Managing Stormwater in the Newton Creek Watershed

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RUTGERS
New Jersey Agricultural Experiment Station

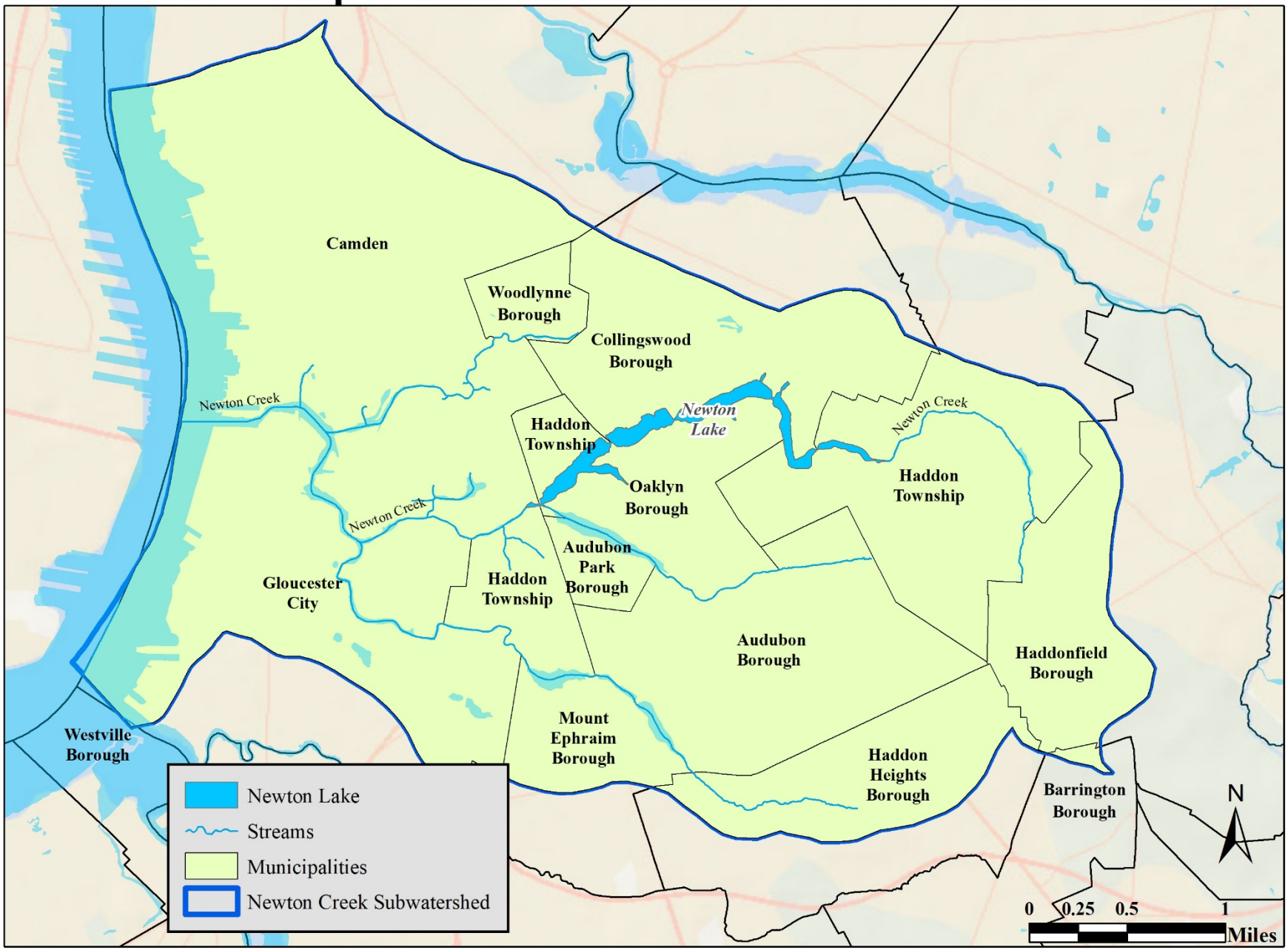
Rutgers Cooperative Extension

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.

