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Impervious Cover Assessment and Reduction Action Plan for Pilesgrove, 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.

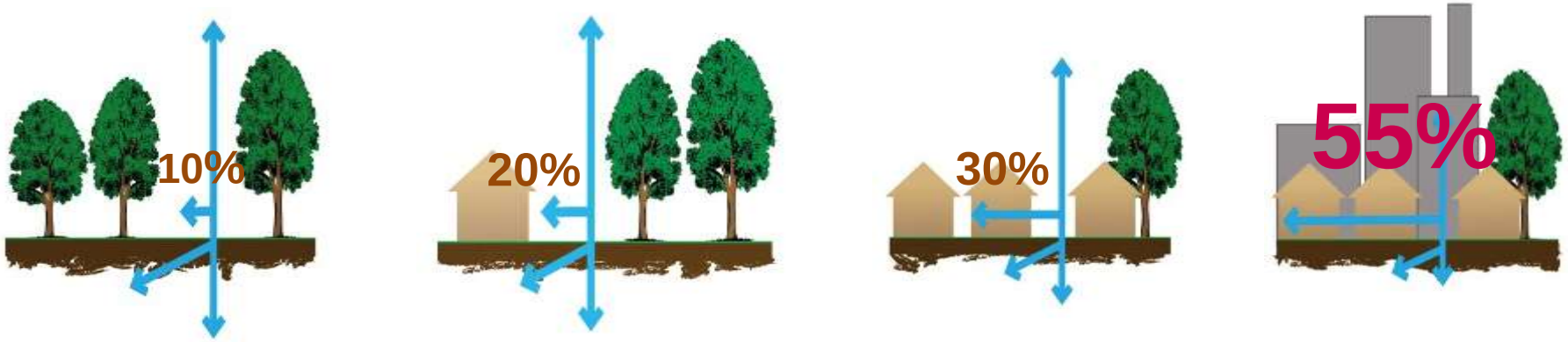
Water Resources Program

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.

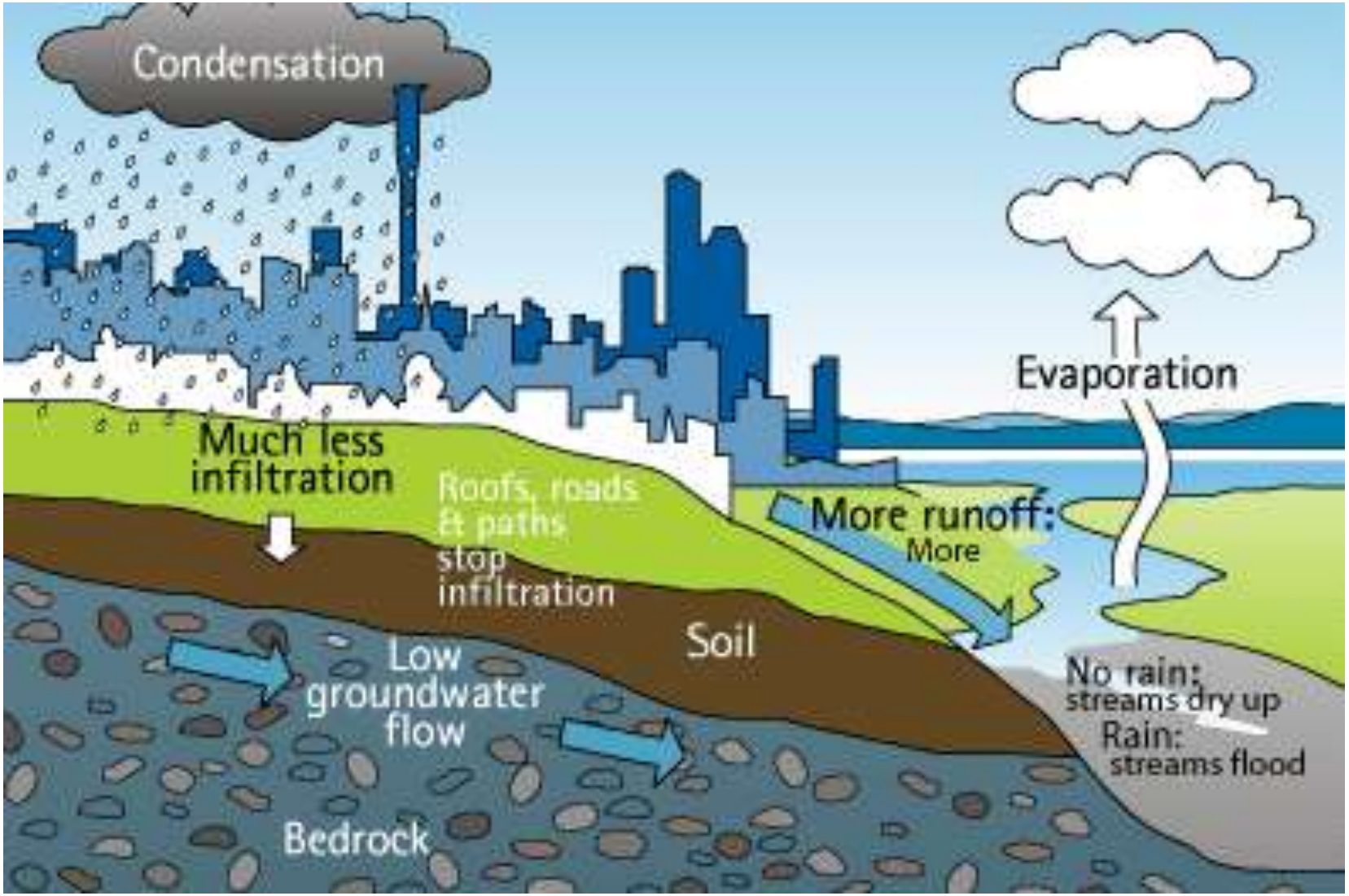
The Water Resources Program serves all of New Jersey, working closely with the County Extension Offices.

