

Managing Stormwater Runoff to Your Lake

*Presented by Christopher C. Obropta, Ph.D., P.E.
on January 9, 2020 at the Randolph Township
Harmful Algal Blooms (HABs) Workshop*



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



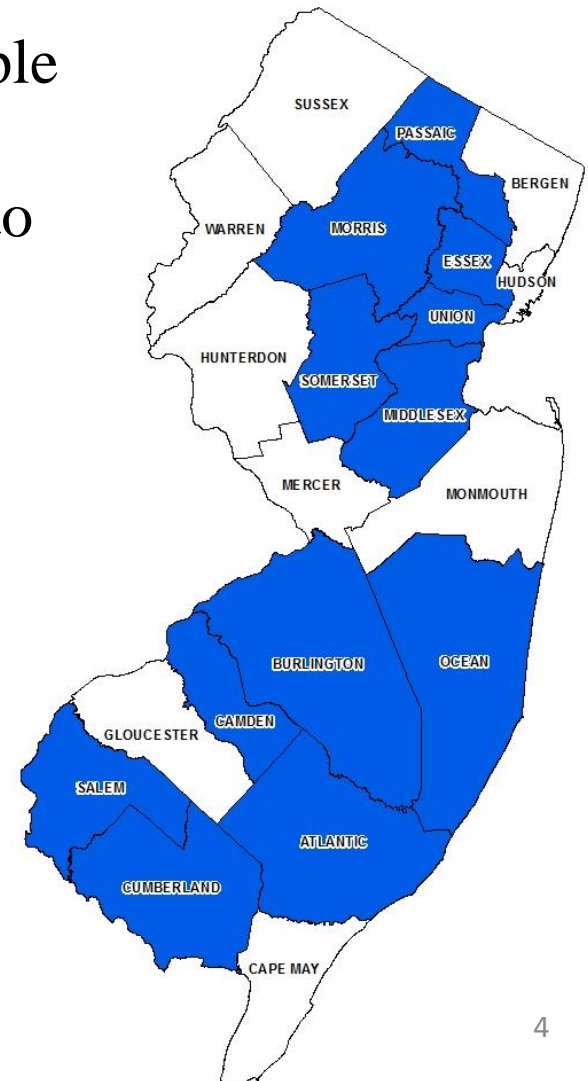
Our Mission is to identify and address community water resources issues using sustainable and practical science-based solutions.



Environmental County Agents

The Environmental County Agents teach people new skills and information so they can make better informed decisions and improvements to their businesses and personal lives.

- Michele Bakacs, Middlesex and Union
- Amy Rowe, Essex and Passaic
- Mike Haberland, Camden and Burlington
- Sal Mangiafico, Salem and Cumberland
- Steve Yergeau, Ocean and Atlantic
- Vacant, Morris and Somerset
- Vacant, Sussex and Warren



