

**Ocean Township Water Panel:  
Impervious Cover Assessment and Reduction  
Action Plan for Ocean Township, 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.

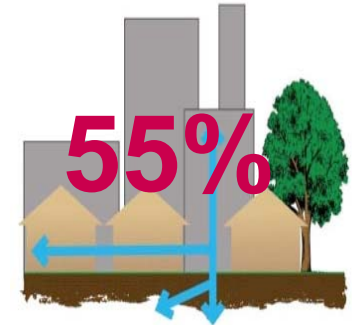
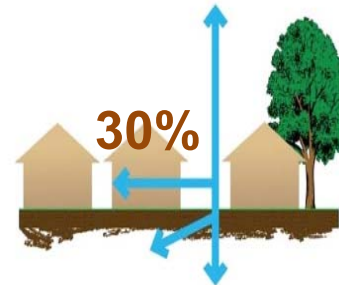
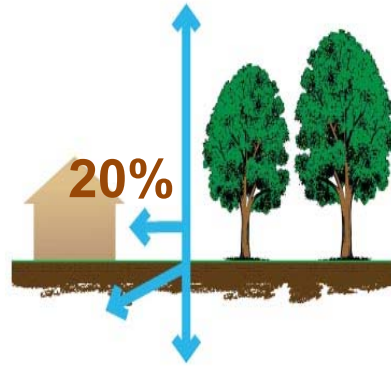
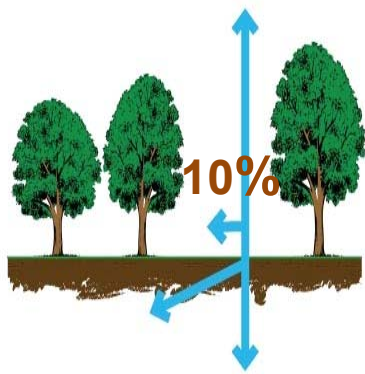
Our Mission is to identify and address community water resources issues using sustainable and practical science-based solutions.

