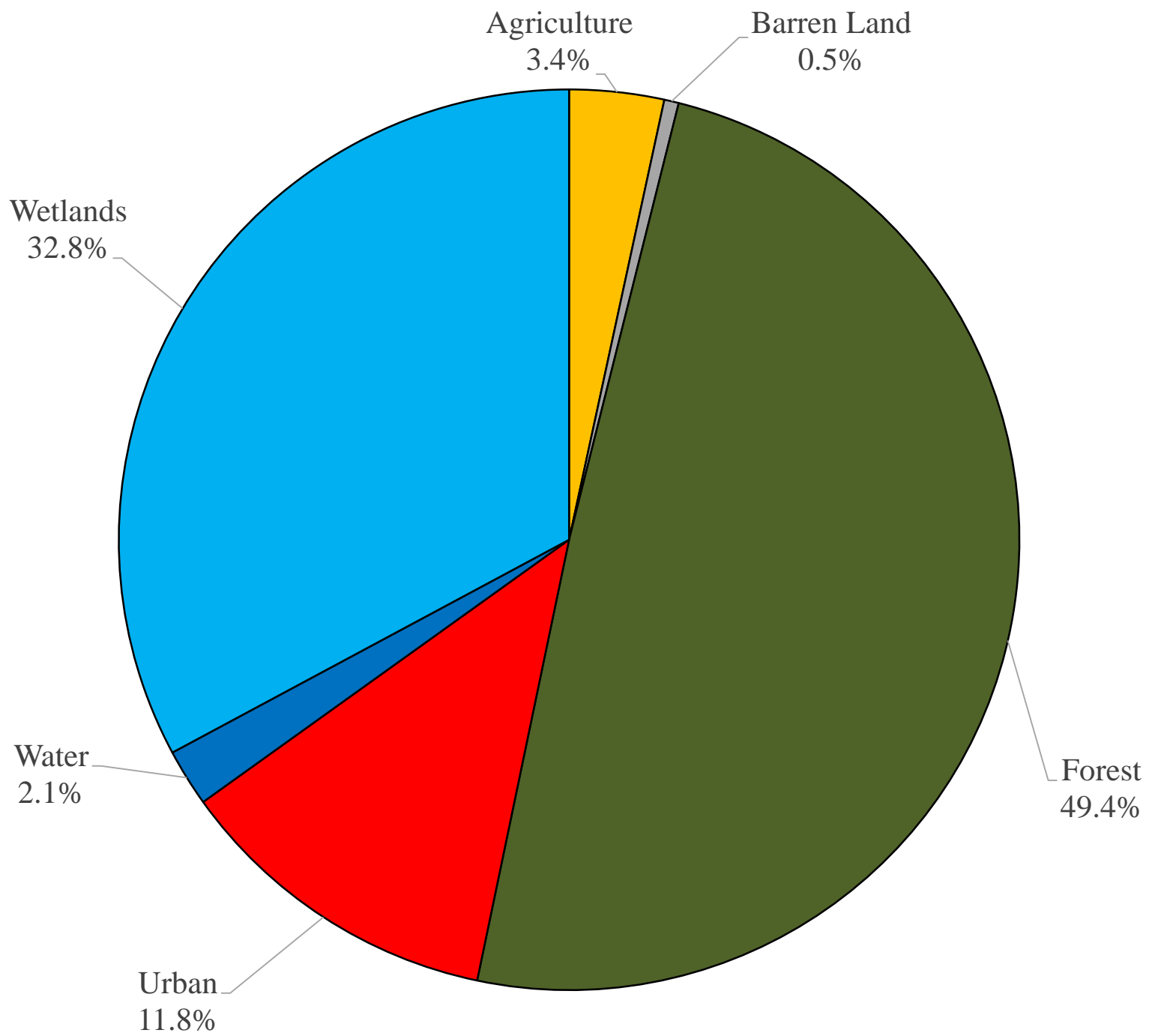


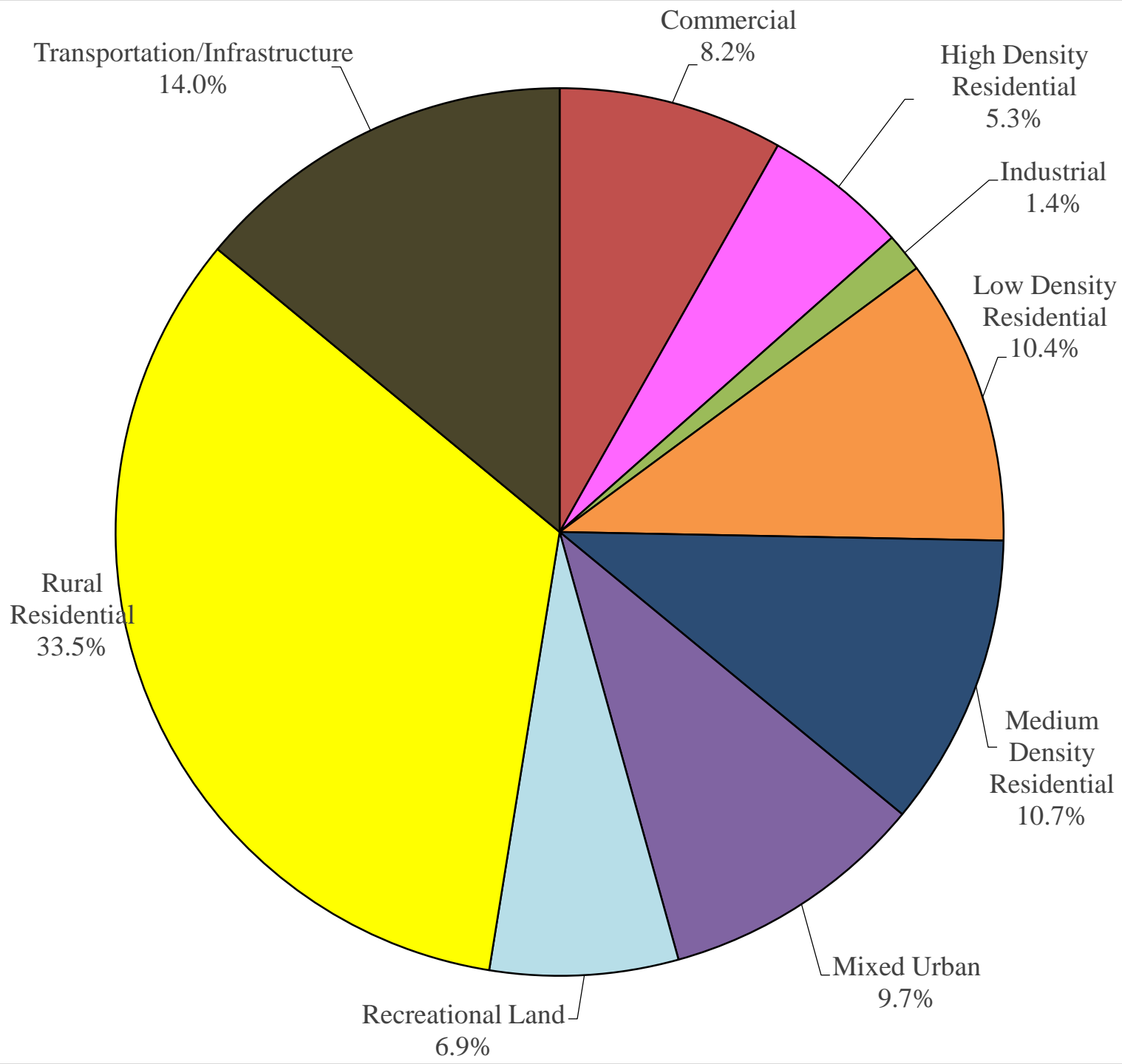
Impervious Cover Assessment

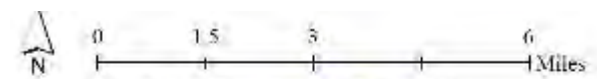