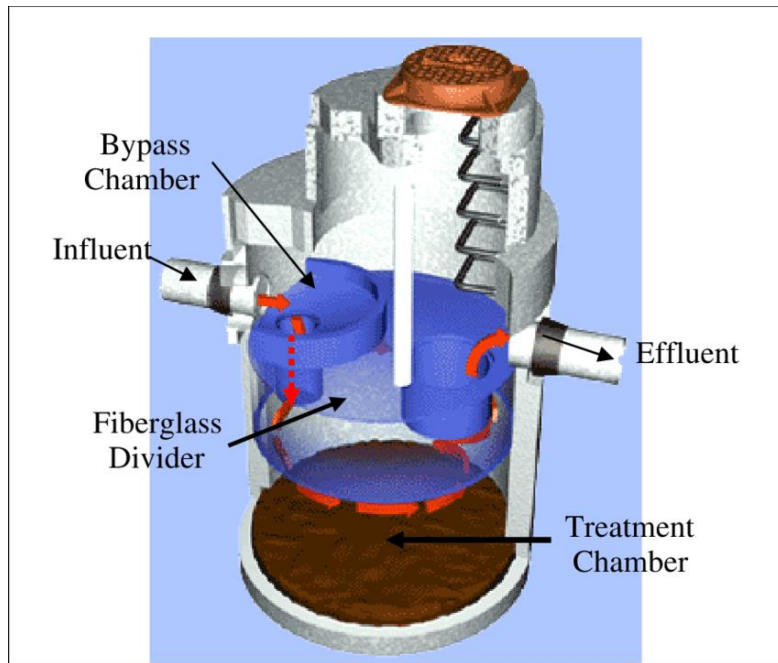
Managing Stormwater

- Water Quality Management
 - Reduce pollutants from entering the waterway
 - Systems manage the frequent storms (NJ Water Quality Storm = 1.25" of rain over 2-hours)
 - Manufactured treatment devices
 - Green infrastructure practices
- Flood Control Management
 - Reduce runoff volumes and peak runoff rates
 - Systems manage bigger storms (100-year storm = 8.9 inches of rain over 24-hours)
 - Large storage systems (detention basins or underground storage reservoirs)
 - Some green infrastructure practices

Water Quality

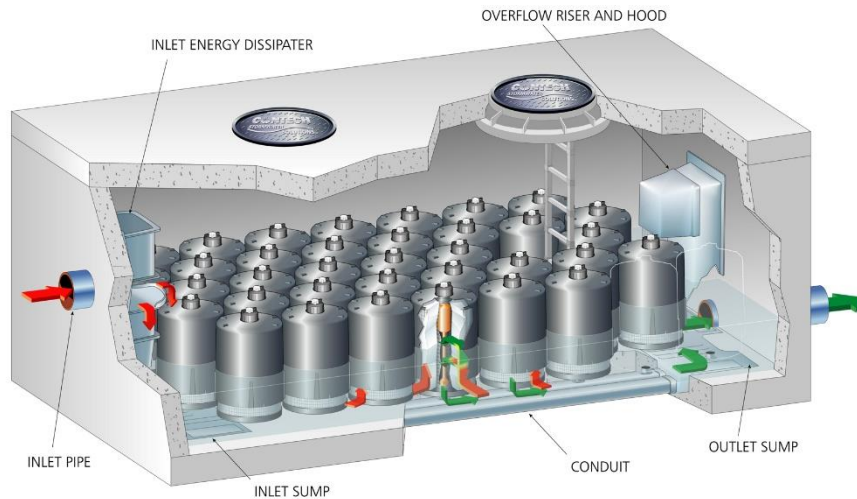


Manufactured Treatment Devices (Hydrodynamic Separators)



Typically removes 50% of total
suspended solids (TSS)

Manufactured Treatment Devices (Filter Systems)



Typically removes
80% of total
suspended solids
(TSS)



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

- Rain Gardens/Bioretention Systems
- Bioswales
- Downspout Planters
- Stormwater Planters
- Rainwater Harvesting
- Permeable Pavements
- Tree Filter Boxes
- Dry Wells
- Green Roofs
- Naturalizing Detention Basins
- Green Streets



Stormwater Management for Flood Control (Detention Basins)



Stormwater Management for Flood Control (Retention Basins or Wet Ponds)



A Retention Basins or Wet Pond



Stormwater Management for Flood Control (underground detention)



Stormwater Management for Water Quality and Flood Control



Bioretention systems or rain gardens

Stormwater Management for Water Quality and Flood Control



Porous Asphalt Parking Lot

Addressing the Problem

- Regional Scale (municipalities working together)
- Lake Community Scale (residents and businesses working together)
- Residential Scale (individual property owners doing their part on their own property)

Addressing Stormwater at the Regional Scale

- Regional Stormwater Management Planning
 - Watershed Restoration and Protection Plans
 - Green Infrastructure Feasibility Study/Strategic Plan
- Intergovernmental Cooperation
- Available land to implement stormwater treatment solutions
- Ability to transport stormwater to treatment location
- Commitment to maintain treatment facilities
- Funding (see Jim's presentation)

The Deal Lake Watershed Protection Plan Milestone 5 Report Grant #RP04-082

Grantee
and Lead Planning Agency:

Deal Lake Commission
John Everson, Chairman
c/o Village of Loch Arbour
Municipal Offices
550 Main Street
Loch Arbour, NJ 07711
732-531-4740
locharbour@comcast.net
<http://www.deallake.org/>

Prepared by:

Princeton Hydro, LLC
P.O. Box 720
1108 Old York Road, Suite 1
Ringoes, New Jersey 08551
Dr. Stephen J. Souza
ssouza@princetonhydro.com