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





# The Impact of Development on Stormwater Runoff



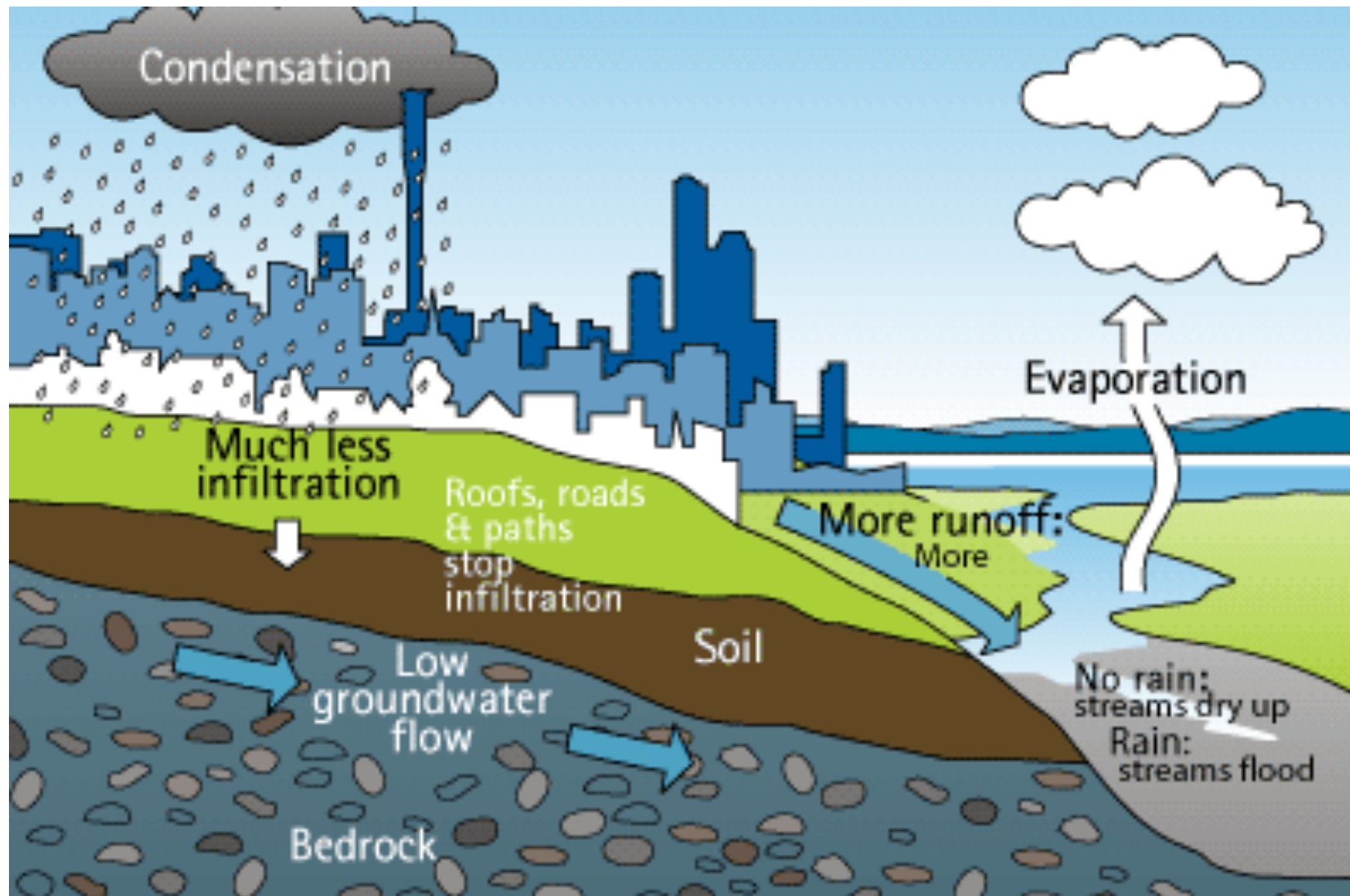
*More development*

→ *More impervious surfaces* →

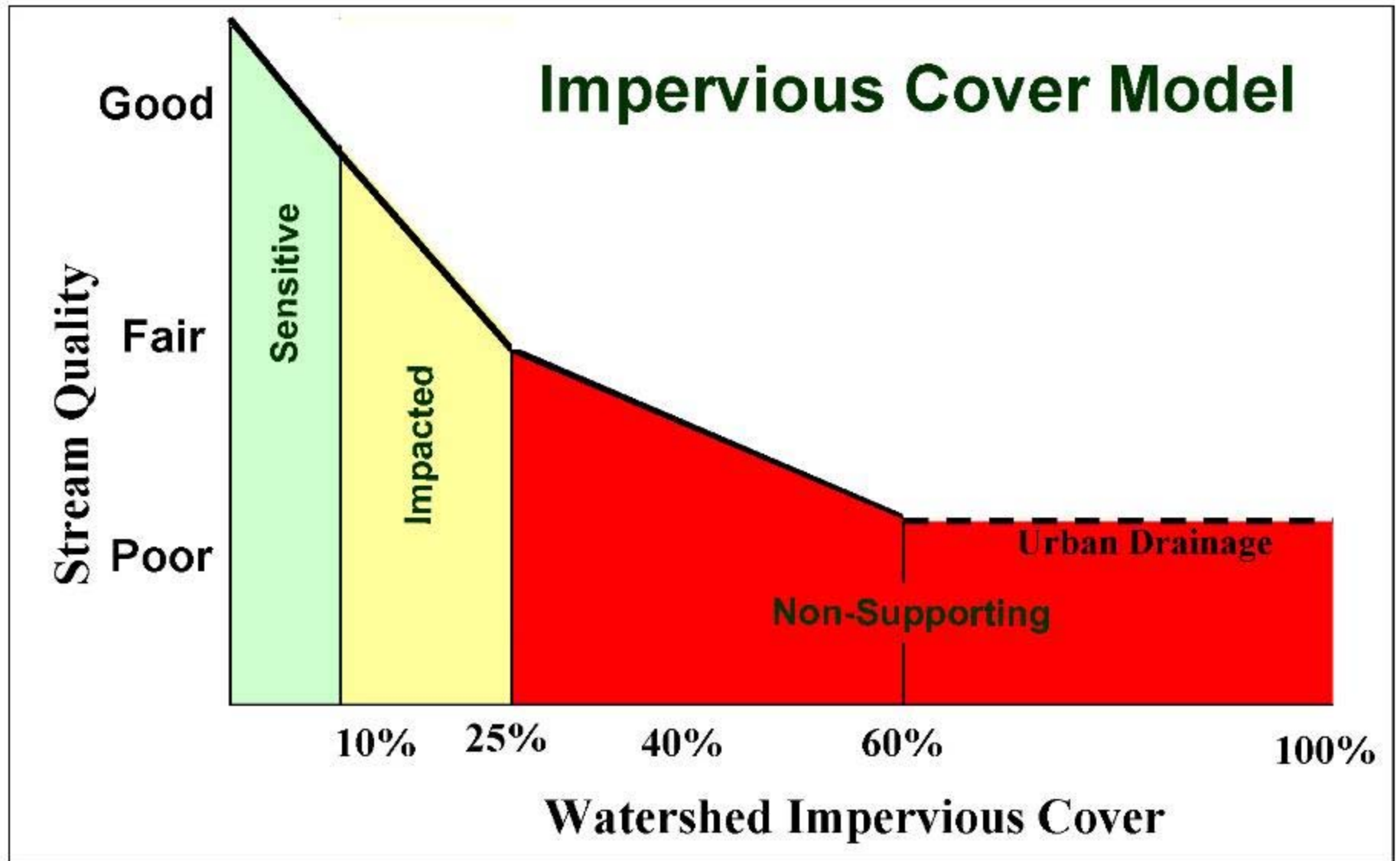
*More stormwater runoff*



# 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.



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?**