The Impact of Development on Stormwater Runoff

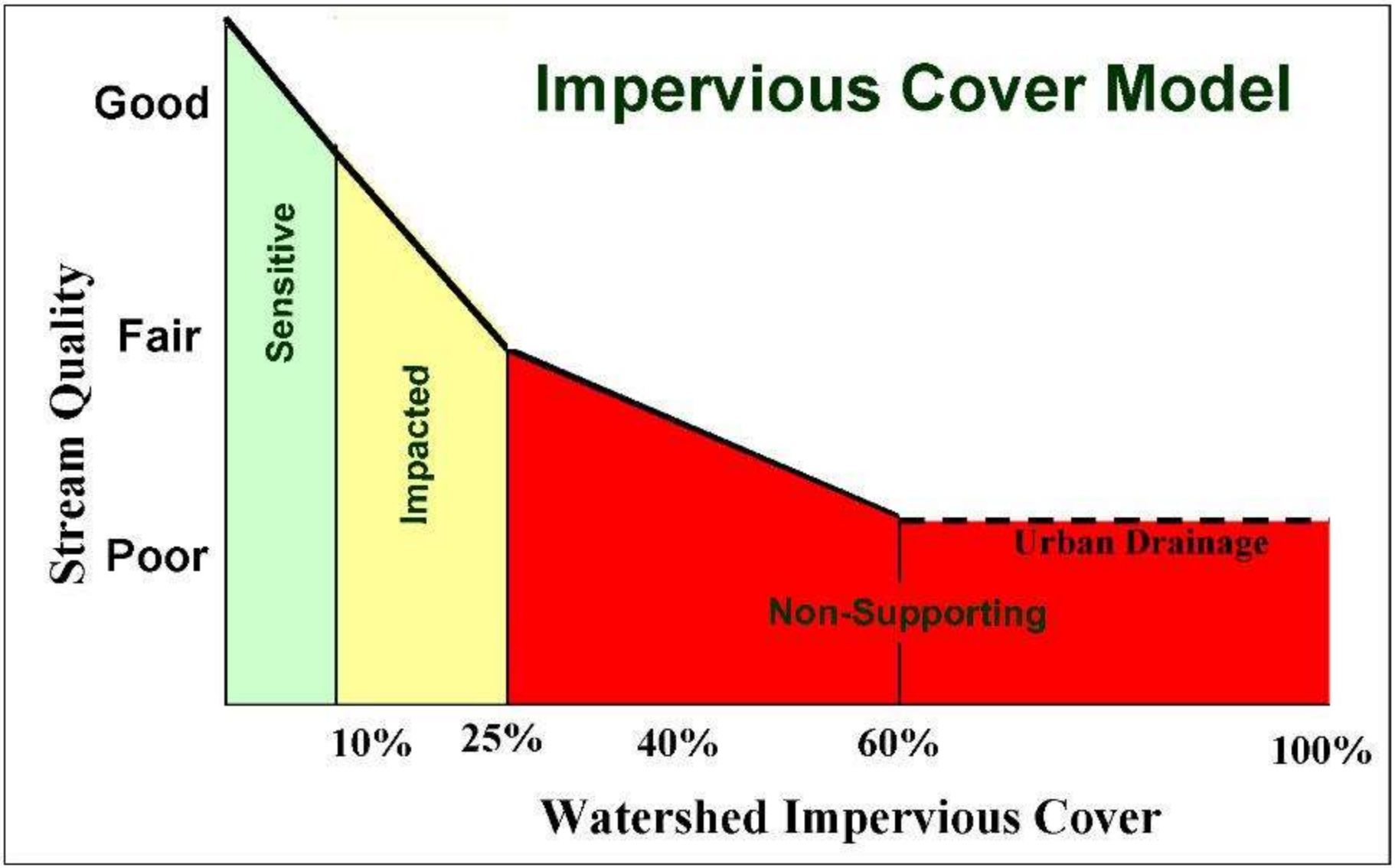


More development → *More impervious surfaces* → *More stormwater runoff*

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

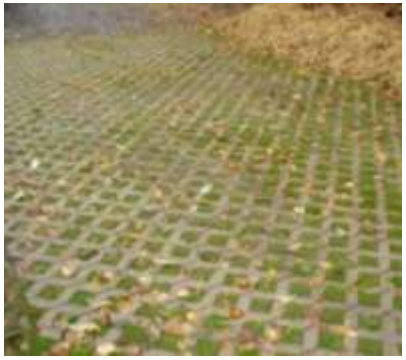
stormwater to maintain or mimic natural systems and treat runoff as a resource

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








We must deal with impacts from impervious cover

Are there impervious surfaces that you can eliminate?

If we can't eliminate it, can we reduce it?

If we can't eliminate or reduce it, can we disconnect it?

Are there impervious surfaces that you can harvest rainwater for reuse?

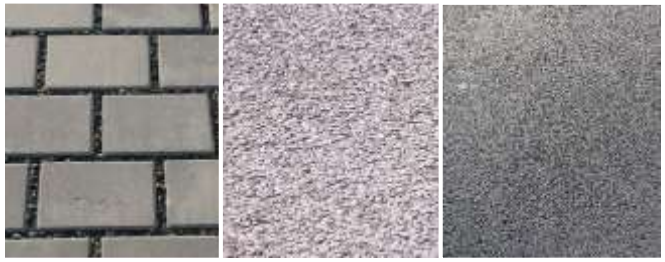
Are there conveyance systems that can be converted to bioswales?

Eliminate it!

“Depaving”

Reduce It!
Permeable Pavements

- Underlying stone reservoir
- Porous asphalt and pervious concrete are manufactured without "fine" materials to allow infiltration
- Grass pavers are concrete interlocking blocks with open areas to allow grass to grow
- Ideal application for porous pavement is to treat a low traffic or overflow parking area
- Terminology: porous asphalt, pervious concrete, permeable pavers

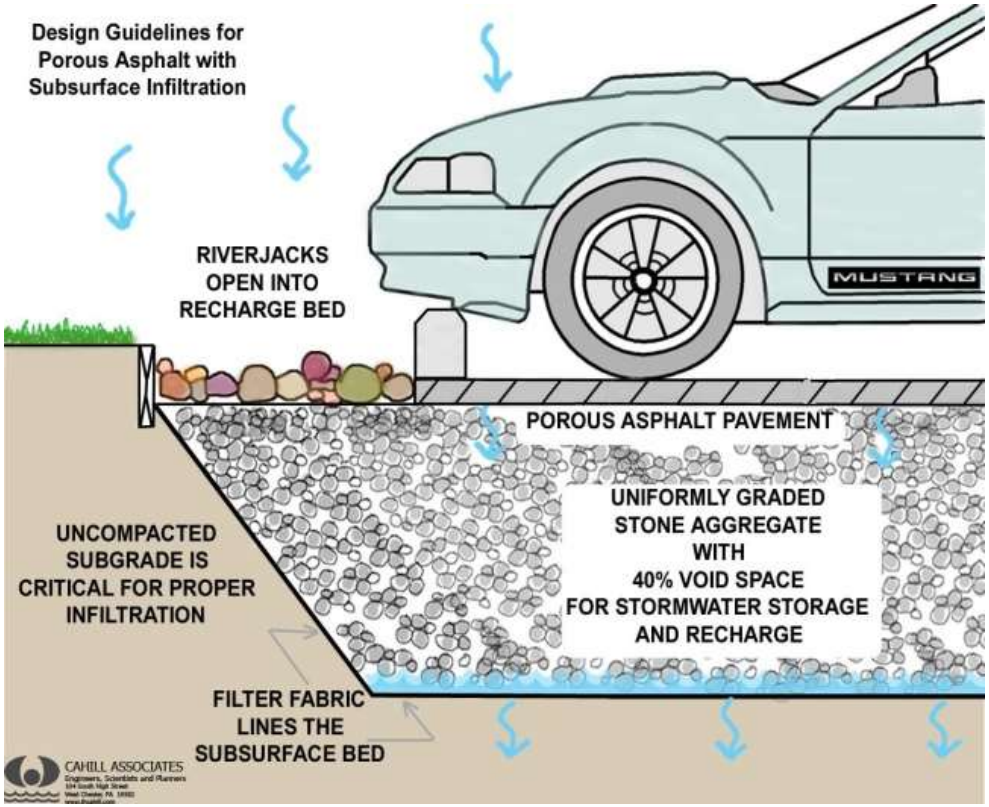


Permeable Pavements

FUNCTIONS

- 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



Disconnect It!