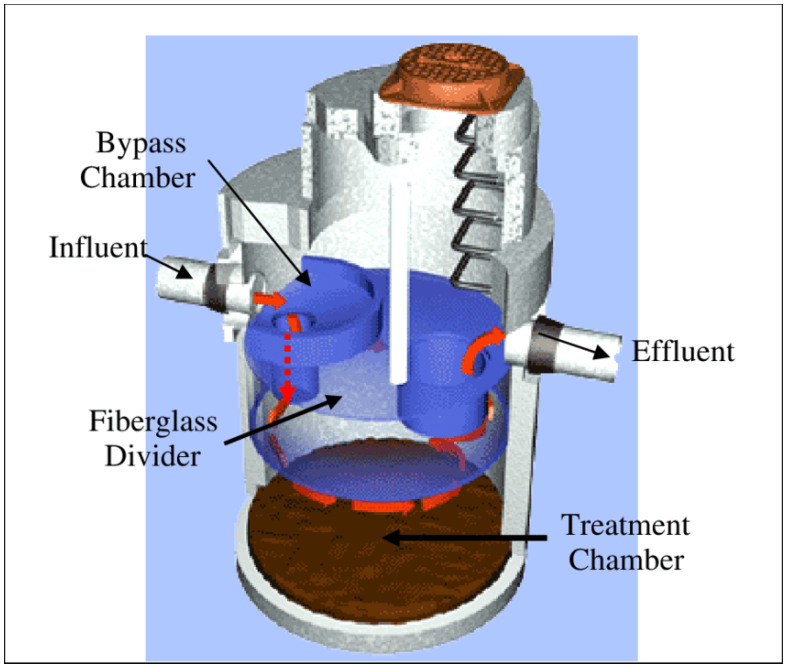
Municipalities of the Newton Creek Watershed



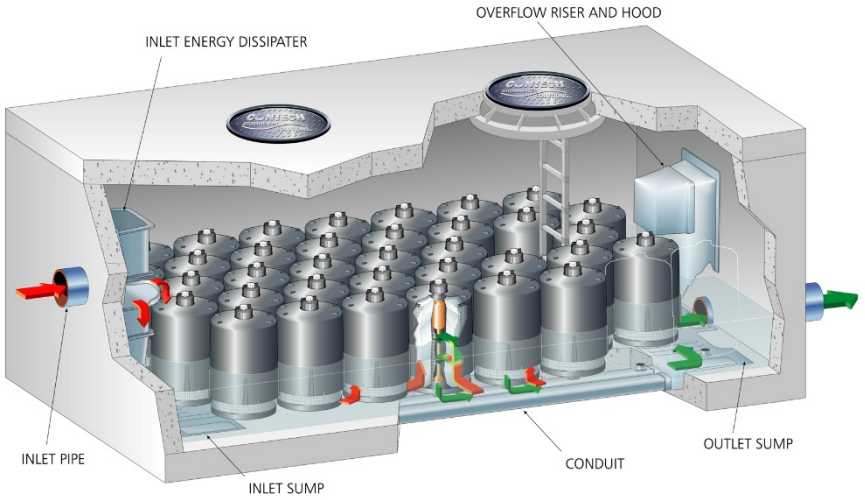
Municipality	Land Area (acres)	Impervious Cover (acres)	Percent Impervious Cover
Audubon Borough	955	395	41.4%
Audubon Park Borough	105	34	32.3%
Barrington Borough	13	3.1	23.3%
Camden City	2,351	1,022	43.5%
Collingswood Borough	774	295	38.2%
Gloucester City	1,328	433	32.6%
Haddon Heights Borough	514	194	37.7%
Haddon Township	1,271	488	38.4%
Haddonfield Borough	497	165	33.2%
Mount Ephraim Borough	274	104	37.4%
Oaklyn Borough	449	153	34.2%
Westville Borough	0.4	0.0	0.0%
Woodlynne Borough	142	62	43.7%
Total	8,674	3,349	38.6%