# Impervious Cover Assessment



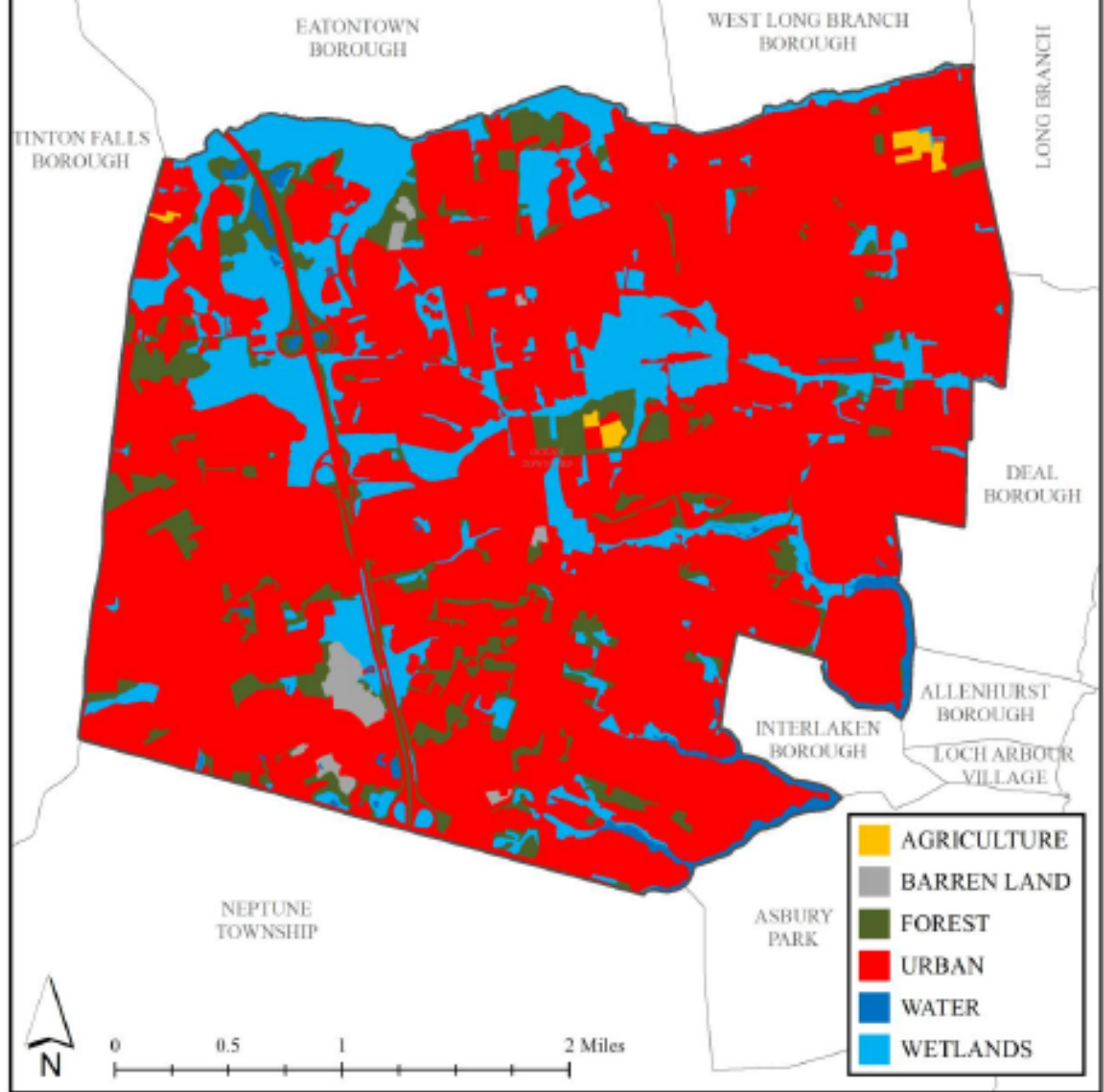
## Impervious Cover Assessment

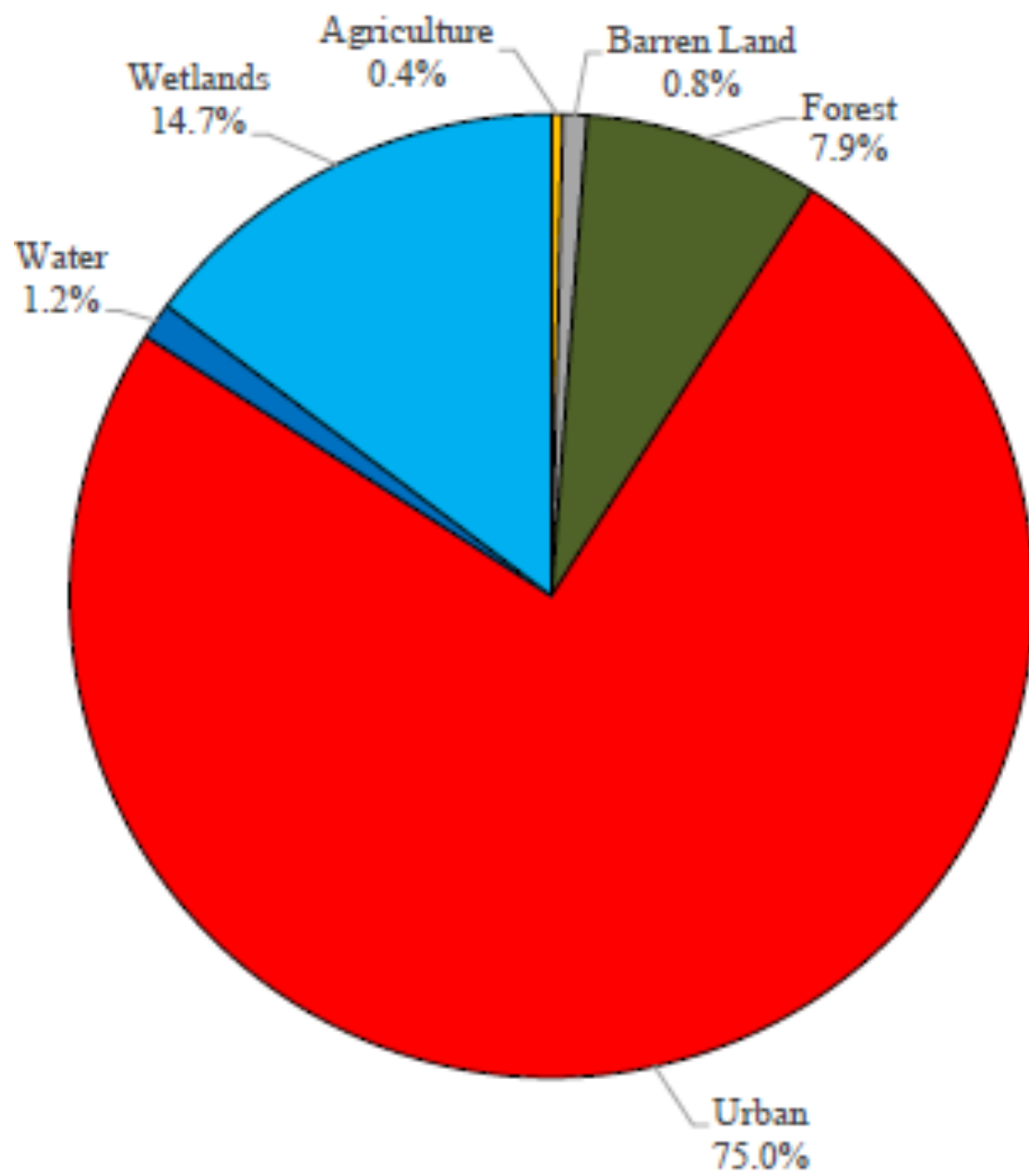
- Analysis completed by watershed and by municipality
- Use 2007 Land Use data to determine impervious cover
- Calculate runoff volumes for water quality, 2, 10 and 100 year design storm and annual rainfall
- Contain three concept designs