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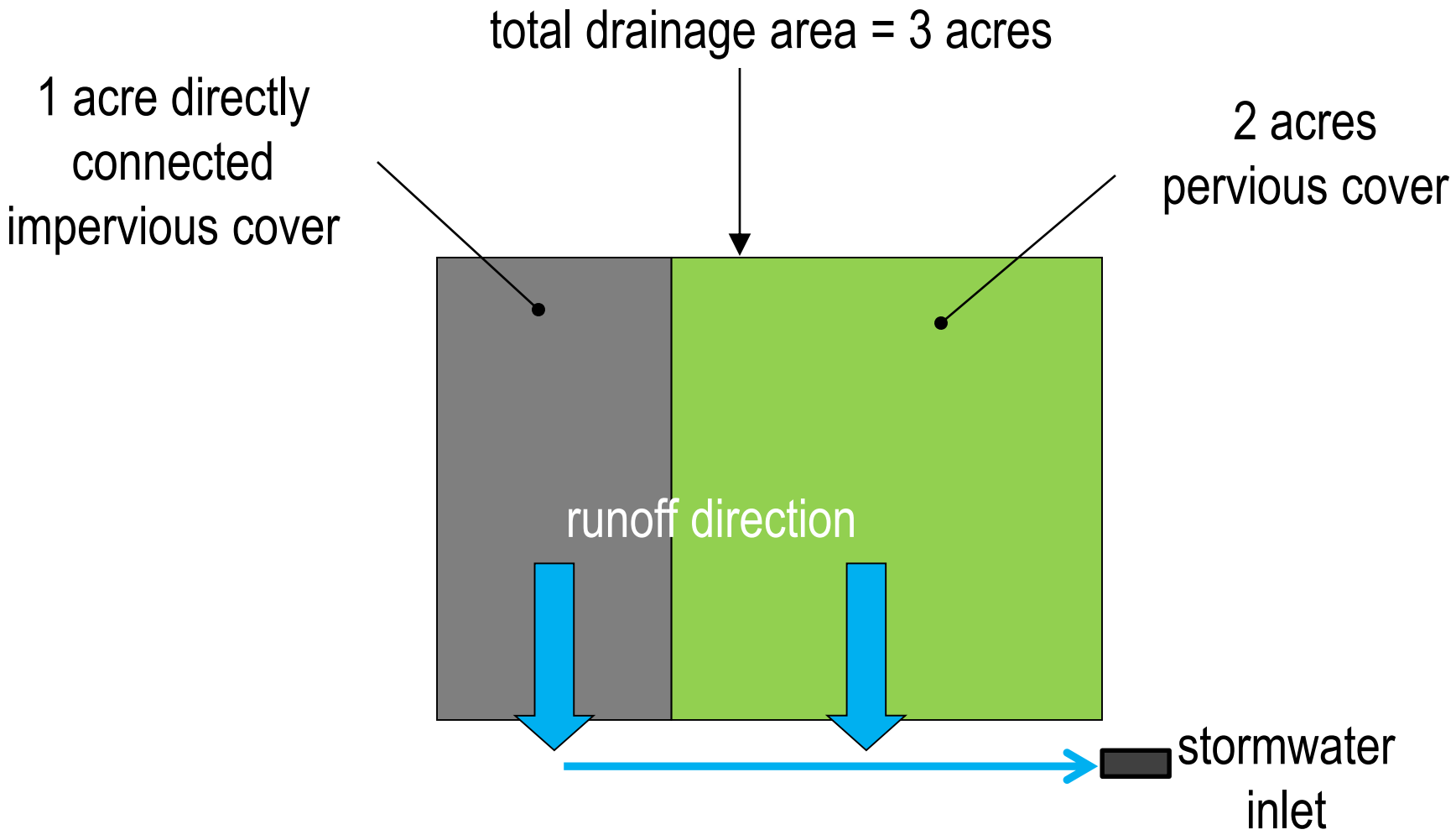
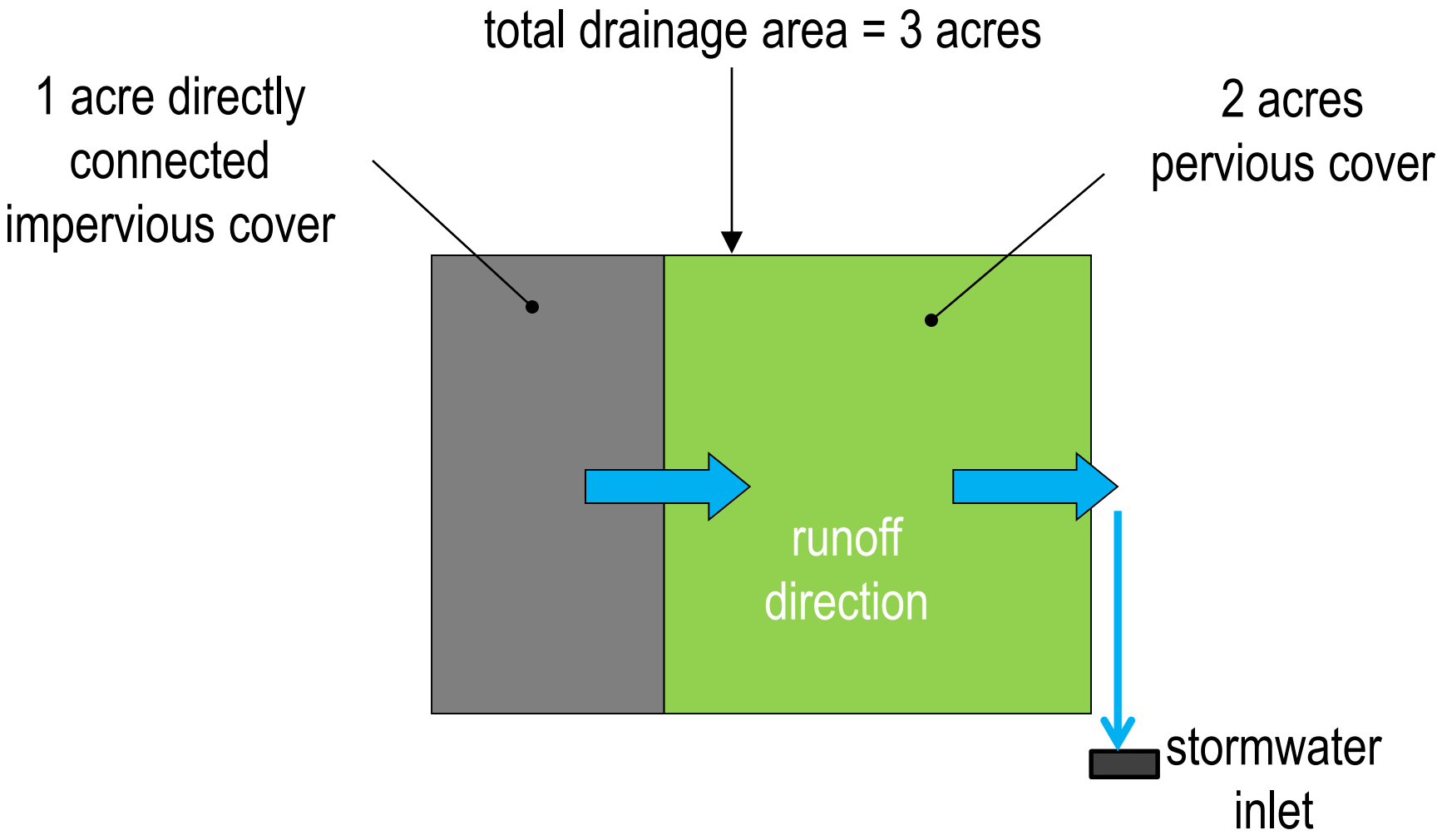
Water Resources Program

For 1.25 inch storm, 3,811 cubic feet of runoff = **28,500 gallons**

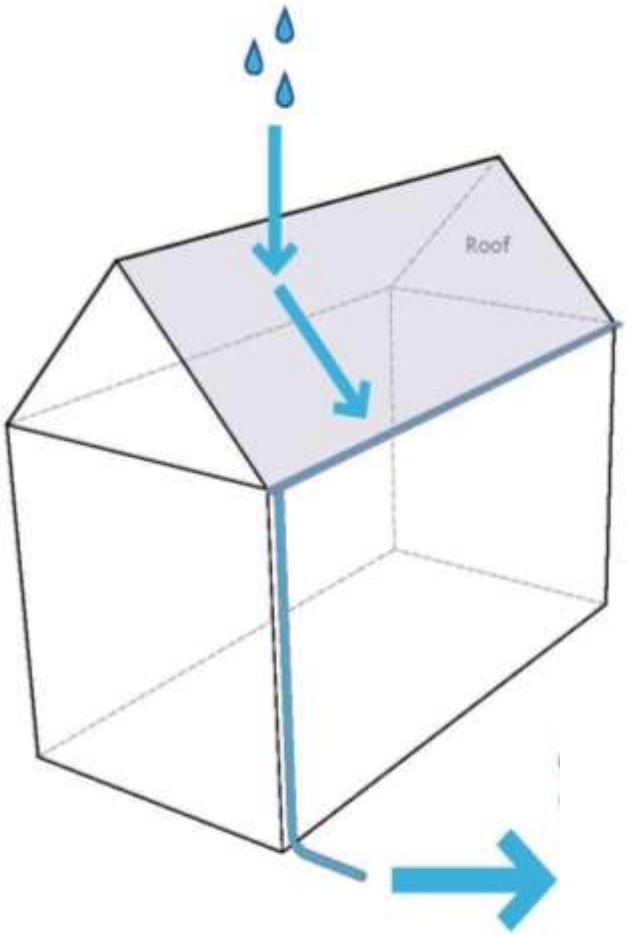


For 1.25 inch storm, 581 cubic feet of runoff = **4,360 gallons**



	Volume of Runoff		
Design Storm	**Connected (gallons)**	**Disconnected (gallons)**	**Percent Difference**
1.25 inches (water quality storm)	28,500	4,360	85%