Municipality	Land Area (acres)	Impervious Cover (acres)	Percent Impervious Cover	Percent Contributed Total Acres	Percent IC Contributed Acres
Audubon Borough	955	395	41.4%	11.0%	11.8%
Audubon Park Borough	105	34	32.3%	1.2%	1.0%
Barrington Borough	13	3.1	23.3%	0.2%	0.1%
Camden City	2,351	1,022	43.5%	27.1%	30.5%
Collingswood Borough	774	295	38.2%	8.9%	8.8%
Gloucester City	1,328	433	32.6%	15.3%	12.9%
Haddon Heights Borough	514	194	37.7%	5.9%	5.8%
Haddon Township	1,271	488	38.4%	14.6%	14.6%
Haddonfield Borough	497	165	33.2%	5.7%	4.9%
Mount Ephraim Borough	274	104	37.4%	3.2%	3.1%
Oaklyn Borough	449	153	34.2%	5.2%	4.6%
Westville Borough	0.4	0.0	0.0%	0.0%	0.0%
Woodlynne Borough	142	62	43.7%	1.6%	1.8%
Total	8,674	3,349	38.6%		

Manufactured Treatment Devices (Hydrodynamic Separators)



Manufactured Treatment Devices (Filter Systems)



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
- Natural Retention Basins
- Green Streets





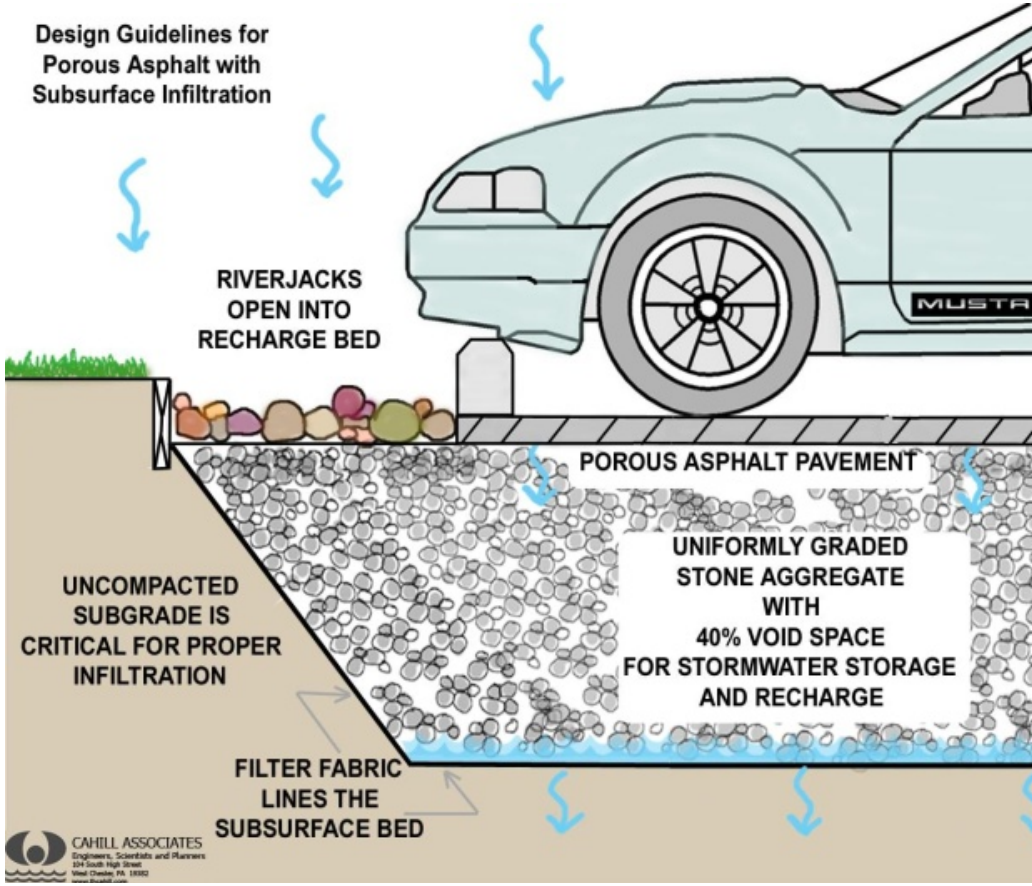



Parker Urban Greenscapes. 2009.