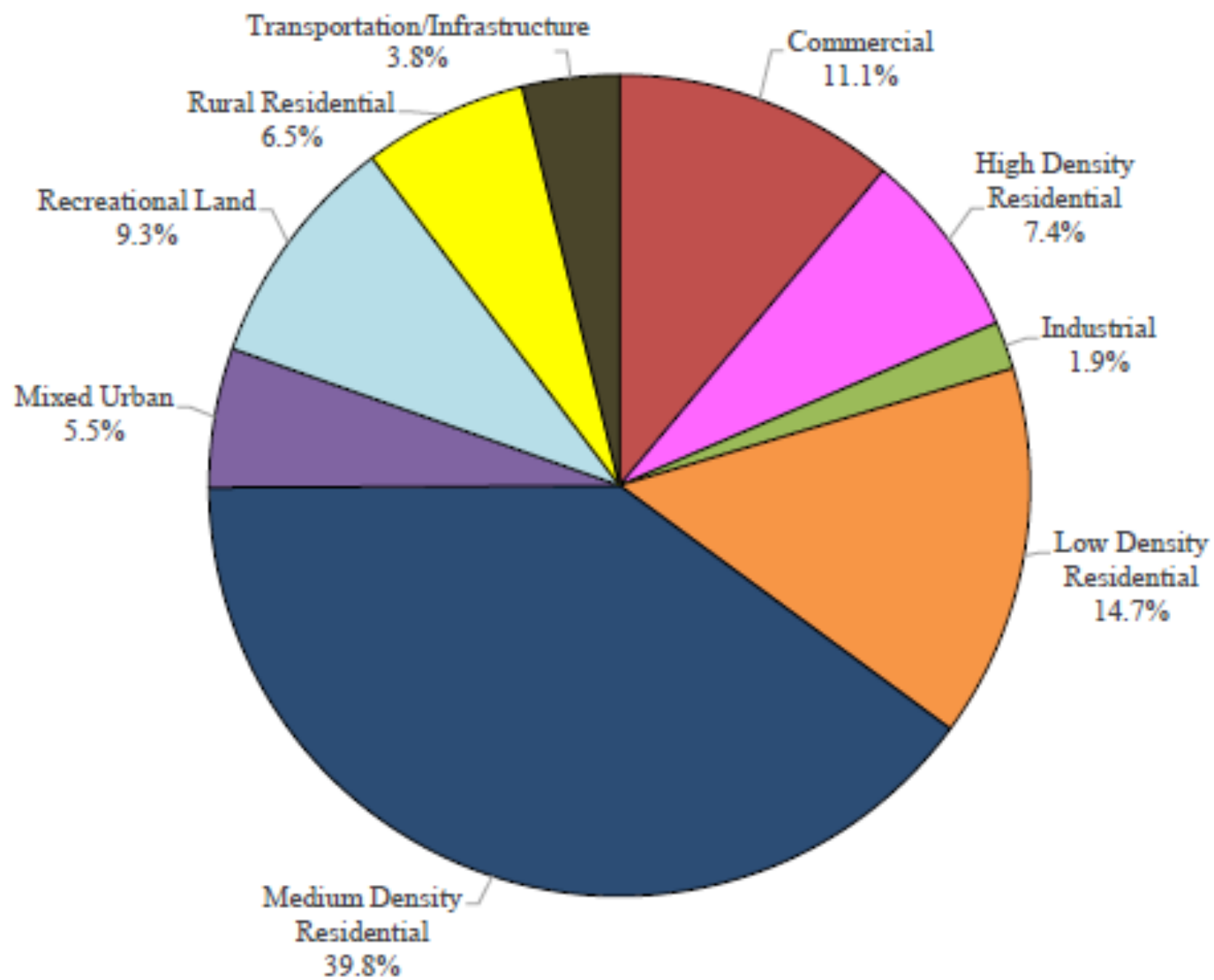




# Land Use Types for Ocean Township

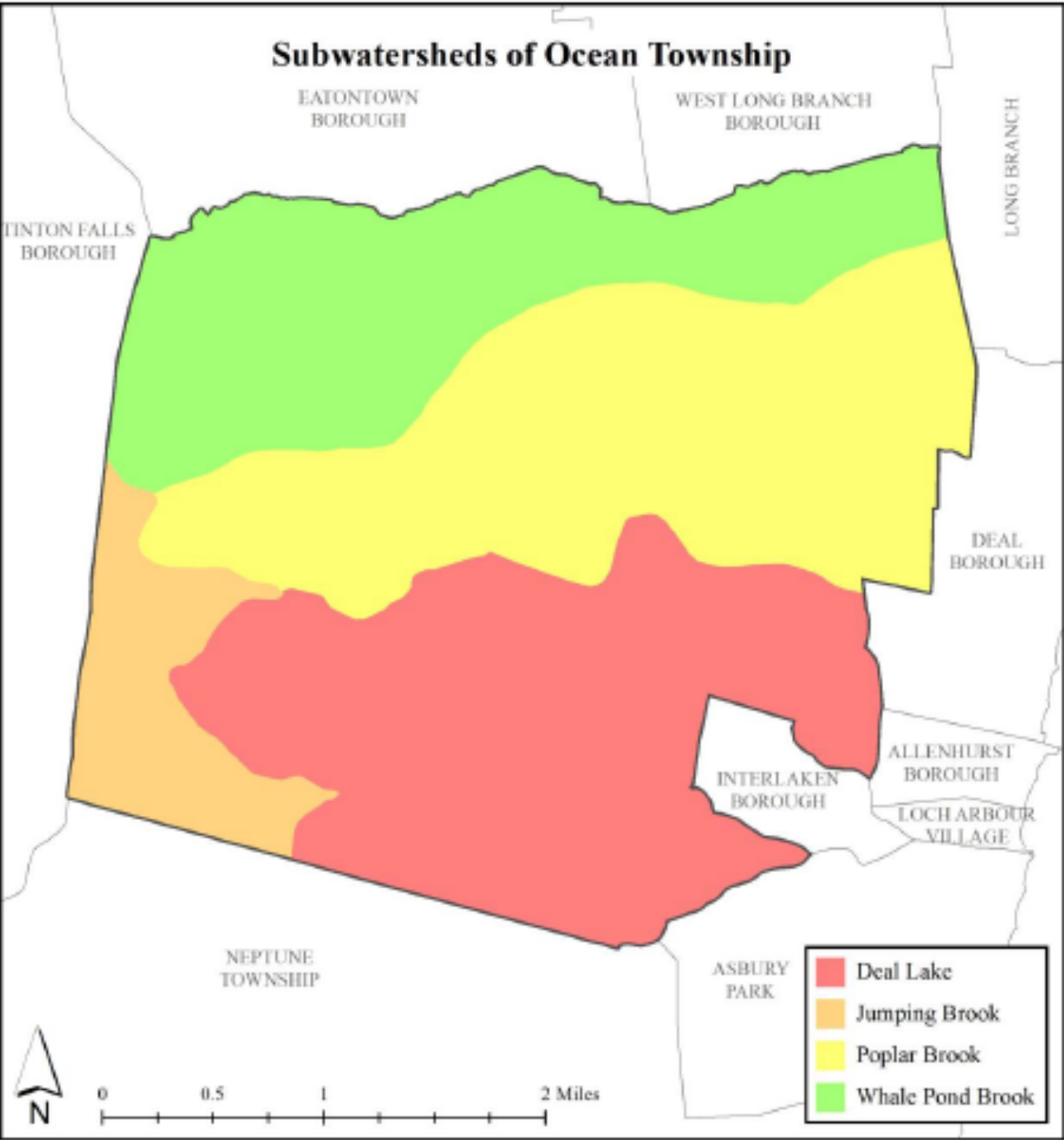








# Subwatersheds of Ocean Township



<b>Watershed</b>	<b>Total Area (ac)</b>	<b>Impervious Cover (ac)</b>	<b>%</b>
<b>Deal Lake</b>	<b>2,398</b>	<b>707.7</b>	<b>30.3%</b>
<b>Jumping Brook</b>	<b>577</b>	<b>143.1</b>	<b>24.8%</b>
<b>Poplar Brook</b>	<b>2,330</b>	<b>617.9</b>	<b>26.5%</b>
<b>Whale Pond Brook</b>	<b>1,723</b>	<b>400.5</b>	<b>23.5%</b>
<b>Total</b>	<b>7,030</b>	<b>1,869.2</b>	<b>26.9%</b>

<b>Subwatershed</b>	<b>NJ Water Quality Storm (MGal)</b>	<b>Annual Rainfall of 44" (MGal)</b>	<b>2-Year Design Storm (3.3") (MGal)</b>	<b>10-Year Design Storm (5.0") (MGal)</b>	<b>100-Year Design Storm (8.2") (MGal)</b>
<b>Deal Lake</b>	<b>24.0</b>	<b>845.5</b>	<b>65.3</b>	<b>99.9</b>	<b>171.0</b>
<b>Jumping Brook</b>	<b>4.9</b>	<b>171.0</b>	<b>13.2</b>	<b>20.2</b>	<b>34.6</b>
<b>Poplar Brook</b>	<b>21.0</b>	<b>738.2</b>	<b>57.0</b>	<b>87.2</b>	<b>149.3</b>
<b>Whale Pond Brook</b>	<b>13.6</b>	<b>478.5</b>	<b>37.0</b>	<b>56.5</b>	<b>96.8</b>
<b>Total</b>	<b>63.4</b>	<b>2,233.1</b>	<b>172.6</b>	<b>263.9</b>	<b>451.7</b>