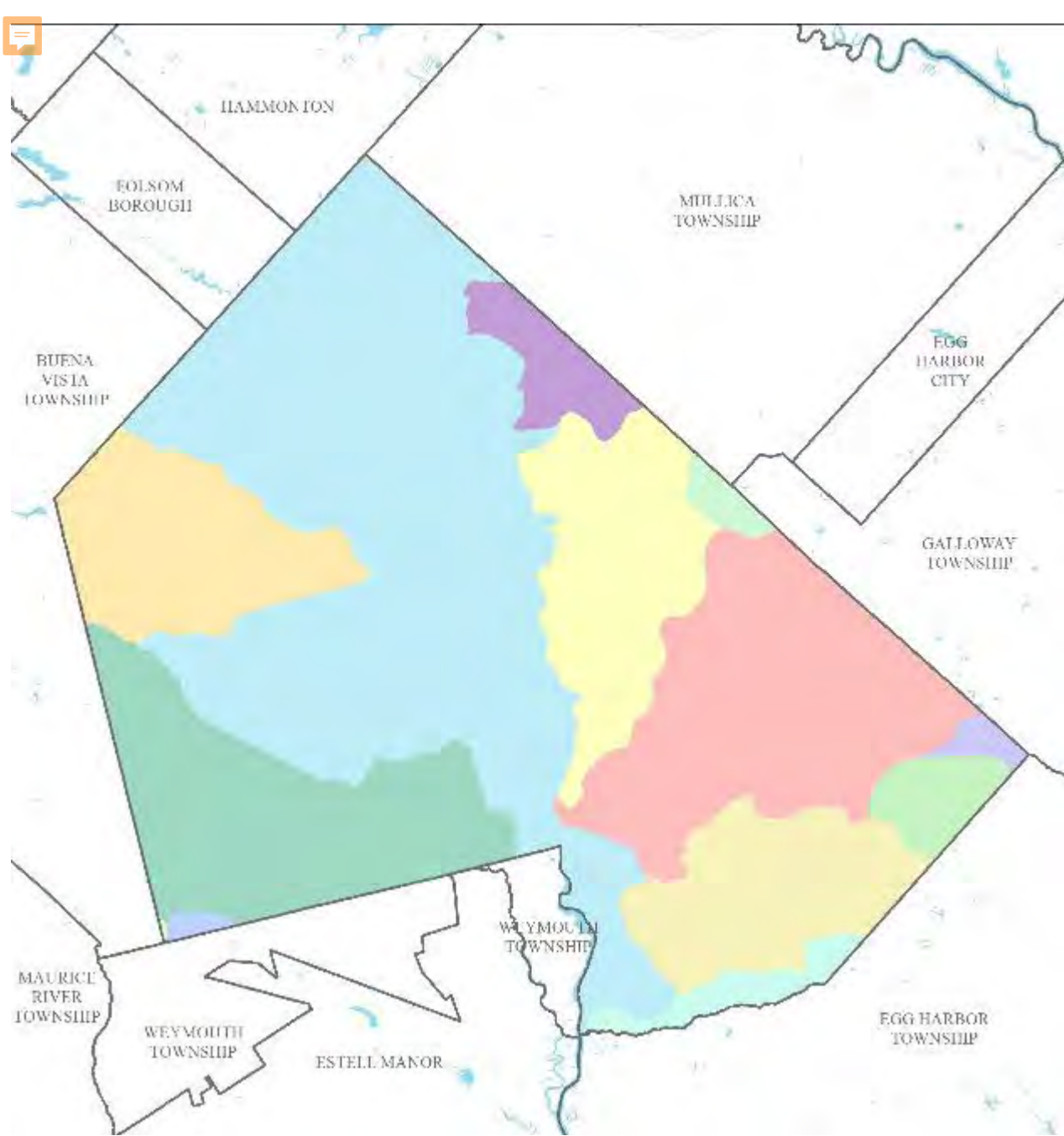
- Analysis completed by watershed and by municipality
- Use 2015 Land Use data to determine impervious cover
- Calculate runoff volumes for water quality, 2, 10 and 100-year design storm and annual rainfall
- Contains three concept designs