Disconnection with Rain Water Harvesting



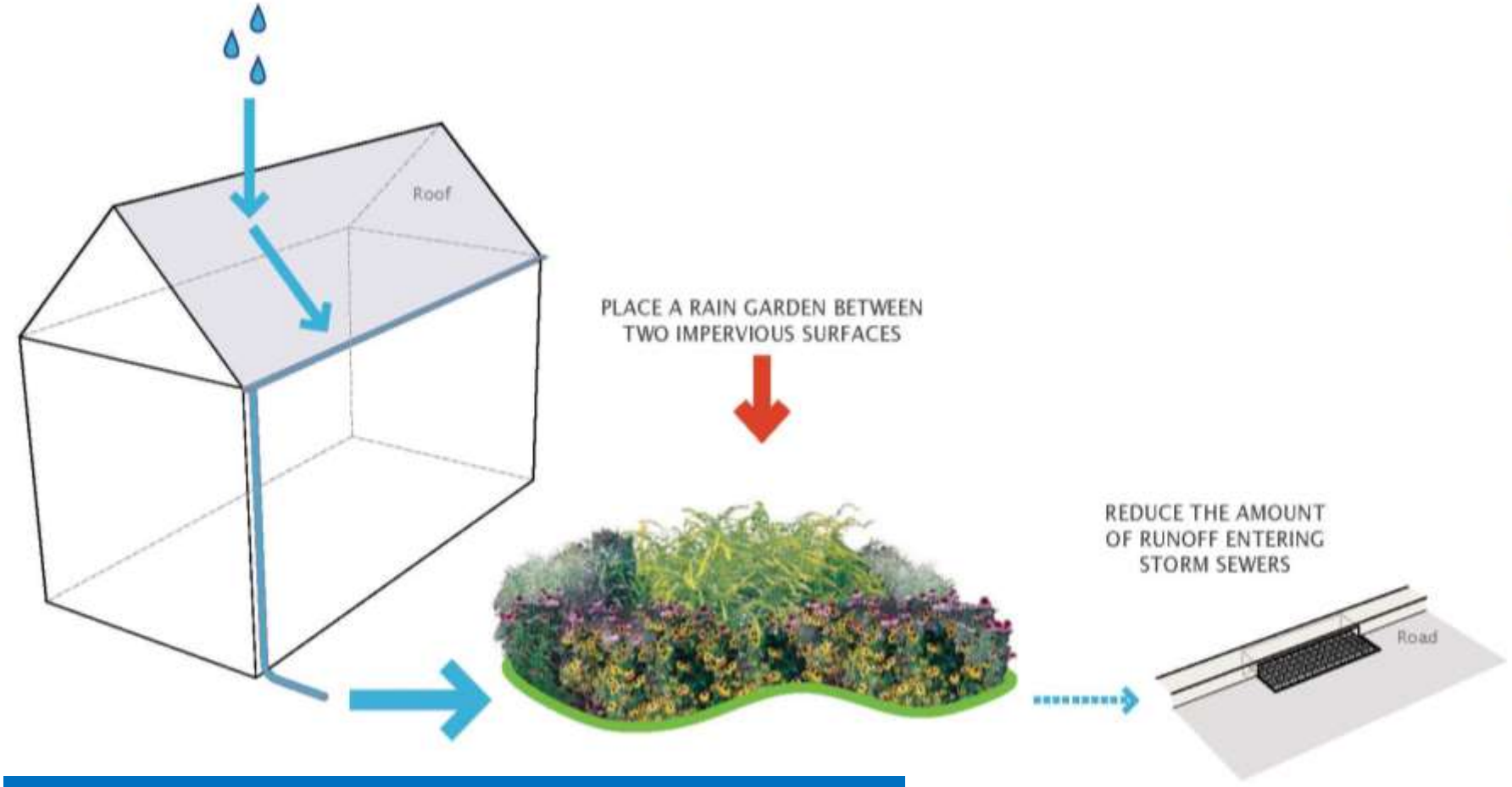
Disconnect your downspout by installing a rain barrel

Impervious area is now ***"disconnected"*** from flowing directly into the storm sewer system

So Many Barrels to Choose From…

Or Larger Rainwater Harvesting Systems…

Disconnection with Rain Gardens



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

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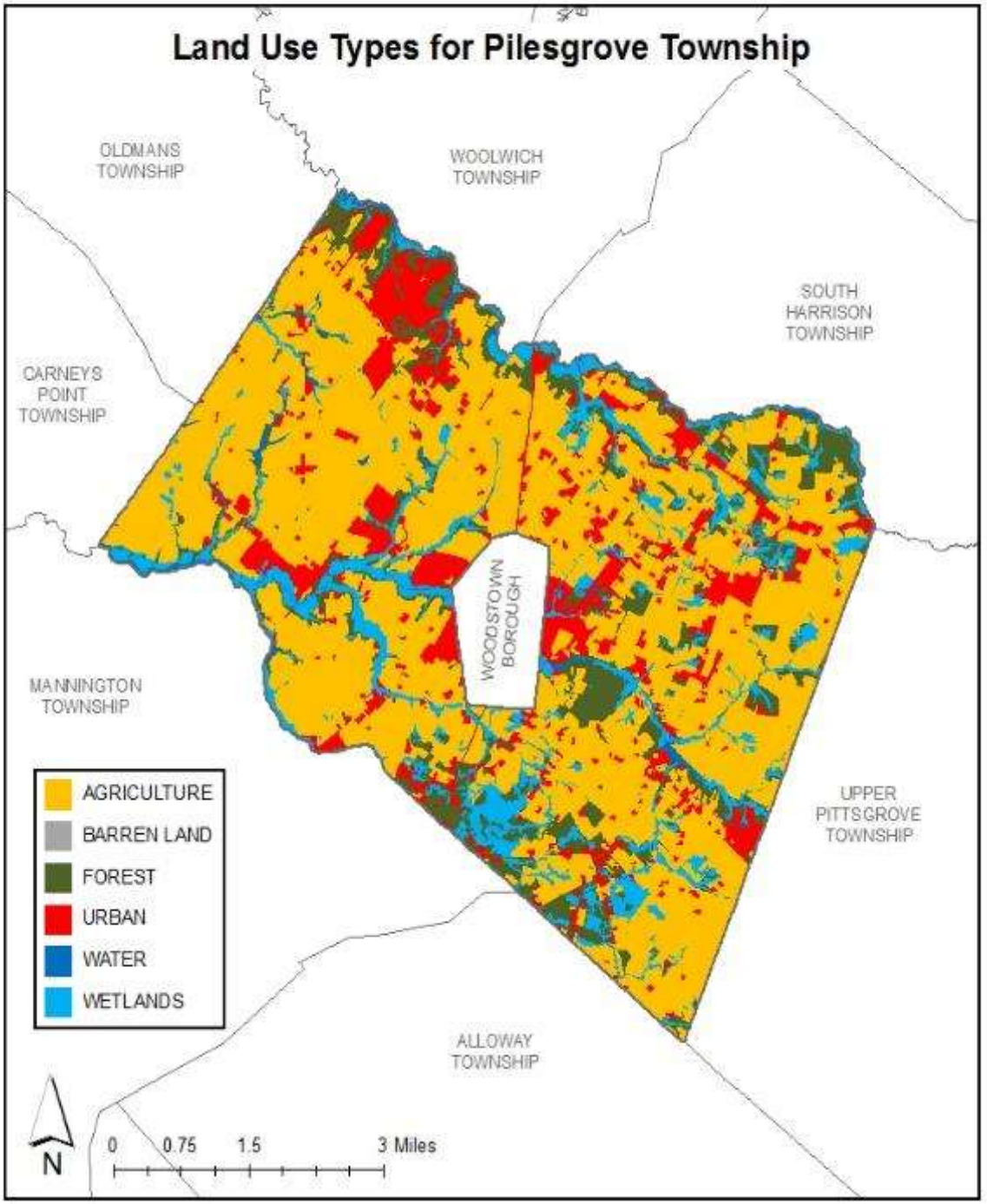
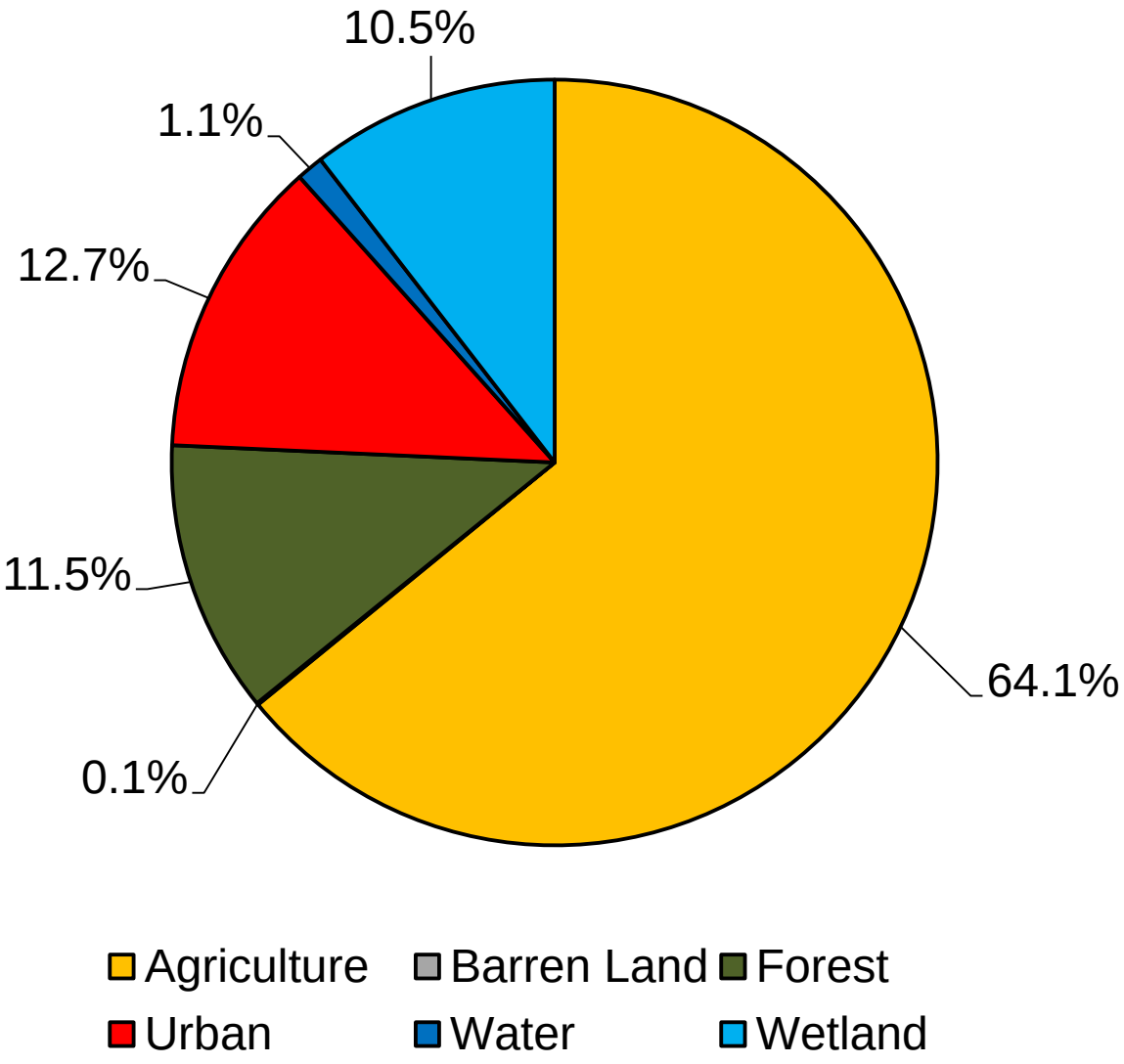
Lots of Rain Gardens