## 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



Ocean Township  
 Impervious Cover Assessment

*First United Methodist Church, 103 Monmouth Road*



**PROJECT LOCATION:**



**SITE PLAN:**



**A**



**B**



**C**

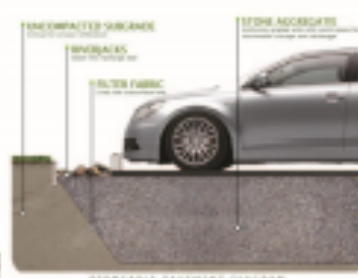


- 1 BIORETENTION SYSTEMS:** Rooftop runoff from the northwest corner of the building can be captured, treated, and infiltrated into a bioretention system. Bioretention systems can reduce sediment and nutrient loading to the local waterway while providing habitat for birds, butterflies, and pollinators.
- 2 POROUS PAVEMENT:** A portion of the parking lot can be converted to porous pavement. This can allow for infiltration of runoff from the parking lot and reduce the volume of stormwater entering the storm drain.
- 3 RAINWATER HARVESTING:** Rainwater can be harvested from the roof of the building and stored in a cistern. The water can be used for the community garden and landscaping at the church.

**1 BIORETENTION SYSTEM**

**2 POROUS PAVEMENT**

**3 RAINWATER HARVESTING SYSTEM**



**RESTRICTIVE SOILS IN THIS REGION**

- Site specific soil testing must be conducted.
- Green infrastructure in this area may require underdrain systems.