- | | |
|----------------------------|------------------------|
| Absecon Creek South Branch | Deep Run |
| Absecon Creek North Branch | Great Egg Harbor River |
| Babcock Creek | Gravelly Run |
| Landing Creek | Hospitality Branch |
| Makepeace Stream | South River |
| Mill Branch* | Stephen Creek |
| Miry Run | Tuckahoe River* |
| | Watering Race Branch |



Subwatershed	Total Area	Land Use Area	Impervious Cover	
	(ac)	(ac)	(ac)	(%)
Absecon Creek South Branch	409.2	409.2	16.3	4.0%
Absecon Creek North Branch	1,420.9	1,413.2	119.4	8.4%
Babcock Creek	11,045.7	10,941.5	847.6	7.7%
Deep Run	6,060.2	6,042.6	106.1	1.8%
Great Egg Harbor River	28,036.8	26,902.6	1032.3	3.8%
Gravelly Run	5,523.5	5,459.3	737.9	13.5%
Hospitality Branch	0.6	0.6	0.0	1.4%
Landing Creek	541.5	501.5	10.8	2.1%
Makepeace Stream	1,863.6	1,860.3	37.6	2.0%
Mill Branch	14.1	14.1	6.9	49.0%
Miry Run	1,204.6	1,135.8	59.9	5.3%
South River	9,292.8	9,263.8	398.2	4.3%
Stephen Creek	207.6	207.6	6.0	2.9%
Tuckahoe River	17.2	17.2	0.0	0.3%
Watering Race Branch	6,632.7	6,612.7	298.8	4.5%
Total	72,271.1	70,782.0	3,677.8	5.2%



Subwatershed	Total Runoff Volume for the 1.25" NJ Water Quality Storm (MGal)	Total Runoff Volume for the NJ Annual Rainfall of 44" (MGal)	Total Runoff Volume for the 2-Year Design Storm (3.31") (MGal)	Total Runoff Volume for the 10-Year Design Storm (5.16") (MGal)	Total Runoff Volume for the 100-Year Design Storm (8.90") (MGal)
Absecon Creek South Branch	0.6	19.4	1.5	2.3	3.9
Absecon Creek North Branch	4.1	142.7	10.7	16.9	28.9
Babcock Creek	28.8	1,012.7	76.0	119.7	204.8
Deep Run	3.6	126.8	9.5	15.0	25.6
Great Egg Harbor River	35.0	1,233.3	92.5	145.8	249.5
Gravelly Run	25.0	881.5	66.1	104.2	178.3
Hospitality Branch	0.0	0.0	0.0	0.0	0.0
Landing Creek	0.4	12.8	1.0	1.5	2.6
Makepeace Stream	1.3	44.9	3.4	5.3	9.1
Mill Branch	0.2	8.2	0.6	1.0	1.7
Miry Run	2.0	71.6	5.4	8.5	14.5
South River	13.5	475.7	35.7	56.2	96.2
Stephen Creek	0.2	7.2	0.5	0.8	1.4
Tuckahoe River	0.0	0.1	0.0	0.0	0.0
Watering Race Branch	10.1	357.0	26.8	42.2	72.2
Total	124.8	4,393.9	329.5	519.3	888.8

WE LOOK HERE FIRST:

- ✓ Schools
 - ✓ Places 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

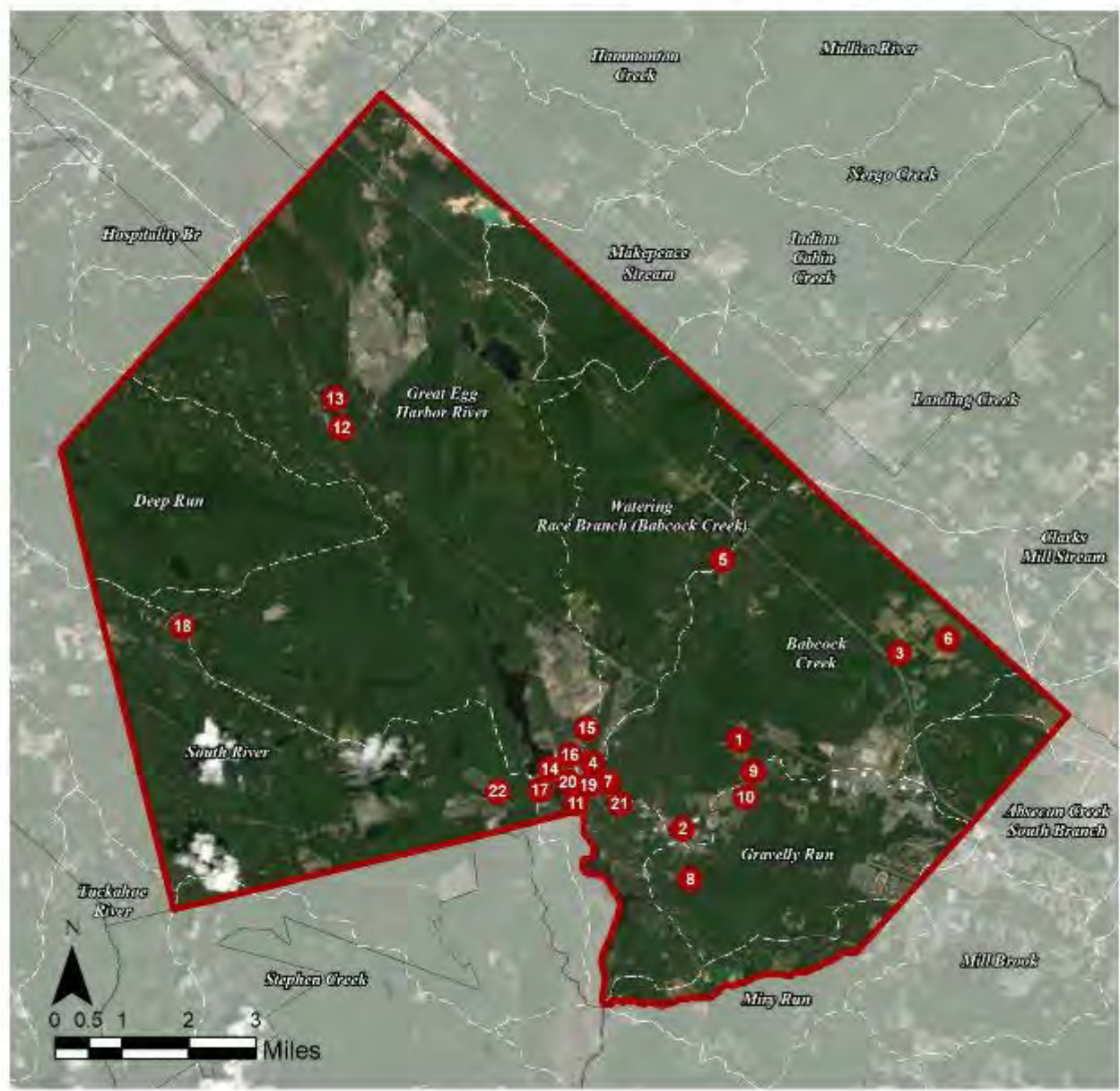


Green Infrastructure Strategic Plan





HAMILTON TOWNSHIP (ATLANTIC): GREEN INFRASTRUCTURE SITES



BABCOCK CREEK SITES

1. Atlantic Cape Community College
2. Atlantic County Institute of Technology & Special Services School District
3. Cologne Volunteer Fire Company: Station 18-5
4. Joseph Shaner Elementary School
5. Laureldale Volunteer Fire and Rescue Company
6. Leipzig Avenue Park
7. Underhill Park

GRAVELLY RUN SITES

8. George L. Hess Educational Complex
9. Oakcrest High School
10. William Davies Middle School

GREAT EGG HARBOR RIVER SITES

11. Atlantic County Library - Mays Landing Branch
12. Cherry Lane Right of Way
13. Driftwood Lane Right of Way
14. First Methodist Church of Mays Landing
15. Hamilton Township Municipal Building
16. Hamilton Township Municipal Utilities Authority
17. Mays Landing Fire Department: Station 18-1
18. Rose Quaterman Park
19. St. Vincent de Paul Regional School
20. The Presbyterian Church of Mays Landing
21. Township of Hamilton Public Works