Stormwater Management for Flood Control

Stormwater Management for Flood Control

Stormwater Management for Flood Control



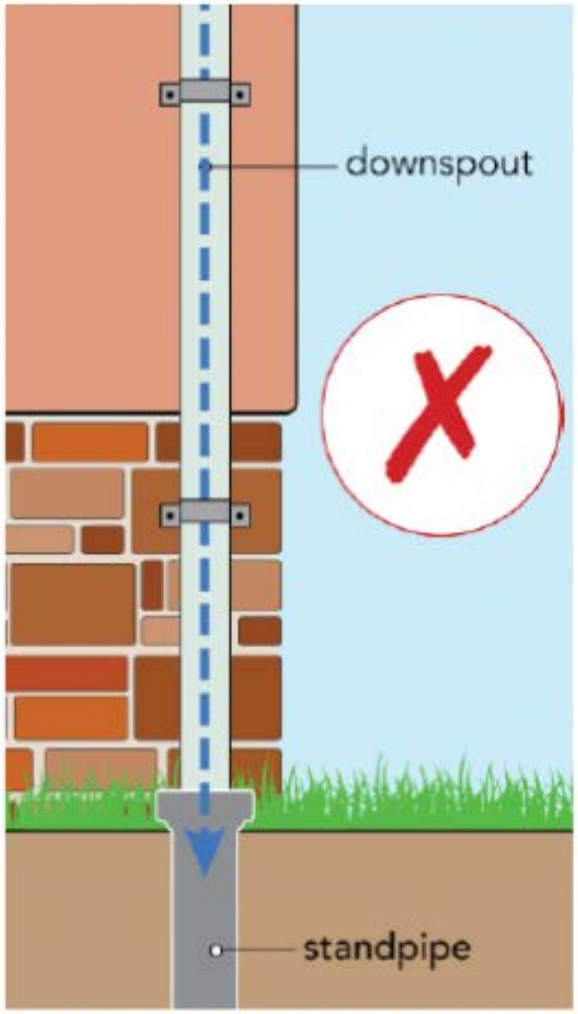
It is all about controlling runoff from impervious surfaces