Ocean Township  
Impervious Cover Assessment

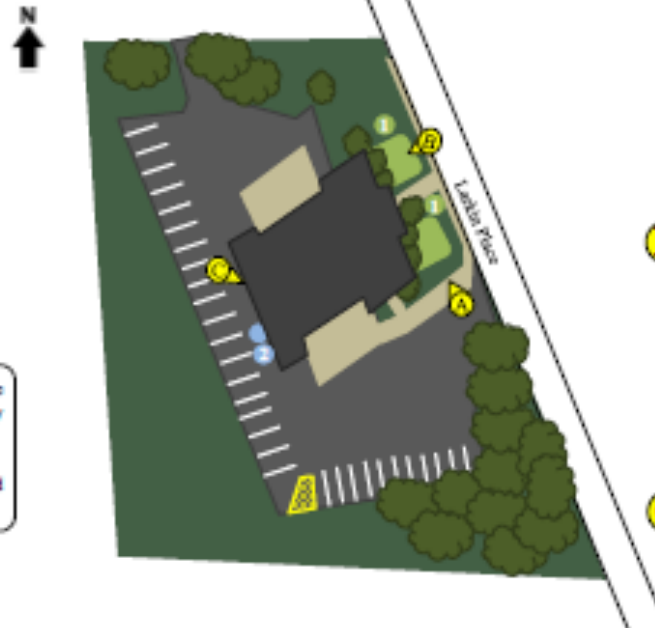
*Oakhurst Independent Hose Co. No. 1, 72 Larkin Place*



**PROJECT LOCATION:**



**SITE PLAN:**



- 1 **BIORETENTION SYSTEMS:** Two bioretention systems can be installed on the east side of the building to capture, treat, and infiltrate rooftop runoff by disconnecting and redirecting nearby downspouts. The bioretention system can also provide habitat for birds, butterflies, and pollinators.
- 2 **RAINWATER HARVESTING:** Rainwater can be harvested from the roof of the building and stored in a cistern. The water can be used to wash the fire trucks.

A



B



C



**1 BIORETENTION SYSTEM**



**2 RAINWATER HARVESTING SYSTEM**



**RESTRICTIVE SOILS IN THIS REGION**

- Site specific soil testing must be conducted.
- Green infrastructure in this area may require underdrain systems.

Ocean Township  
Impervious Cover Assessment

*Monmouth County Library, 701 Deal Road*



**PROJECT LOCATION:**



**SITE PLAN:**



- 1 **BIORETENTION SYSTEMS:** A bioretention system can be installed to capture, treat, and infiltrate runoff from the northeast corner of the library. The garden can also provide habitat for birds, butterflies, and pollinators.
- 2 **DOWNSPOUT PLANTER BOX:** Rooftop runoff from the southwest entrance of the building can be reused in a downspout planter box.
- 3 **RAINWATER HARVESTING:** Rainwater can be harvested from the roof of the building and stored in a cistern. The water can be used to water the landscaping at the library.

**1 BIORETENTION SYSTEM**



**2 DOWNSPOUT PLANTER BOX**



**3 RAINWATER HARVESTING SYSTEM**



**RESTRICTIVE SOILS IN THIS REGION**

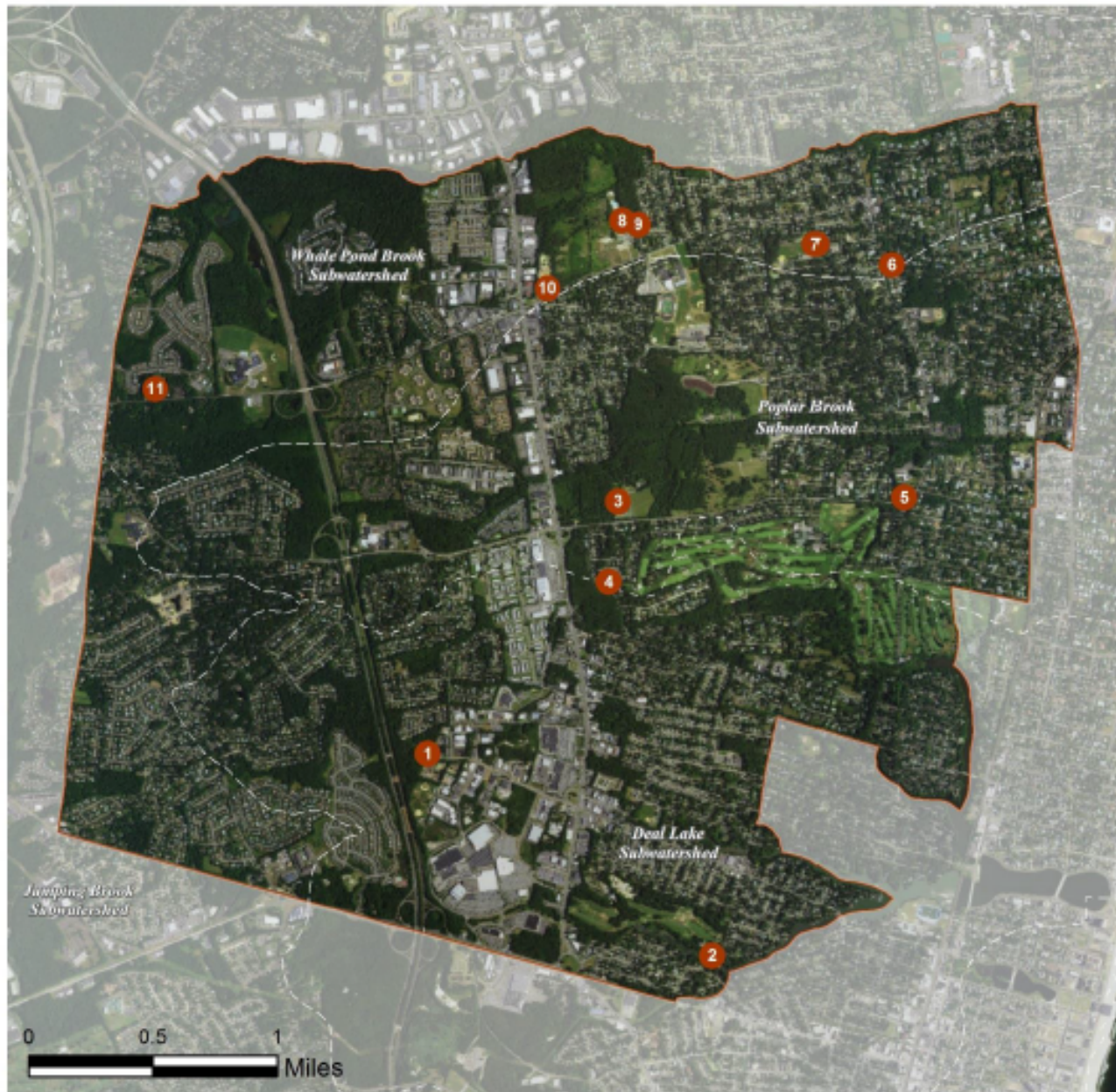
- Site specific soil testing must be conducted.
- Green infrastructure in this area may require underdrain systems.