January 2011



GREEN INFRASTRUCTURE FEASIBILITY STUDY

DEAL LAKE WATERSHED

Ocean
Township

Deal
Borough

Interlaken
Borough

Allenhurst
Borough

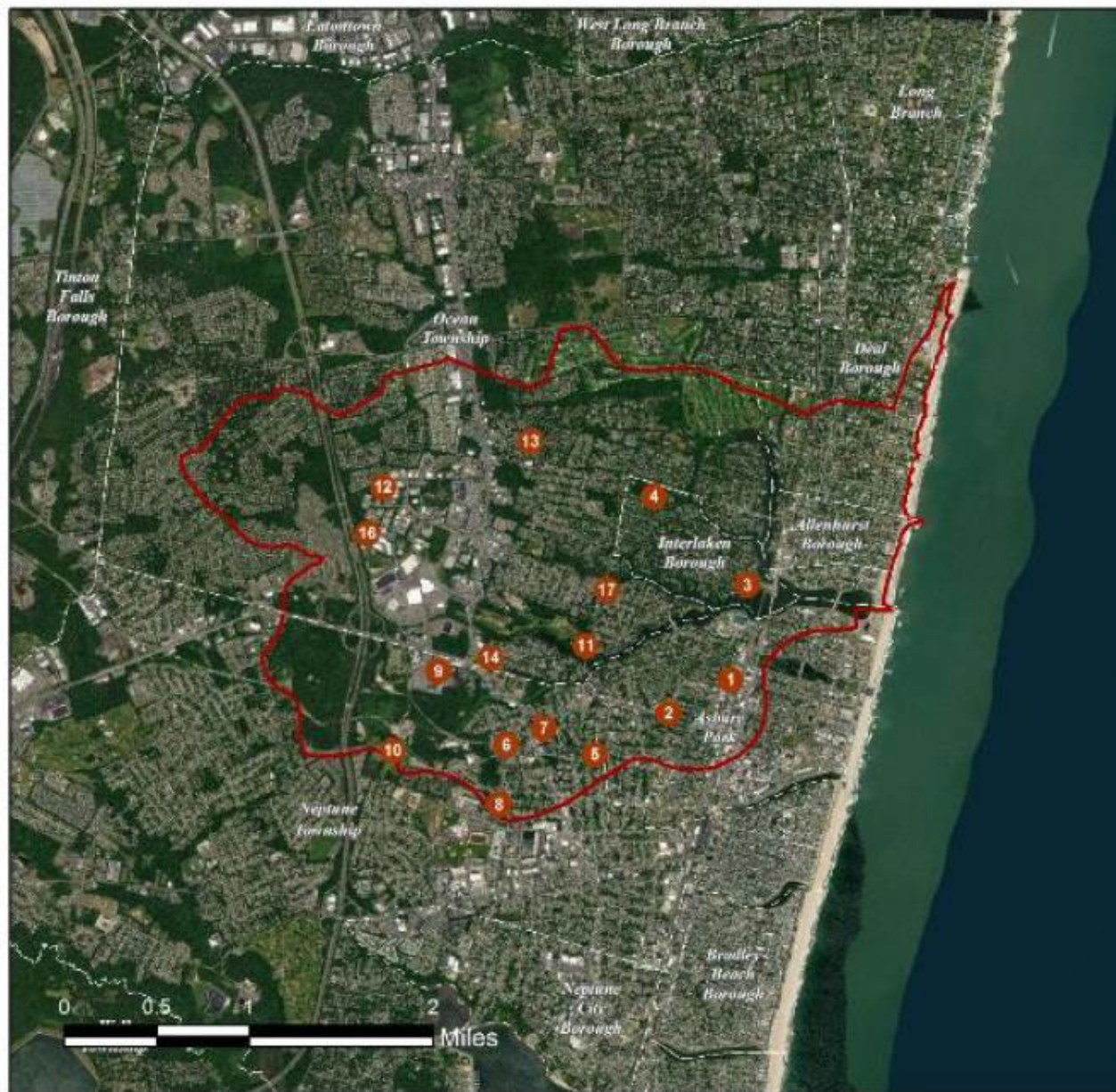
Arthur
Village

Neptune
Township

Asbury
Park



Deal Lake Subwatershed: Green Infrastructure Sites



SITES WITHIN ASBURY PARK

1. Asbury Park Board of Education
2. Our Lady of Mount Carmel Church

SITES WITHIN INTERLAKEN

3. Interlaken Boro Office
4. Interlaken Park






SITES WITHIN NEPTUNE CITY

5. Church of God of Prophecy
6. Good Samaritan Church
7. Liberty Park
8. Loffredo Fields
9. Monmouth County Vocational School
10. Shoprite of Neptune