SOUTH RIVER SITES






22. Atlantic County Office Building



Site	Name	Address
1	Atlantic Cape Community College	5100 East Black Horse Pike, Mays Landing, NJ 08330
2	Atlantic County Institute of Technology & Special Services School District	4805 Nawakwa Boulevard, Mays Landing, NJ 08330
3	Cologne Volunteer Fire Company: Station 18-5*	2870 South Cologne Avenue, Mays Landing, NJ 08330
4	Joseph Shaner Elementary School	5801 3rd Street, Mays Landing, NJ 08330
5	Laureldale Volunteer Fire and Rescue Company	2657 NJ-50, Mays Landing, NJ 08330
6	Liepzig Avenue Park	3155 South Leipzig Avenue, Mays Landing NJ, 08330
7	Underhill Park	129 Old Egg Harbor Avenue, Mays Landing, NJ 08330
8	George L. Hess Educational Complex	700 Babcock Road, Mays Landing, NJ 08330
9	Oakcrest High School	1824 Dr. Dennis Forman Drive, Mays Landing, NJ 08330
10	William Davies Middle School*	1876 Dr. Dennis Forman Drive, Mays Landing, NJ 08330
11	Atlantic County Library Mays Landing Branch	40 Farragut Avenue, Mays Landing, NJ 08330
12	Cherry Lane Right of Way	2032 Cherry Lane, Mays Landing, NJ08330
13	Driftwood Lane Right of Way	7344 Driftwood Lane, Mays Landing, NJ08330
14	First Methodist Church of Mays Landing	6011 Main Street, Mays Landing, NJ 08330
15	Hamilton Township Municipal Building*	6101 13th Street, Mays Landing, NJ 08330
16	Hamilton Township Municipal Utilities Authority	6024 Ken Scull Avenue, Mays Landing, NJ 08330
17	Mays Landing Fire Department: Station 18-1	6081 Reliance Avenue, Mays Landing, NJ 08330
18	Rose Quaterman Park	6925 Railroad Boulevard, Mays Landing, NJ08330
19	St. Vincent de Paul Regional School	5809 Main Street, Mays Landing, NJ 08330
20	The Presbyterian Church of Mays Landing	6001 Main Street, Mays Landing, NJ 08330
21	Township of Hamilton Public Works	5500 Atlantic Avenue, Mays Landing, NJ, 08330
22	Atlantic County Office Building	6260 Old Harding Highway, Mays Landing, NJ 08330

Examples of Identified Project Sites



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

**COLOGNE VOLUNTEER FIRE COMPANY:
STATION 18-5**

2870 South Cologne Avenue
Mays Landing, NJ 08330



Rain gardens can be installed to intercept stormwater coming from the parking areas at the east and south corners of the site. A cistern can be installed to capture stormwater that can be reused for washing firetrucks or for watering existing landscaping. 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"
42	48,450	2.3	24.5	222.5	0.038	1.33

Recommended 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	0.244	41	17,880	0.67	2,425	\$12,125
Rainwater harvesting	0.045	8	1,500	0.06	1,500 (gal)	\$3,000

CURRENT CONDITION



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**COLOGNE VOLUNTEER FIRE COMPANY:
STATION 18-5**





2870 South Cologne Avenue
Mays Landing, NJ 08330



CONCEPT DESIGN





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

0' 50' 100'



A bioretention system can be installed in the green space to the west of the property. Another system can be installed next to the garden area and the parking lot at the northwestern edge of the school property. Another system can be installed at the east corner of the school property near the transformer. Another system can be installed along the southeast edge of the school property by the main entrances. All of these systems can be installed to capture, treat, and infiltrate, the stormwater runoff from the nearby road and the downspouts to prevent flooding. 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"
31	452,709	21.8	228.6	2,078.6	0.353	12.42

Recommended 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	0.601	101	44,060	1.66	5,765	\$28,825








CURRENT CONDITION




CONCEPT DESIGN



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

0' 50' 100'