Step 1: Depave

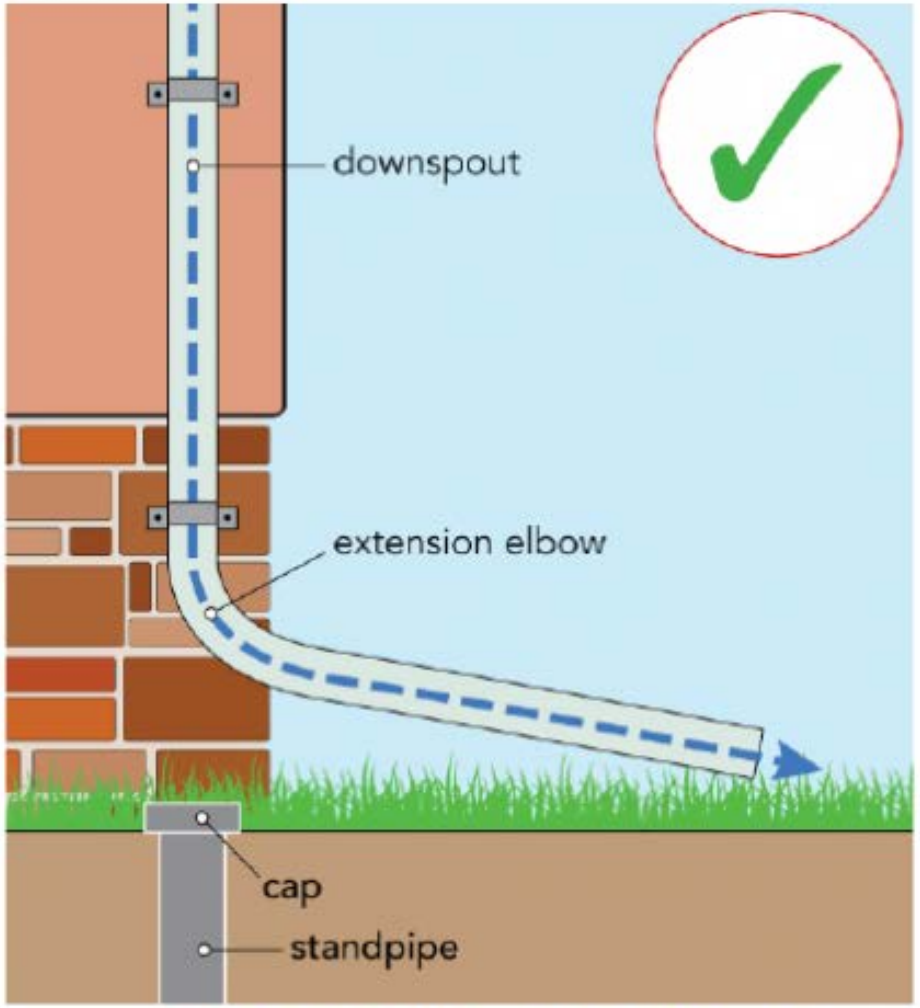





Step 2: Simple Disconnection



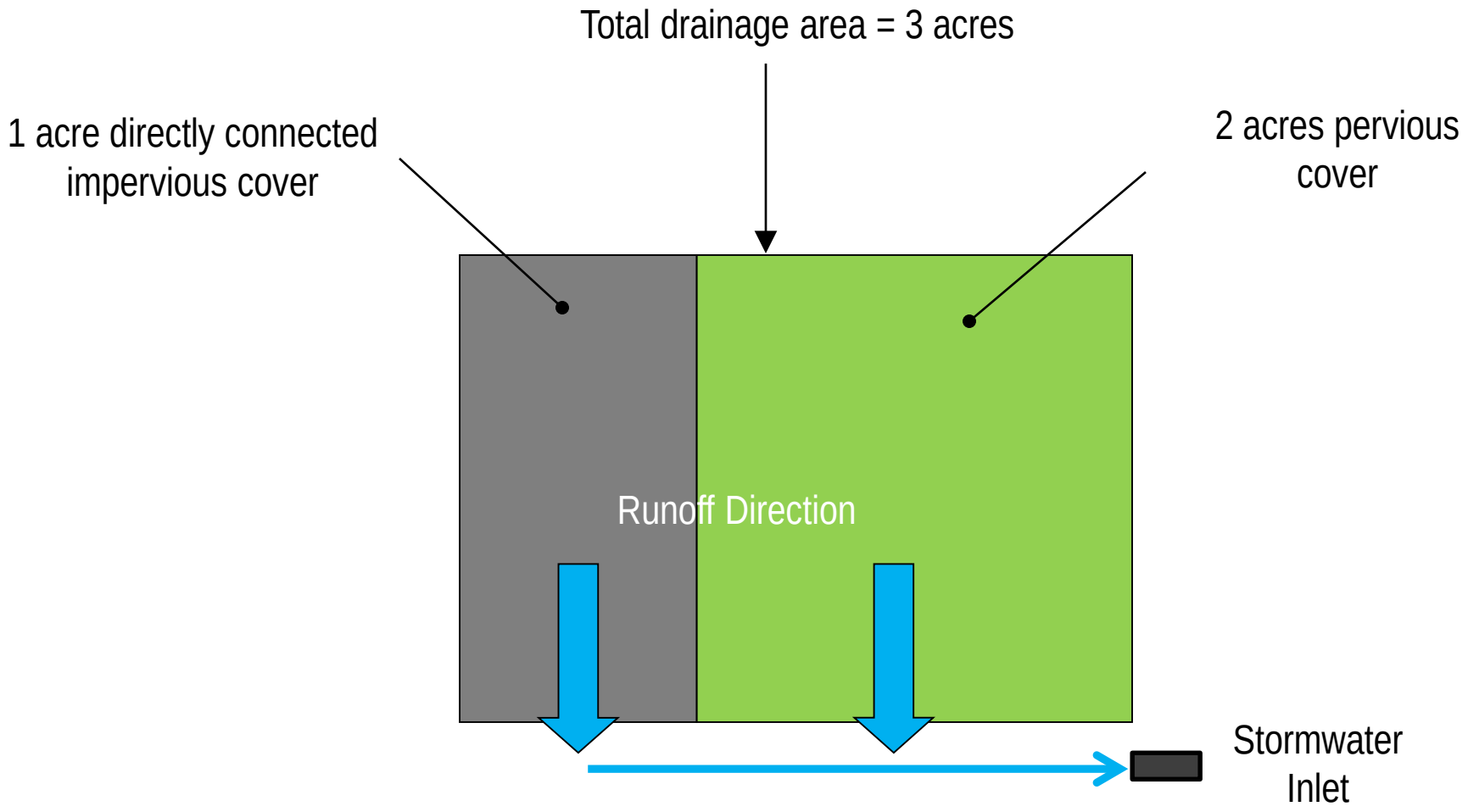