SITES WITHIN OCEAN TOWNSHIP

11. Colonial Terrace Golf Club
12. Ocean Township Maintenance Shop
13. Open Grass Lot on Logan Road
14. Planning Incentive
15. Vacant Lot on Wickapecko Drive
16. Wannamassa Firemen's Field
17. Wannamassa First Aid & Fire Police



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

VACANT LOT ON WICKAPECKO DRIVE

101 Bimbler Boulevard
Ocean Township, NJ 07712

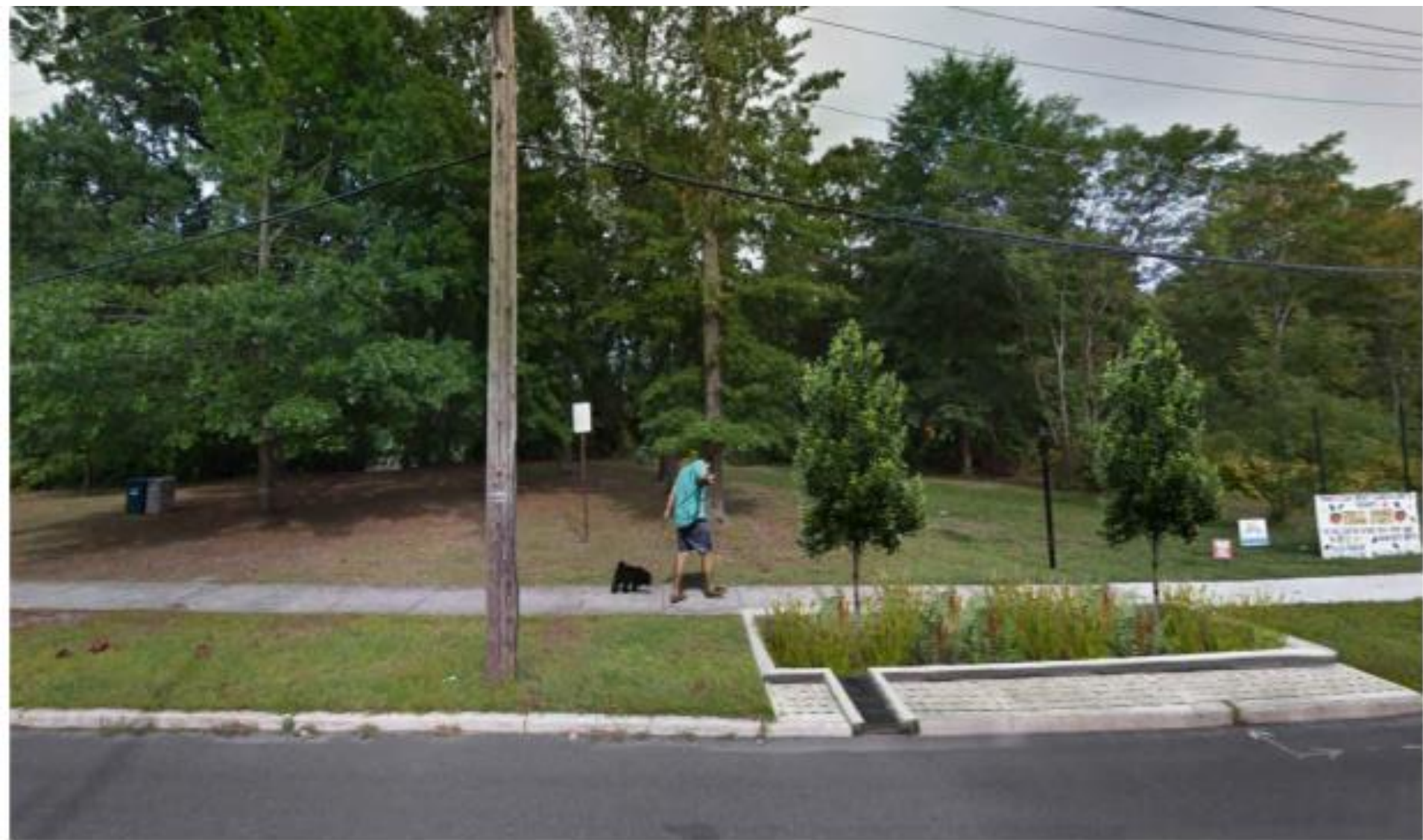


Stormwater planters can be installed along the roadsides, and a rain garden can be installed in the middle of the triangle to capture, treat, and infiltrate stormwater runoff from the road and paved areas. A preliminary soil assessment suggests that the soils have suitable drainage characteristics for green infrastructure.