HAMILTON TOWNSHIP MUNICIPAL BUILDING

6101 13th Street
Mays Landing, NJ 08330



Parking spaces on the west side of the site can be converted to pervious pavement to capture stormwater from the parking lot. Two rain gardens can be installed along the south end of the building by redirecting downspouts into them to capture stormwater from the rooftop. 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"
29	155,444	7.5	78.5	713.7	0.121	4.26

Recommended 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	0.072	12	5,300	0.20	700	\$3,500
Pervious pavement	0.859	144	63,040	2.37	7,290	\$182,250

CURRENT CONDITION

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HAMILTON TOWNSHIP MUNICIPAL BUILDING

6101 13th Street
Mays Landing, NJ 08330

CONCEPT DESIGN



75

HAMILTON TOWNSHIP MUNICIPAL BUILDING

6101 13th Street
Mays Landing, NJ 08330

Hamilton Township

ALL SITES

BABCOCK CREEK

GRAVELLY RUN

GREAT EGG HARBOR RIVER

SOUTH RIVER



1 Atlantic Cape Community College



2 Atlantic County Institute of Technology & Special Services



3 Cologne Volunteer Fire Company: Station 18-5



4 Joseph Shaner Elementary School



5 Laureldale Volunteer Fire and Rescue Company



6 Liepzig Avenue Park



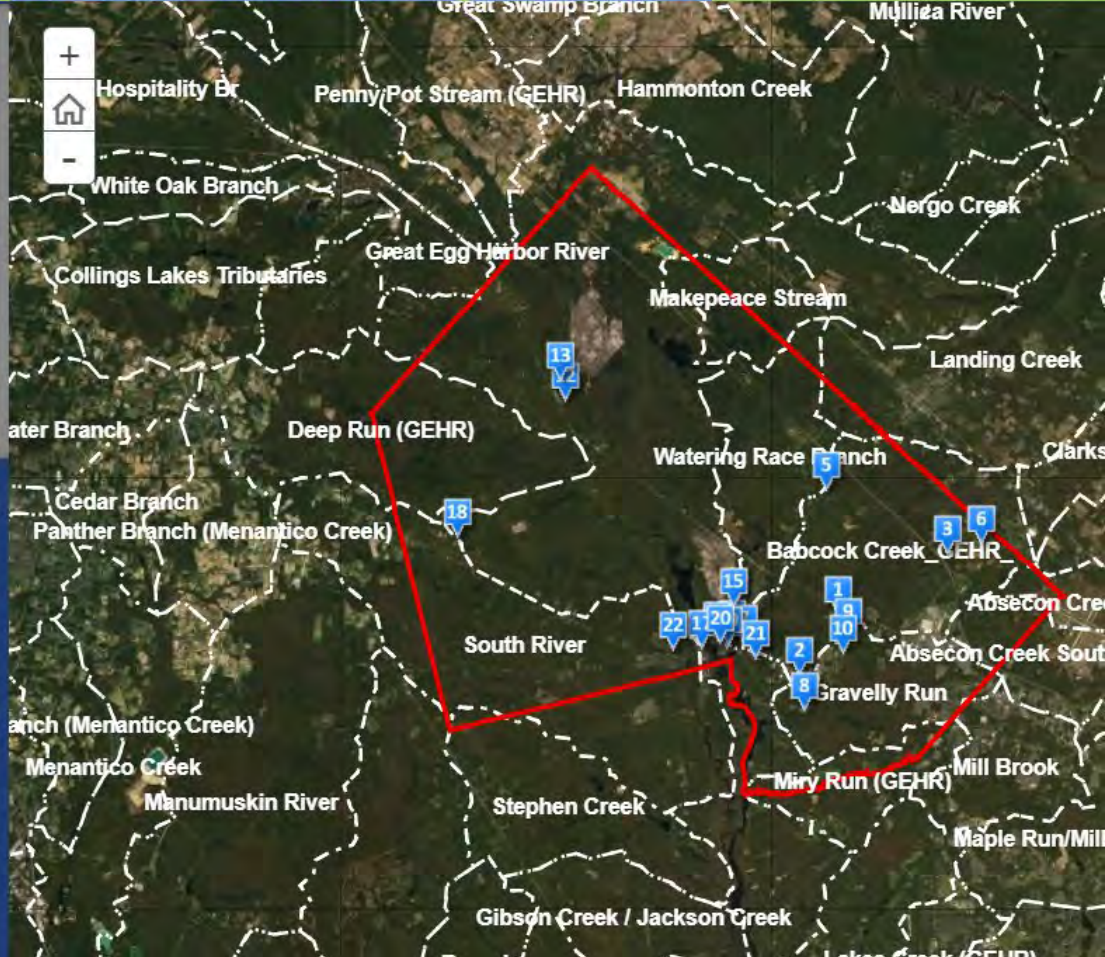
7 Underhill Park



8 George L. Hess Educational Complex



9 Oakcrest High School



http://water.rutgers.edu/Projects/HamiltonTwp-AtlanticCo/HamiltonTwp_AtlanticCounty/index.html

Hamilton Township

ALL SITES

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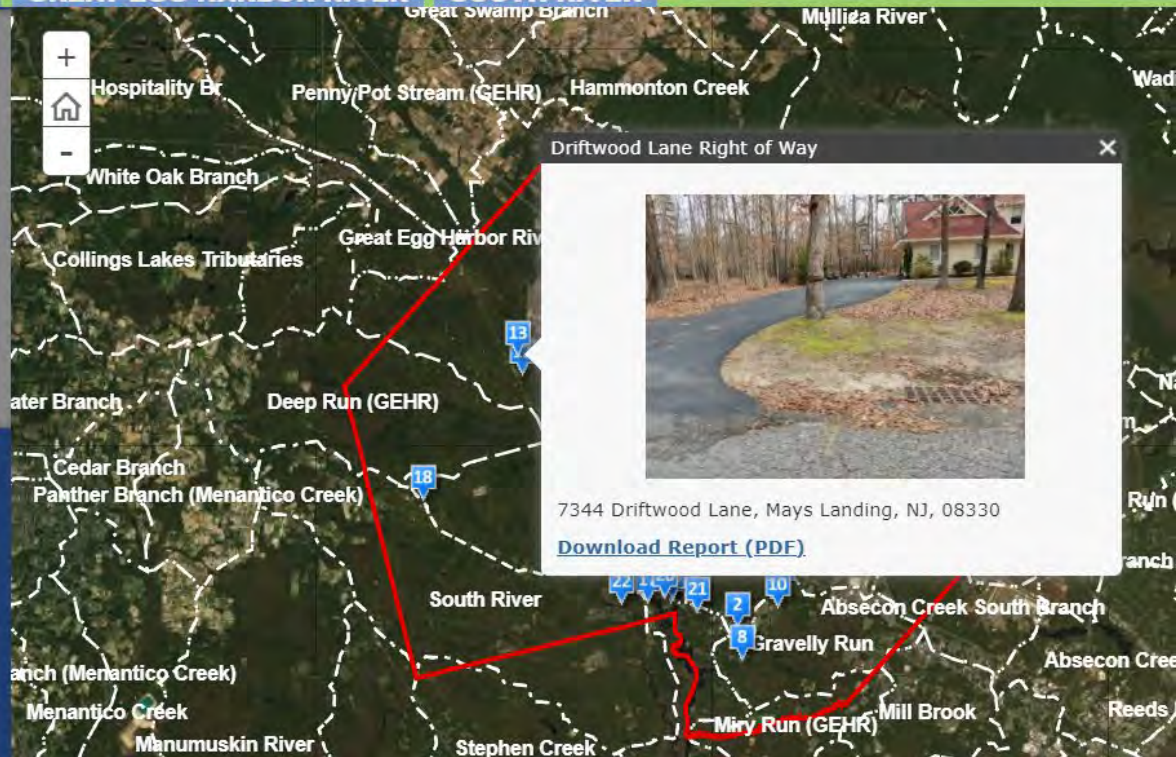
7 Underhill Park



8 George L. Hess Educational Complex



9 Oakcrest High School



Final Thoughts

- Plans promote action and earn Sustainable Jersey Points
- Plans are a conduit for funding
- Impervious cover reduction action plan/green infrastructure action plan provides 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 plans, and/or integrated water quality plans



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Next Steps and Questions

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