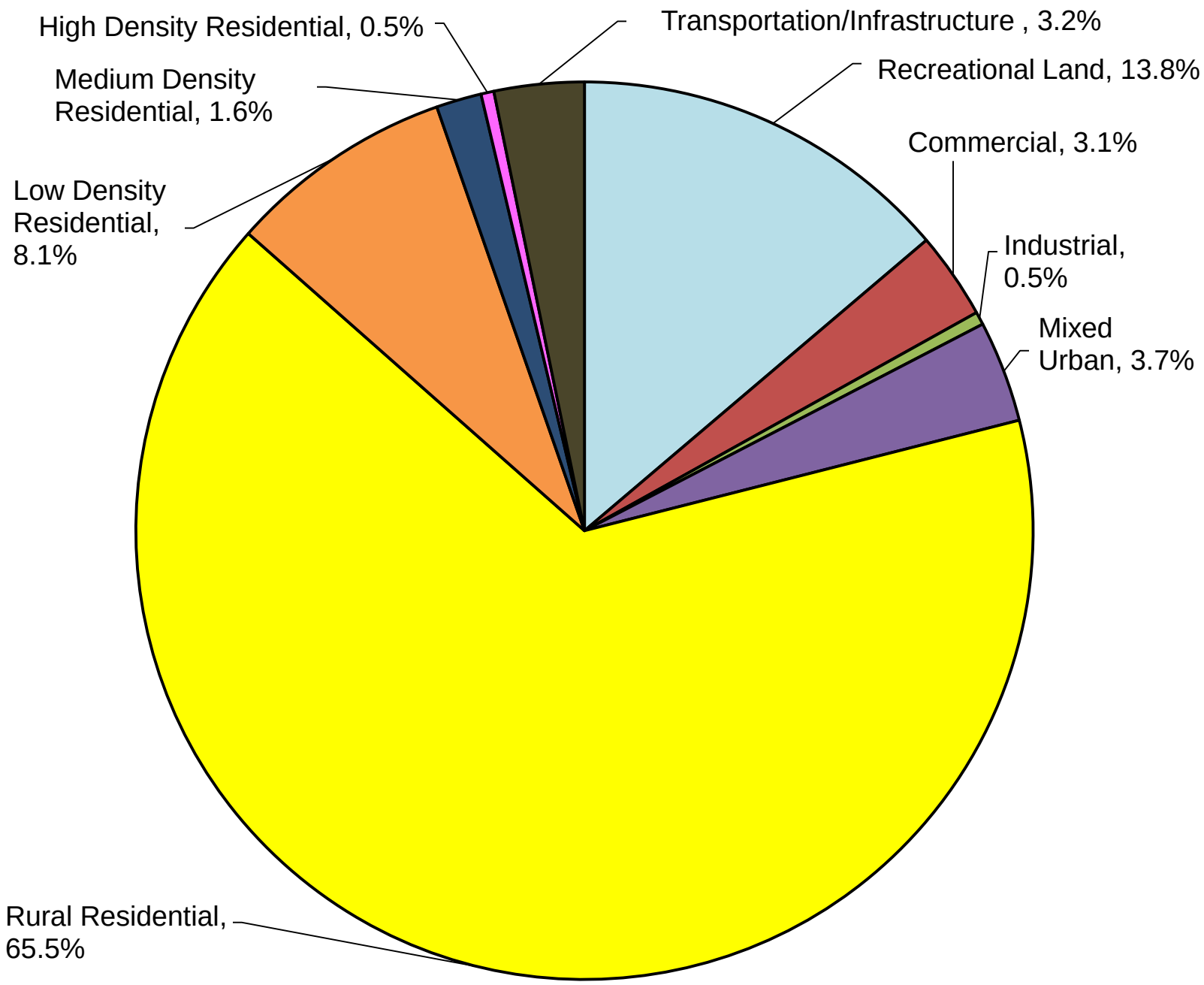
Impervious Cover Assessment

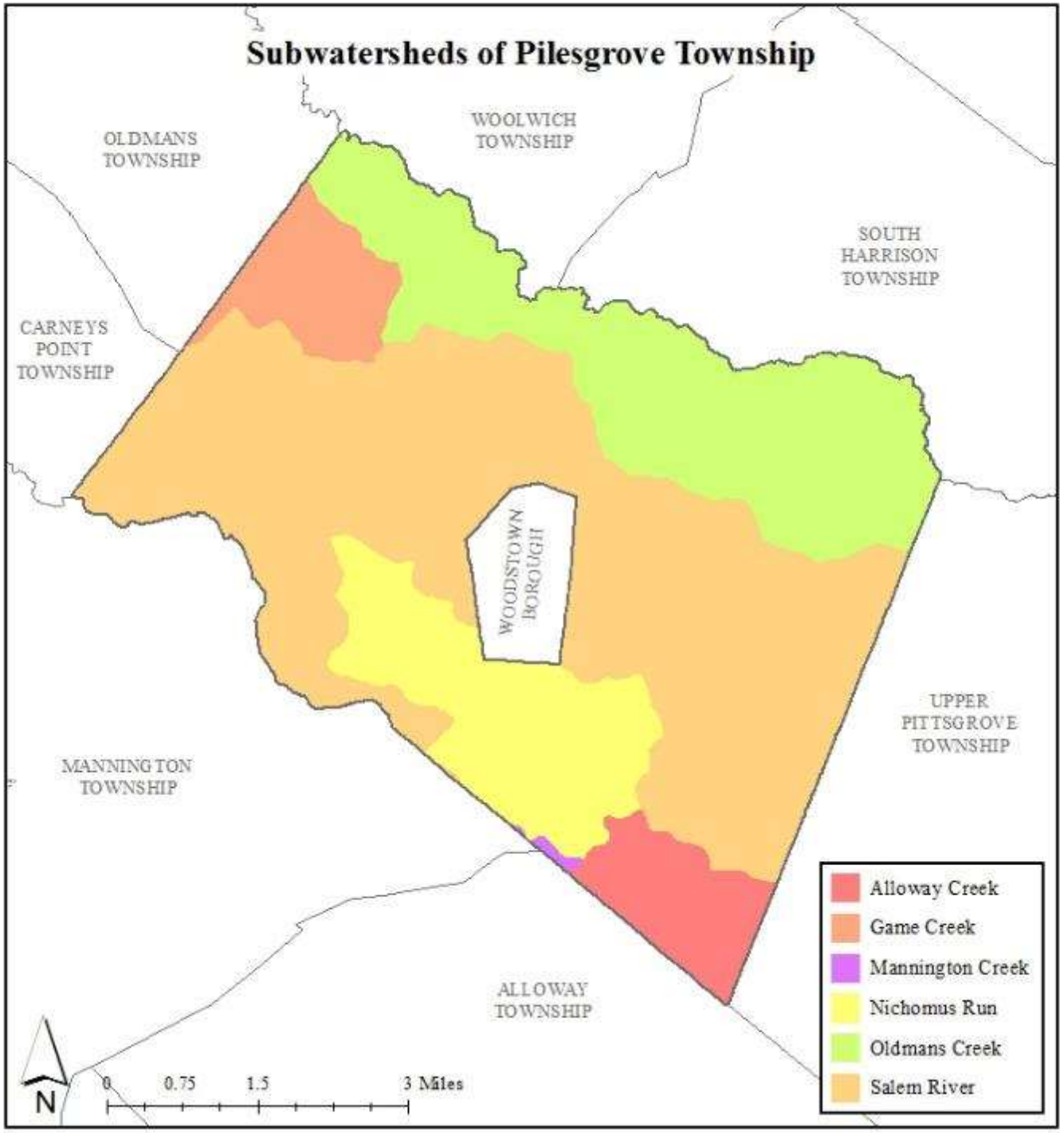
Impervious Cover Assessment

- Analysis completed by watershed and by municipality
- Use 2007 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


Land Use Types for Pilesgrove Township
OLDMANS TOWNSHIP
WOOLWICH TOWNSHIP
SOUTH HARRISON TOWNSHIP
CARNEYS POINT TOWNSHIP
WOODSTOWN BOROUGH
MANNINGTON TOWNSHIP
UPPER PITTSGROVE TOWNSHIP
ALLOWAY TOWNSHIP
AGRICULTURE
BARREN LAND
FOREST
URBAN
WATER
WETLANDS
N
0
0.75
1.5
3 Miles


10.5%
1.1%
12.7%
11.5%
0.1%
64.1%
Agriculture
Barren Land
Forest
Urban
Water
Wetland


High Density Residential, 0.5%
Transportation/Infrastructure , 3.2%
Recreational Land, 13.8%
Medium Density Residential, 1.6%
Commercial, 3.1%
Low Density Residential, 8.1%
Industrial, 0.5%
Mixed Urban, 3.7%
Rural Residential, 65.5%


Subwatersheds of Pilesgrove Township
OLDMANS TOWNSHIP
WOOLWICH TOWNSHIP
SOUTH HARRISON TOWNSHIP
CARNEYS POINT TOWNSHIP
WOODSTOWN BOROUGH
UPPER PITTSGROVE TOWNSHIP
MANNINGTON TOWNSHIP
ALLOWAY TOWNSHIP
N
0
0.75
1.5
3 Miles
Alloway Creek
Game Creek
Mannington Creek
Nichomus Run
Oldmans Creek
Salem River

Watershed	Total Area (ac)	Impervious Cover (ac)	%
Alloway Creek	1,177	13.3	1.1%
Game Creek	1,193	16.9	1.4%
Mannington Creek	38.8	0.5	1.3%
Nichomus Run	2,930	49.6	1.7%
Oldmans Creek	5,265	147.8	2.8%
Salem River	11,885	258.7	2.2%
TOTAL	22,489	486.8	2.2%

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)
Alloway Creek	0.45	15.89	1.19	1.81	3.07
Game Creek	0.57	20.19	1.51	2.29	3.90
Mannington Creek	0.02	0.60	0.04	0.07	0.12
Nichomus Run	1.68	59.26	4.44	6.73	11.45
Oldmans Creek	5.02	176.58	13.24	20.07	34.11
Salem River	8.78	309.07	23.18	35.12	59.71
TOTAL	16.52	581.58	43.62	66.09	112.35

WE LOOK HERE FIRST:

- ✓Schools