Impervious Cover		Existing Loads from Impervious Cover (lbs/yr)			Runoff Volume from Impervious Cover (Mgal)	
%	sq. ft.	TP	TN	TSS	From the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
34	13,458	0.6	6.8	61.8	0.010	0.37

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 system	0.046	8	3,370	0.13	440	\$2,200
Stormwater planters	0.067	11	4,930	0.19	650	\$243,750





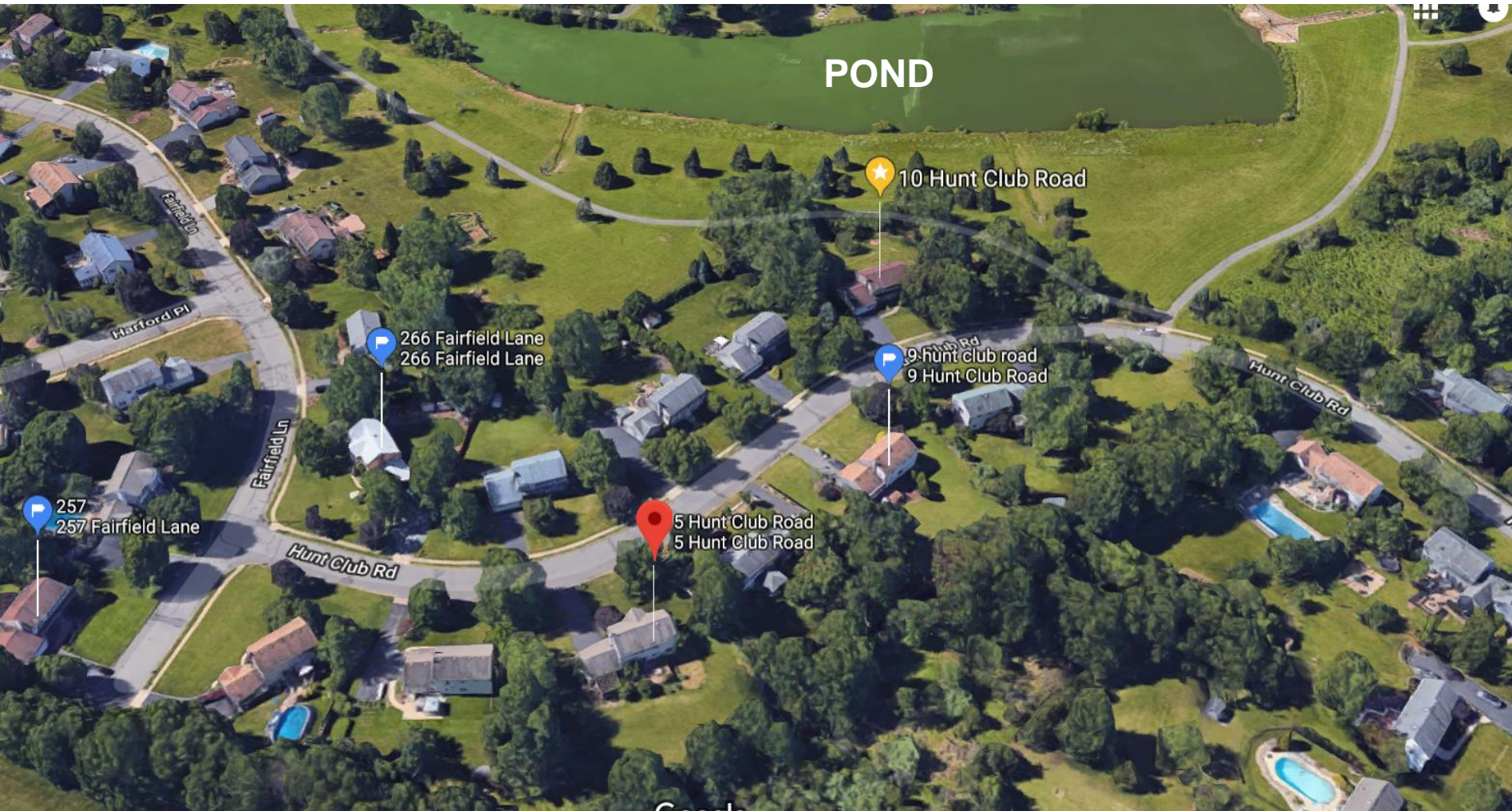
Addressing Stormwater at the Lake Community Scale