# Impervious Cover Reduction Action Plan



## OCEAN TOWNSHIP: GREEN INFRASTRUCTURE SITES



### SITES WITHIN THE DEAL LAKE SUBWATERSHED:

1. Municipal Garage of Ocean Township
2. Northern Shore District United Methodist Church

### SITES WITHIN THE POPLAR BROOK SUBWATERSHED:

3. Monmouth County Library, Ocean Township Branch
4. Ocean Township Little League
5. Ocean Township Municipal Office / Police Department

### SITES WITHIN THE WHALE POND BROOK SUBWATERSHED:

6. First United Methodist Church
7. Oakhurst Independent Hose Co No. 1
8. Ocean Township Community Pool
9. Township of Ocean Senior Center
10. US Post Office
11. Wayside United Methodist Church



# NORTHERN SHORE DISTRICT UNITED METHODIST CHURCH



Subwatershed: Deal Lake  
 Site Area: 55,035 sq. ft.  
 Address: 1001 Wickapecko Drive  
 Ocean Township, NJ 07712  
 Block and Lot: Block 140, Lot 81



Runoff from the parking lot is directed to the stream behind the building. Parking spots can be replaced with porous asphalt to capture and infiltrate stormwater. The installation of a rain garden adjacent to the building can capture, treat, and infiltrate roof 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"
57	31,629	1.5	16.0	145.2	0.025	0.87

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	0.028	5	2,072	0.08	490	\$2,450
Pervious pavements	0.515	86	37,804	1.42	5,260	\$131,500

# GREEN INFRASTRUCTURE RECOMMENDATIONS



**Northern Shore District  
United Methodist  
Church**

-  pervious pavements
-  bioretention / rain gardens
-  drainage areas
-  property line
-  2012 Aerial: NJOIT, OGIS