- ✓Churches
- ✓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

Pilesgrove Township

Impervious Cover Assessment

Pilesgrove Municipal Building, 1180 US 40

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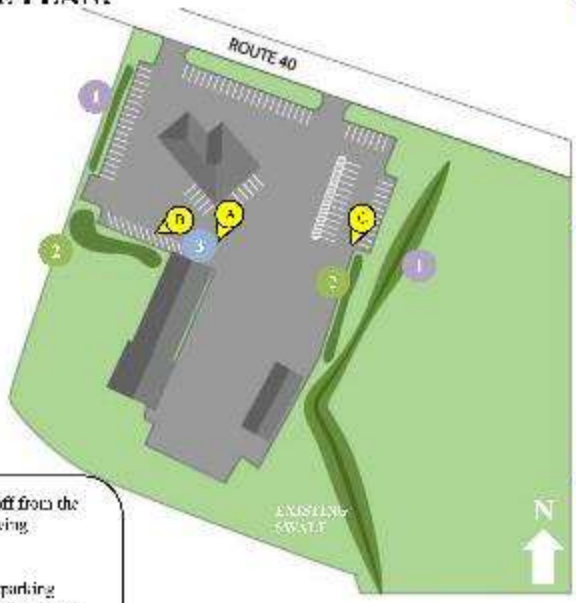
PROJECT LOCATION:

SITE PLAN:



A

B

C

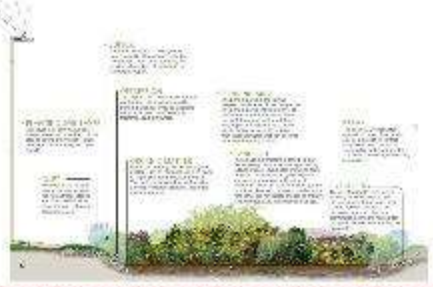
1. **BIOSWALE:** An existing swale could be modified into a bioswale to accommodate the runoff from the parking lot. A bioswale is a vegetated system that will convey stormwater runoff while removing sediment and nutrients.

2. **BIORETENTION SYSTEMS:** Curb cuts will be used to allow stormwater runoff from the parking areas to enter into the bioretention systems. The bioretention systems will reduce sediment and nutrient loading to the local waterway.

3. **RAINWATER HARVESTING SYSTEM:** A rainwater harvesting system could be installed to capture stormwater runoff from one of the rooftops to wash vehicles, fill street sweepers, etc.

1 BIOSWALE

2 BIORETENTION SYSTEM



3 RAINWATER HARVESTING SYSTEM

Pilesgrove Township

Impervious Cover Assessment

Woodstown Preschool Academy, 343 Lincoln Road

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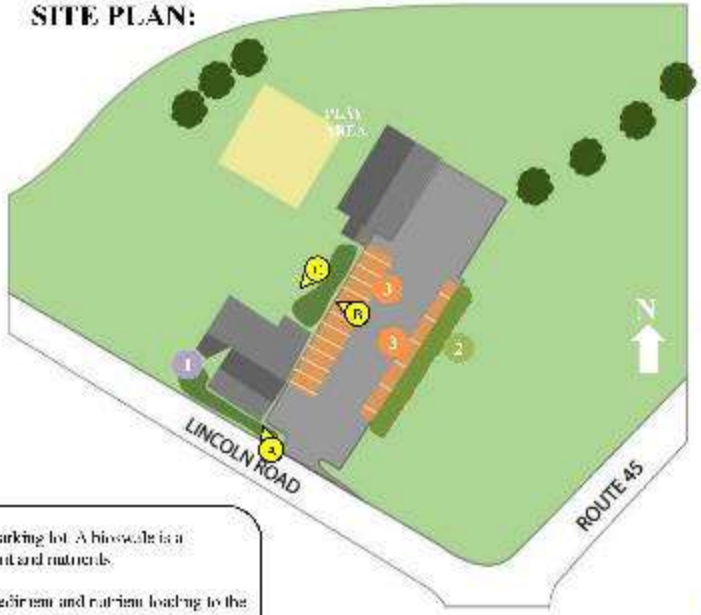
PROJECT LOCATION:

SITE PLAN:



A

B

C

1. **BIOSWALE:** A bioswale could be installed to treat runoff from the parking lot. A bioswale is a vegetated system that will convey stormwater while removing sediment and nutrients.
2. **BIORETENTION SYSTEM:** The bioretention system will reduce sediment and nutrient loading to the local tributary. Curb cuts will be used to allow stormwater runoff from the parking areas to enter into the bioretention system.
3. **POROUS ASPHALT:** Porous asphalt promotes groundwater recharge and filters stormwater.