- Common goal (e.g., To protect our lake or pond)
- Local champion to rally the troops (Check out our Green Infrastructure Champions Program)
- Technical expertise

Hunts Club Pond, Hillsborough, NJ

- Township organized a couple of meetings with residents and interested stakeholders
- Rutgers Cooperative Extension presented solutions to addressing stormwater pollution to pond
- Rutgers offered free rain garden designs to homeowners
- Rutgers helped install rain gardens
- Program generated lots of excitement and lots of action

Hunts Club Pond Neighborhood



Residential Programs

- Rain Garden Program
 - Rebate Program
 - Neighborhood Rain Garden Program
- Rain Barrel Program
 - Build-A-Rain Barrel Workshop
 - Rain Barrel Rebate Program
 - One Barrel at a Time Co-op

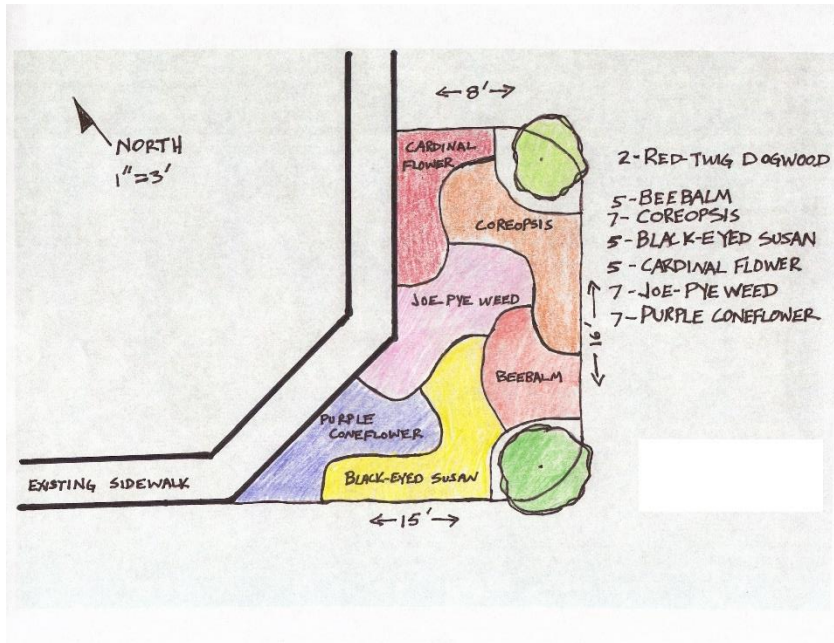


Rain Garden Rebate Program

- 45-minute Educational Session
- 30-minute Design Session
- \$3 per square foot rebate
- Assistance with installation is available