DOWNSPOUT CONNECTED TO SEWER SYSTEM



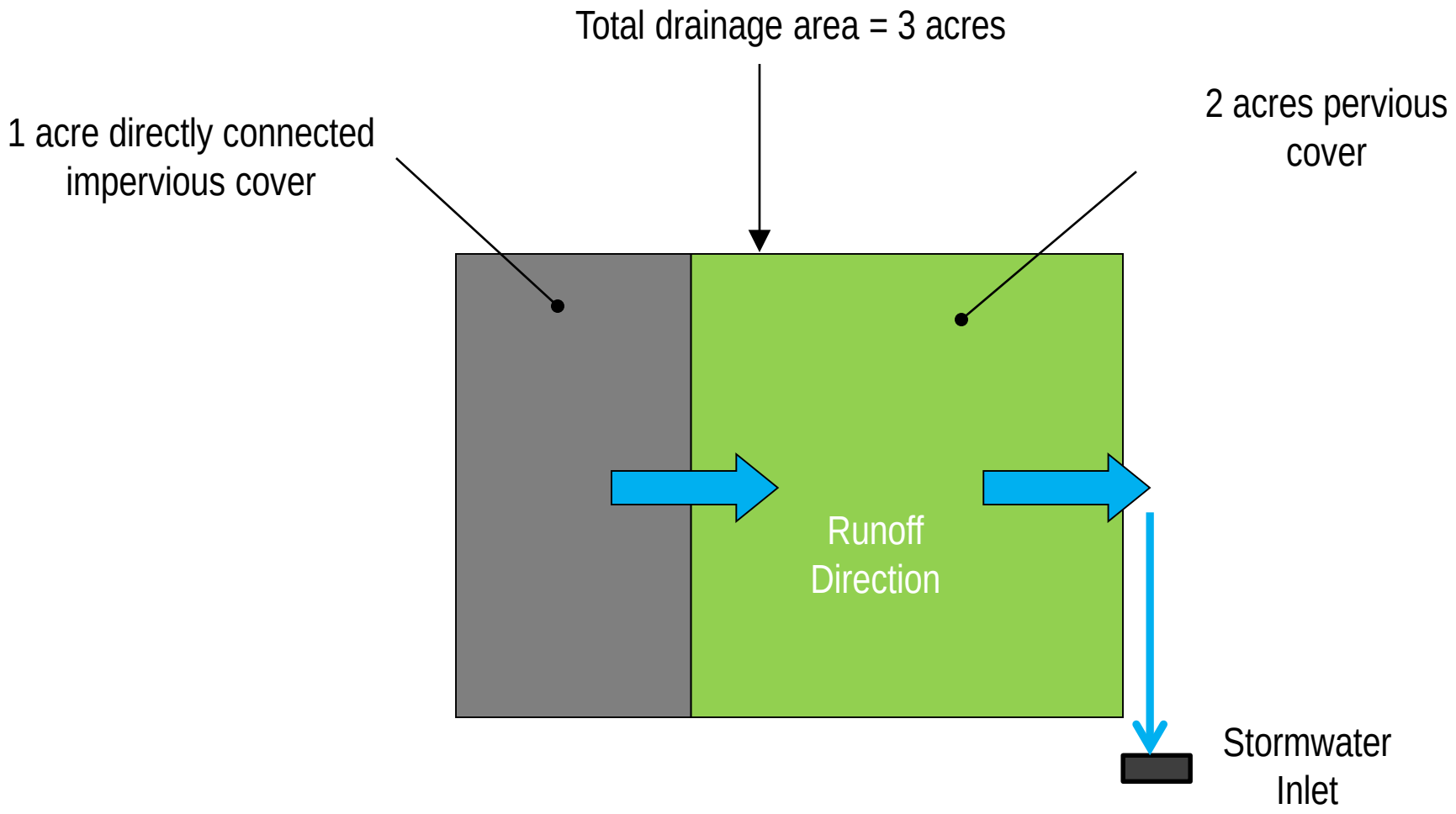
DOWNSPOUT DISCONNECTED FROM SEWER SYSTEM