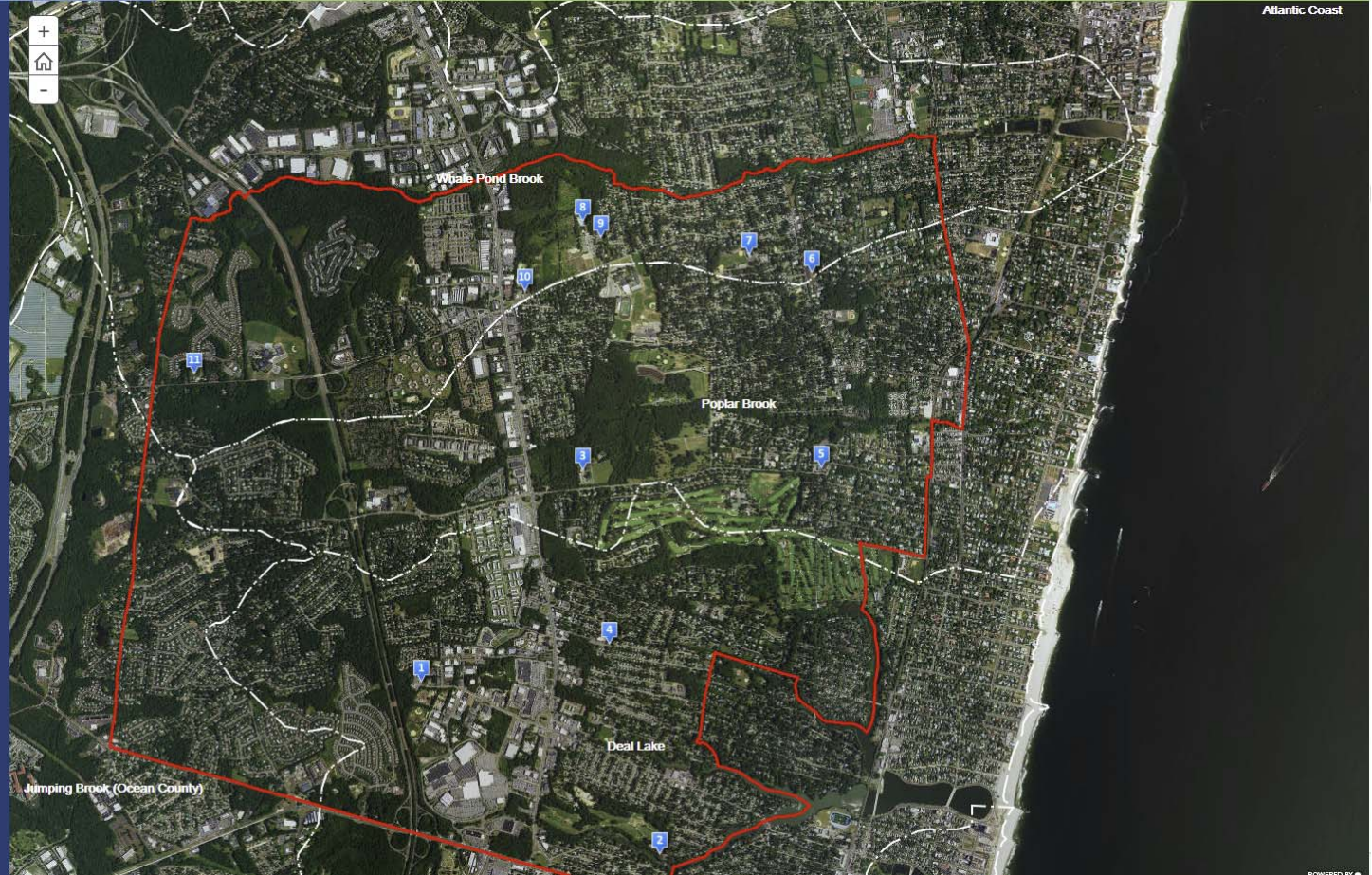


# Ocean Township



ALLSITES DEAL LAKE POPLAR BROOK WHALE POND BROOK

 <b>1</b> Municipal Garage of Ocean Township	 <b>2</b> Northern Shore District United Methodist Church	 <b>3</b> Monmouth County Library, Ocean Township Branch
 <b>4</b> Ocean Township Little League	 <b>5</b> Ocean Township Municipal Office / Police Department	 <b>6</b> First United Methodist Church
 <b>7</b> Oakhurst Independent Hose Company NO. 1	 <b>8</b> Ocean Township Community Pool	 <b>9</b> Township of Ocean Senior Center
 <b>10</b> US Post Office	 <b>11</b> Wayside United Methodist Church	









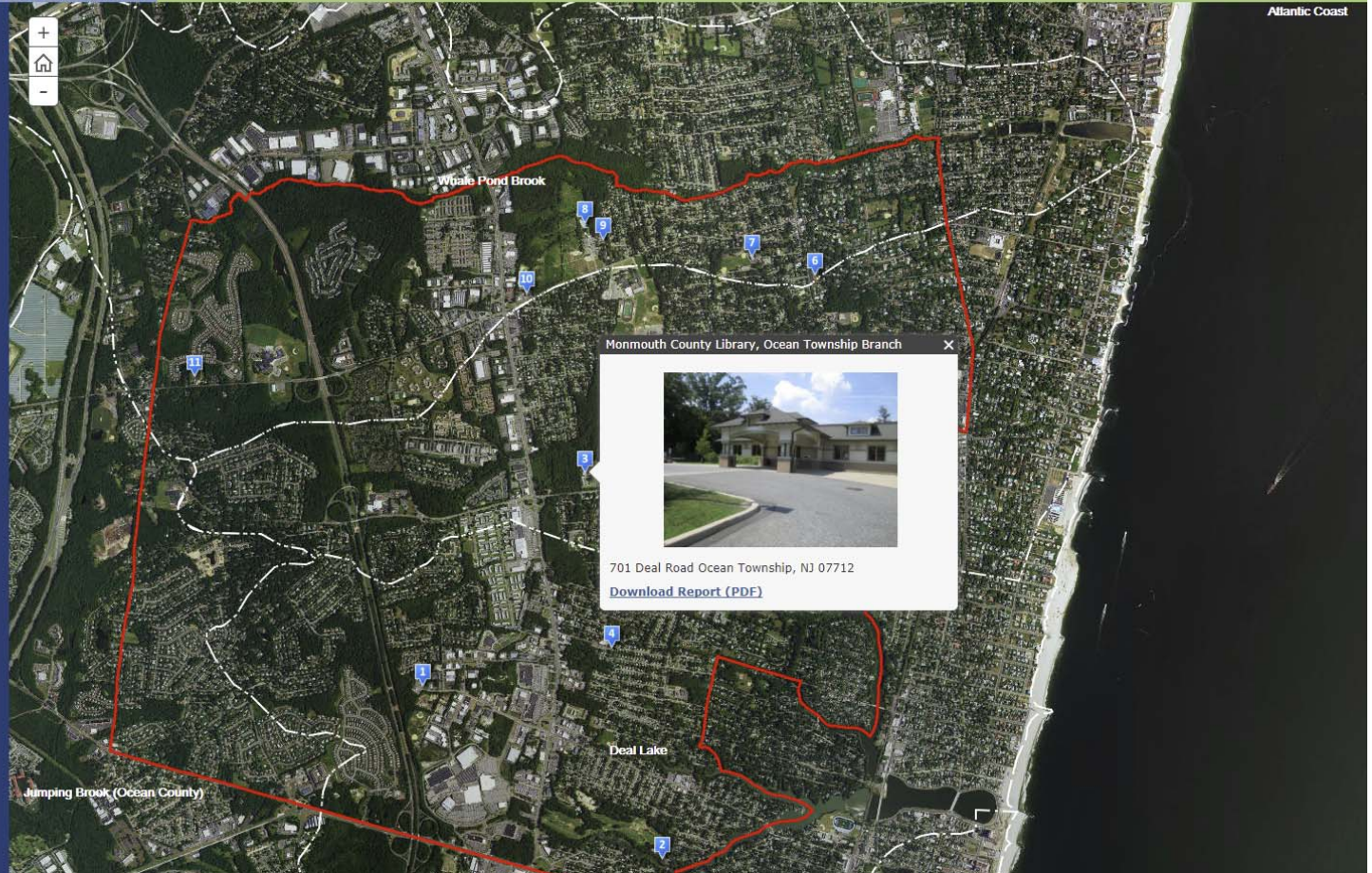


# Ocean Township



ALLSITES DEAL LAKE POPLAR BROOK WHALE POND BROOK

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 4 Ocean Township Little League	 5 Ocean Township Municipal Office / Police Department	 6 First United Methodist Church
 7 Oakhurst Independent Hose Company NO. 1	 8 Ocean Township Community Pool	 9 Township of Ocean Senior Center
 10 US Post Office	 11 Wayside United Methodist Church	




Whale Pond Brook

Deal Lake

Jumping Brook (Ocean County)

Atlantic Coast

Monmouth County Library, Ocean Township Branch



701 Deal Road Ocean Township, NJ 07712

[Download Report \(PDF\)](#)

## 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





# Questions?

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