Design Example for Roof Runoff

Design



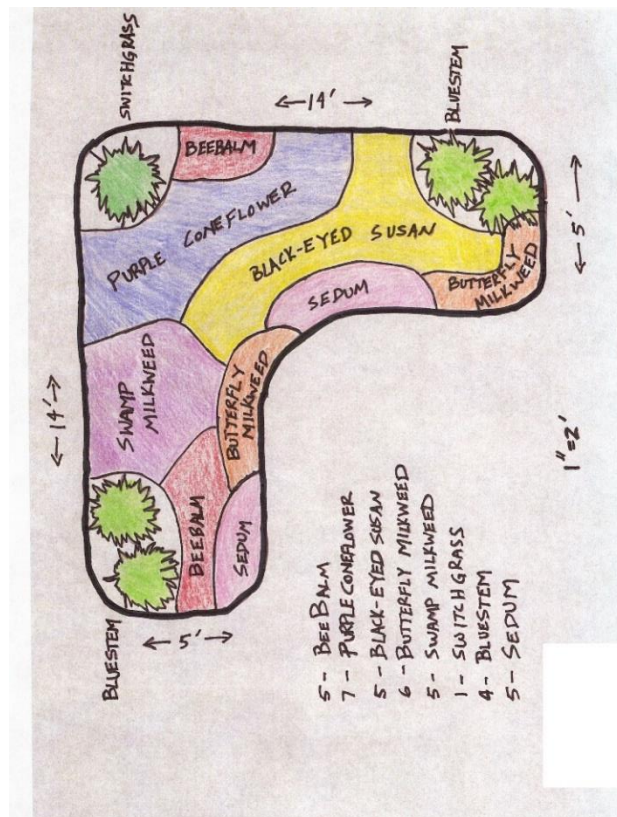
Installed Rain Garden





Design Example for Parking Lot Runoff

Design



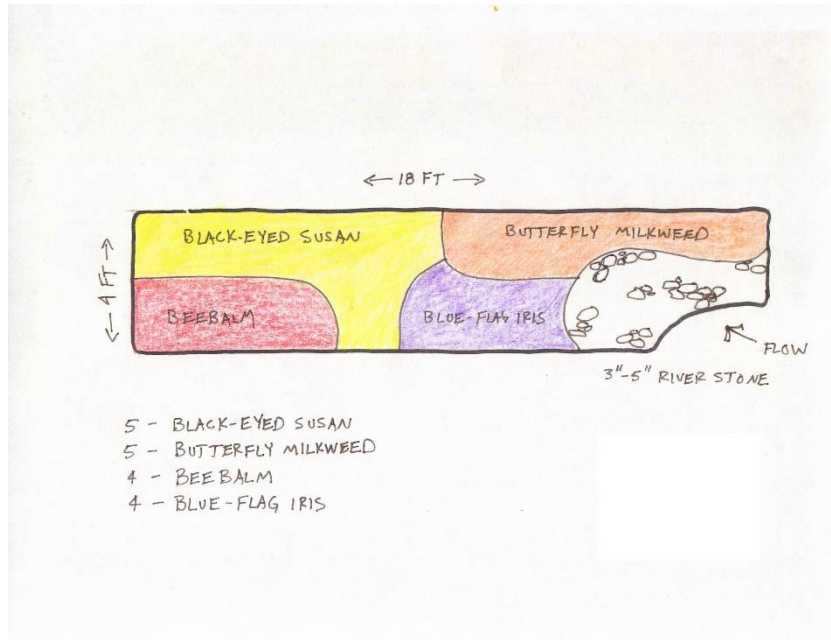
Installed Rain Garden





Roof, Sump Pump and Driveway Runoff – WOW!