Another Example of Simple Disconnection

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

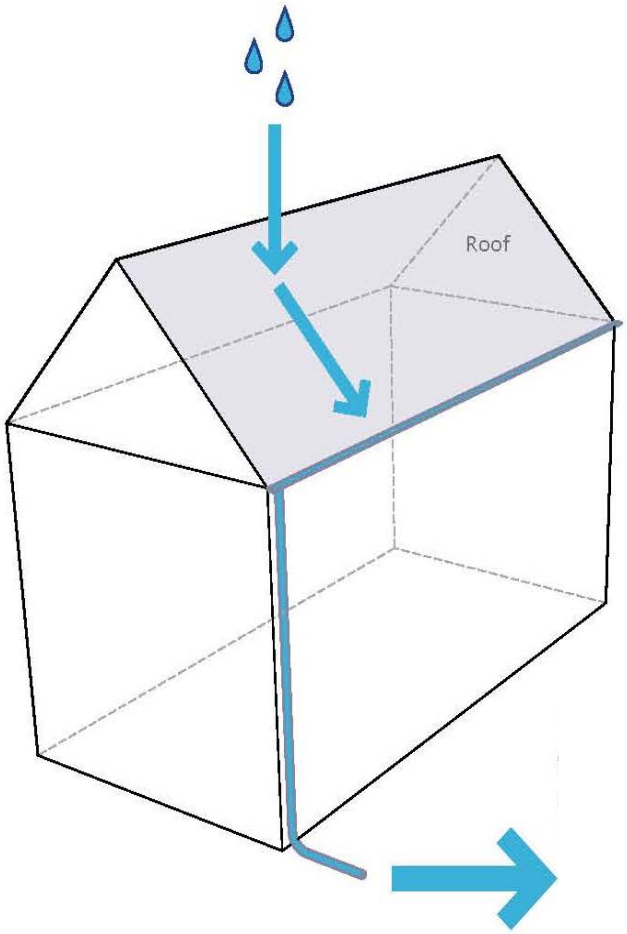


For 1.25 inch storm, 581 cubic feet of runoff = **4,360 gallons**



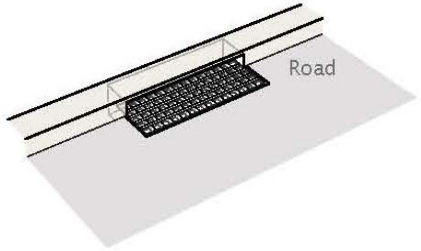
	Volume of Runoff		
Design Storm	**Connected (gallons)**	**Disconnected (gallons)**	**Percent Difference**
1.25 inches (water quality storm)	28,500	4,360	85%