1 BIOSWALE

2 BIORETENTION SYSTEM

3 POROUS ASPHALT

Pilesgrove Township
Impervious Cover Assessment
Woodstown NJ State Police Station, 769 US 40

RUTGERS

PROJECT LOCATION:

SITE PLAN:

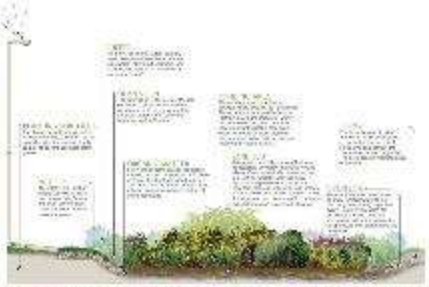
A

B

C

1. **BIORETENTION SYSTEMS:** The bioretention systems will reduce sediment and nutrient loading to the local waterway. Curb cuts will be used to allow stormwater runoff from the driveway to enter into the bioretention systems.
2. **POROUS ASPHALT:** Porous asphalt promotes groundwater recharge and filters stormwater.

1 BIORETENTION SYSTEM



CURB CUTS

2 POROUS ASPHALT

Impervious Cover Reduction Action Plan

Salem River Watershed (West)

1. Woodstown NJ State Police Station
2. Sunoco Gas Station
3. Fulton Bank of New Jersey
4. Richmans Ice Cream
5. The Church of Jesus Christ of Latter-day Saints
6. Sharptown United Methodist Church
7. Dollar General
8. The Corner
9. Salem County Public Works

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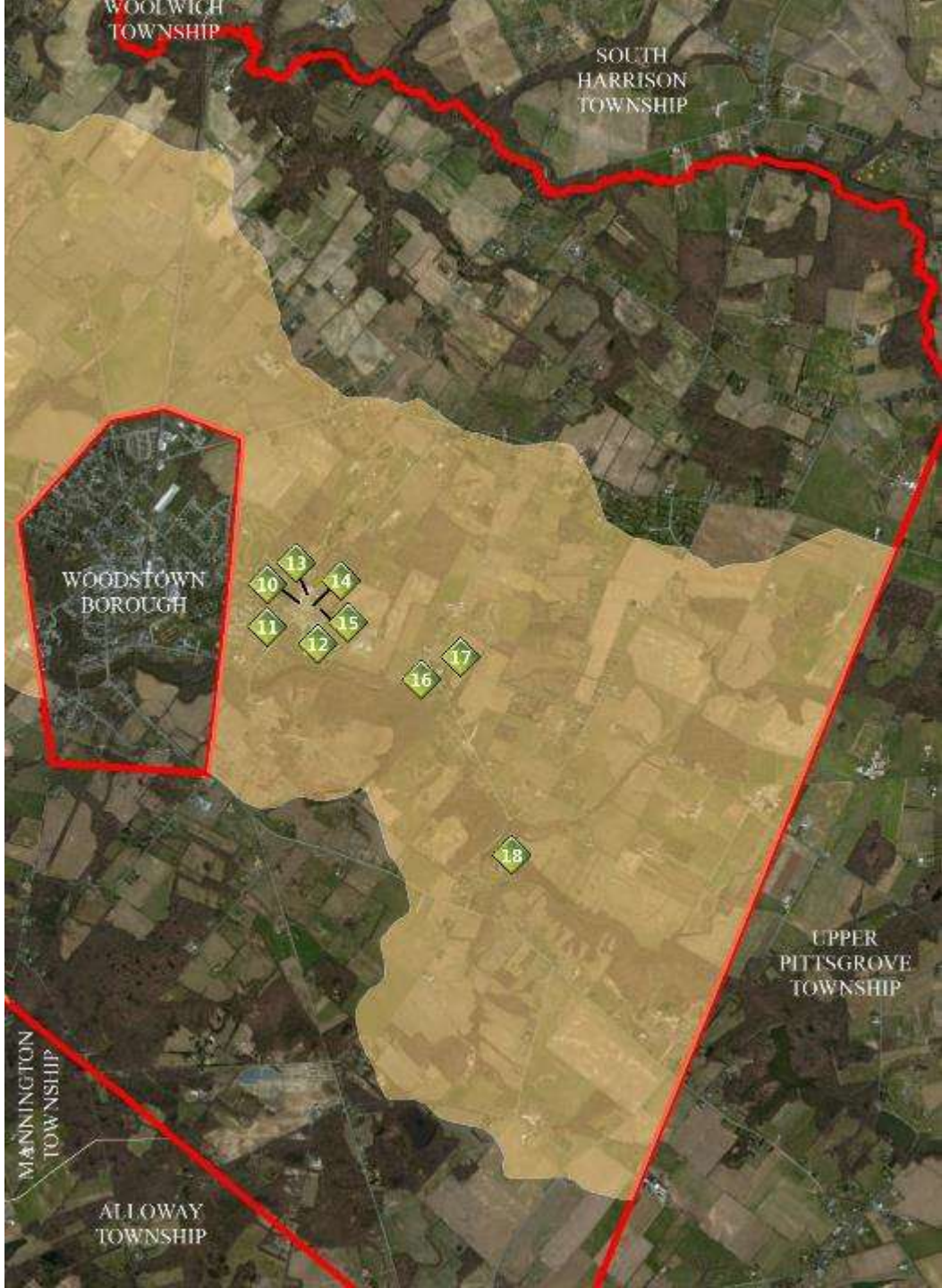
Salem River Watershed (East)

10. Now & Then Consignment and Antiques Mall
11. William Roper Early Childhood Learning Center
12. Pilesgrove Municipal Building
13. Woodstown Mini Storage
14. Wood Lanes
15. Franklin Bank
16. Lighthouse Christian Center
17. Woodstown Veterinary Hospital
18. Camp Crockett County Park



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Nichomus Run Watershed

1. Acme
2. Rite Aid
3. Wendy's
4. Joe's Pizza / Donna's Hallmark Shop
5. Tri-County Veterinary Hospital

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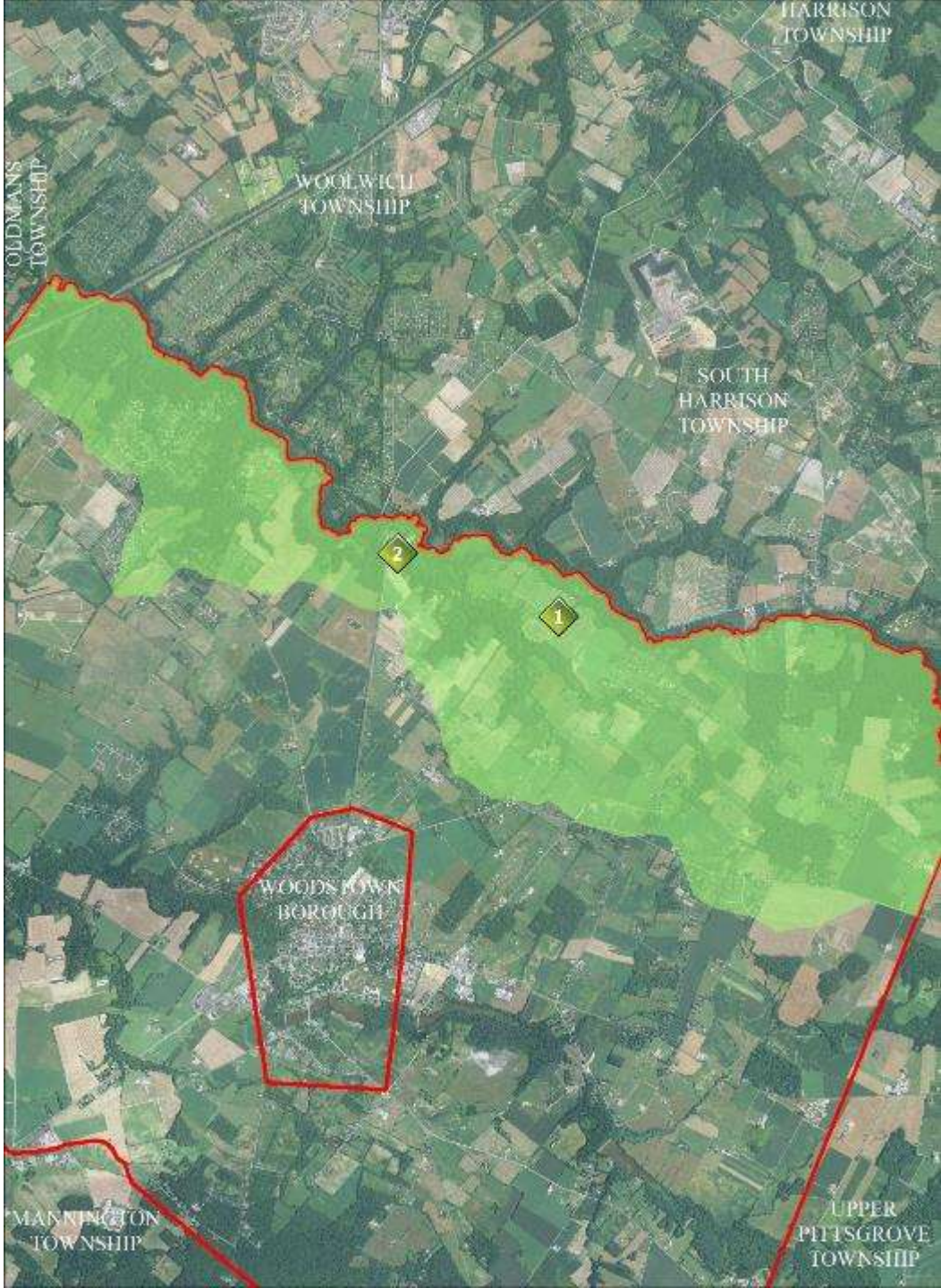
Oldmans Creek Watershed