Design



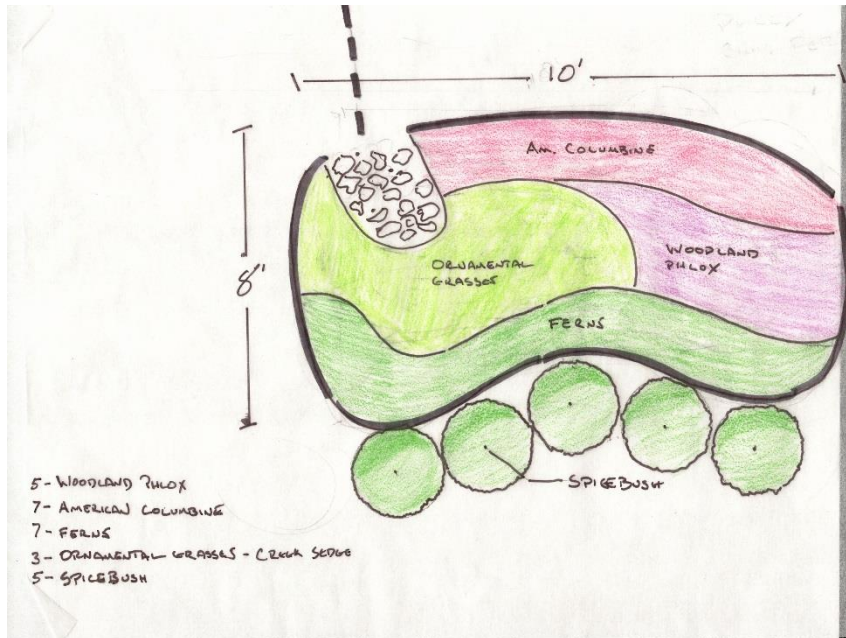
Installed Rain Garden





Another Roof Runoff Example

Design



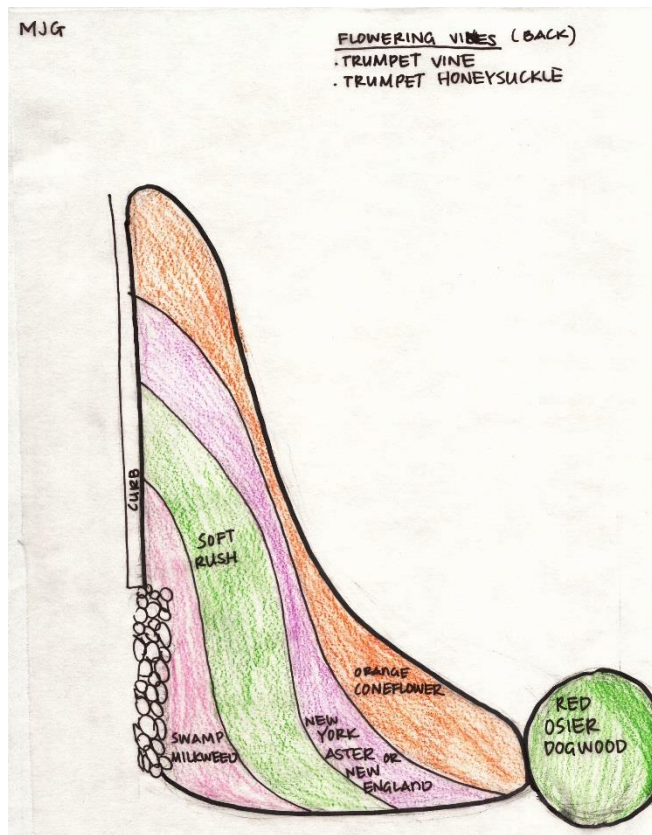
Installed Rain Garden





Another Driveway Runoff Example

Design



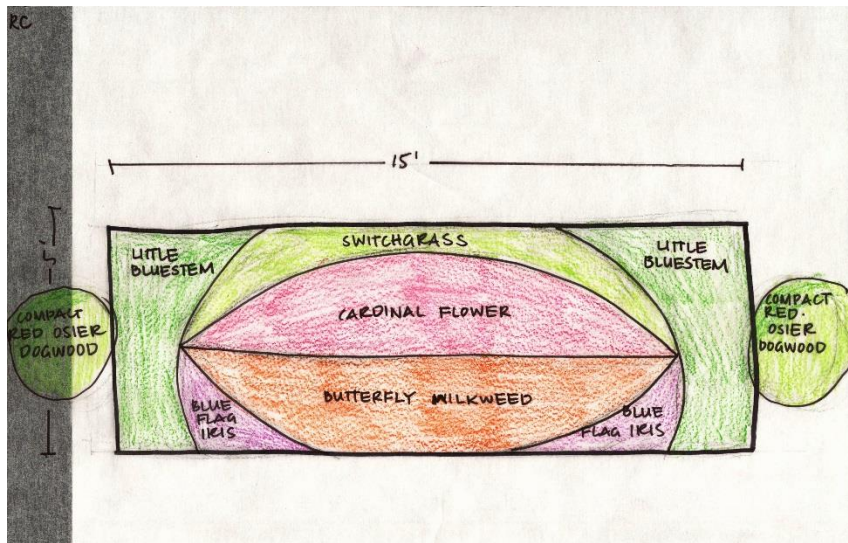
Rain Garden Installed





Roof Runoff from Rain Barrel Overflow

Design



Installed Rain Garden





1189 Jefferson Garden



1244 Briarcliff



How can Rutgers Cooperative Extension help?

- Watershed Restoration and Protection Plans
- Green Infrastructure Feasibility Studies
- Neighborhood Rain Garden Programs
- Rain Garden Rebate Programs
- Green Infrastructure Champion Training
- Assist with Grant Writing

Christopher C. Obropta, Ph.D., P.E.

obropta@envsci.Rutgers.edu

www.water.Rutgers.edu