1. Woodstown Preschool Academy

2. R E Pierson Construction Co. Inc.



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Wood Lanes

1173 US 40 Pilesgrove, NJ 08098
Block 40, Lot 12.05
118,567 sq. ft.

Grass pavers could be installed along the western edge of the building to treat its runoff. The parking lot could be retrofitted with bioretention islands and porous pavement. A preliminary soil assessment for this site suggested that the site's existing soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads (lbs/year)			Runoff Volume (Mgal)	
%	Square Feet	TP	TN	TSS	For the 1.25” Water Quality Storm	For an Annual Rainfall of 44”
69%	82,292	3.97	41.56	377.83	0.06	2.26

Recommended Green Infrastructure Practices	Recharge Potential (Mgal/yr)	Total Suspended Solids Removal Potential (lbs/yr)	Maximum Volume Reduction Potential (gal/storm)	Peak Discharge Reduction Potential (cu.ft./second)
Bioretention systems	0.113	19	8,310	0.28
Grass pavers	0.412	69	30,227	1.01
Porous pavement	0.352	59	25,776	0.86

Estimated cost is $5,438 for 1,088 sq. ft. of bioretention systems. Estimate cost is $114,570 for 4,583 sq. ft. of grass pavers and porous pavement with a two-foot stone reservoir under the pavement.

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Wood Lanes

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Block 40, Lot 12.05
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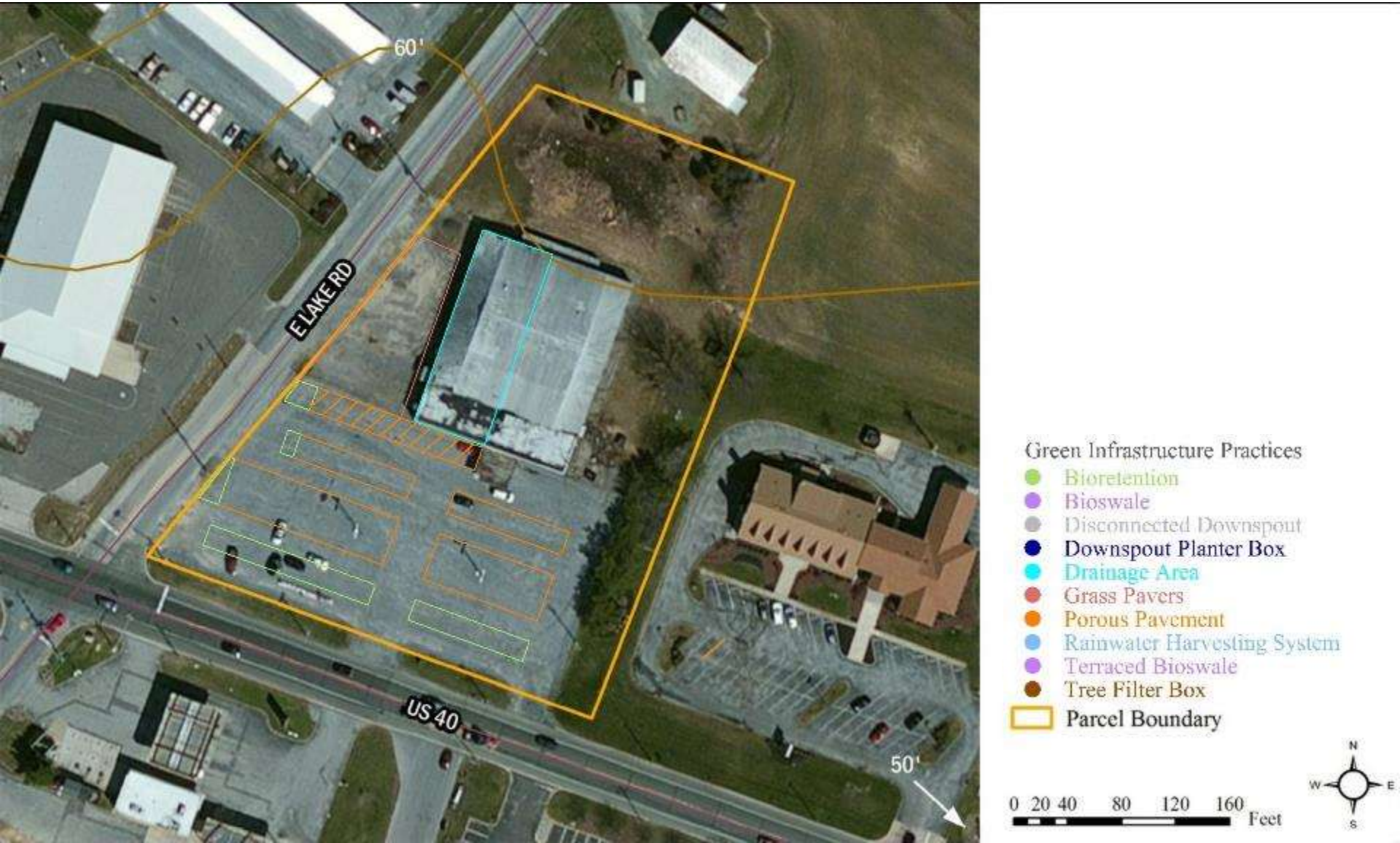

http://ag.crssa.rutgers.edu/kltest/Pilesgrove/
Pilesgrove
Fitbit Dashboard
Suggested Sites
Web Slice Gallery

PILESGROVE

ALL SITES | SALEM RIVER | NICHOMUS RUN | OLDMANS CREEK

1 Woodstown NJ State Police Station

2 Sunoco Gas Station

3 Fulton Bank of New Jersey

Abandoned Site

4 Richmans Ice Cream

5 The Church of Jesus Christ of Latter-day Saints

6 Sharptown United Methodist Church

7 Dollar General

8 The Corner

9 Salem County Public Works / Roads Department

/Pilesgrove/

Pilesgrove

Web Slice Gallery

Page Safety Tools

ROVE

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NICHOMUS RUN | OLDMANS CREEK

Zoom to Subwatersheds

Building

15 Franklin Bank

18 Camp Crockett County Park

21 Wendys

Oldmans Creek

Game Creek

Nichomus Run

Mannington Creek

Alloway Creek

Wood Lanes

For this site, we recommend bioretention systems, grass pavers, and porous pavement. Click on the link below to view or download the Reducation Action Plan.

Download Report (PDF)

Earthstar Geographics, CNES/Airbus DS

POWERED BY esri

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

Next Steps

- Funding is available to implement some of the concept plans or other projects identifies in the action plan
- Decide who will take ownership of the assessment and action plan
  - Township Committee
  - Township Engineer and Business Administrator
  - Environmental Commission
  - Sustainable Jersey Green Team
  - Local Watershed Association
- Form a Municipal Action Team

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Questions?

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