Disconnect to a Rain Barrel or Cistern



Disconnect your downspout by installing a rain barrel

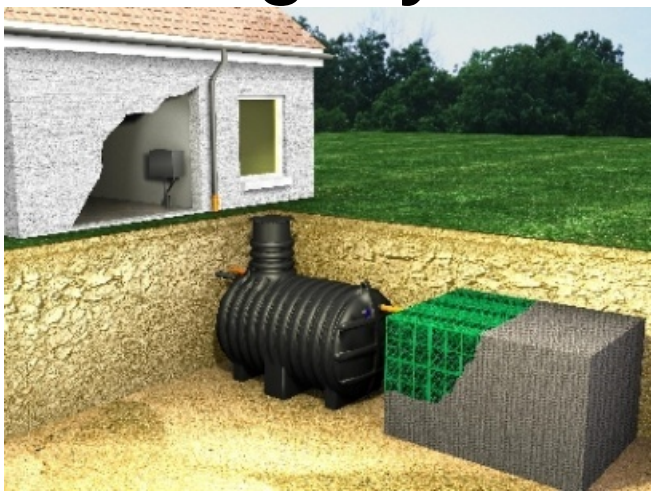
REDUCE THE AMOUNT OF RUNOFF ENTERING STORM SEWERS



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

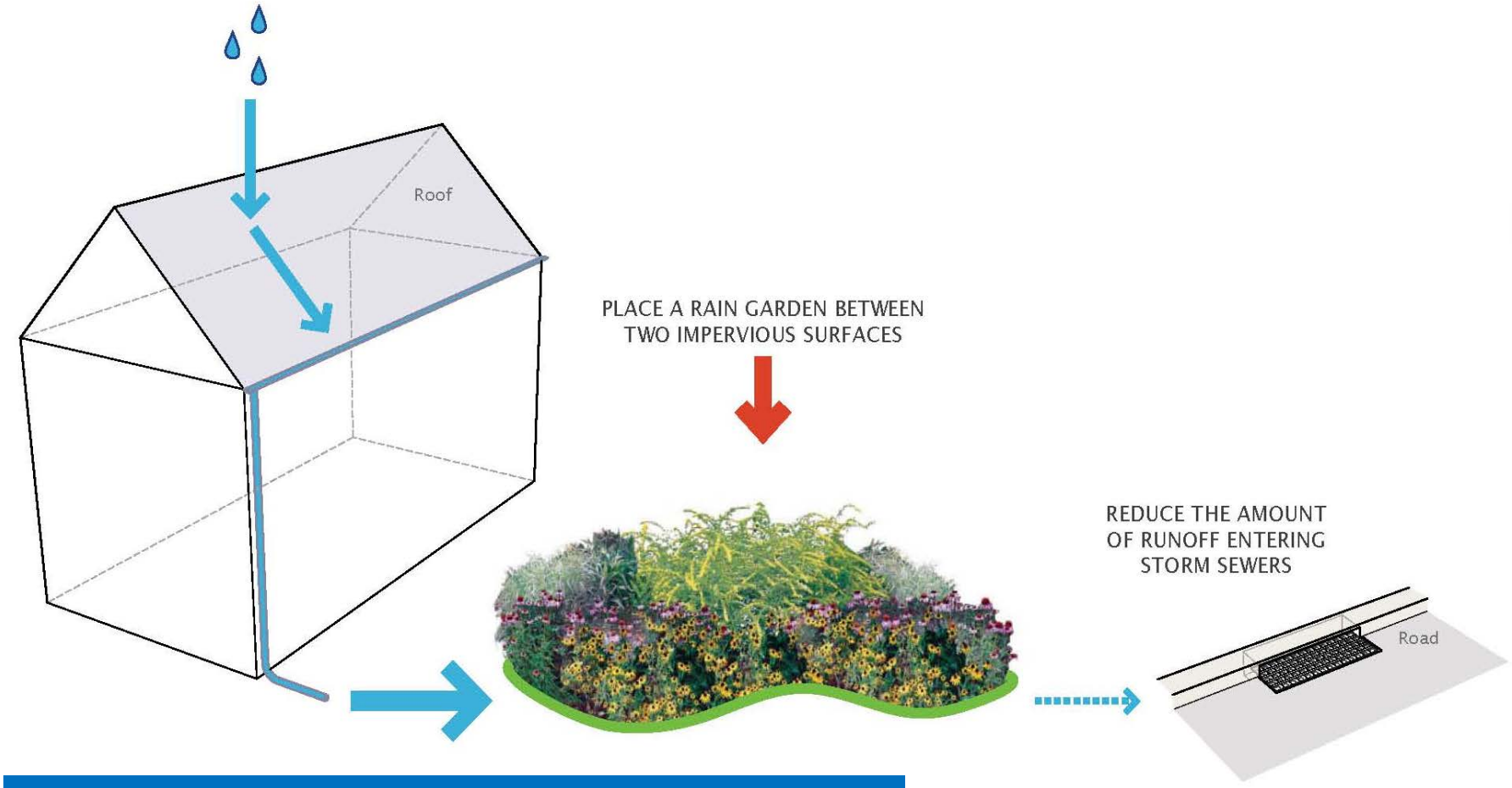
So Many Barrels to Choose From…

Or Larger Rainwater Harvesting Systems…



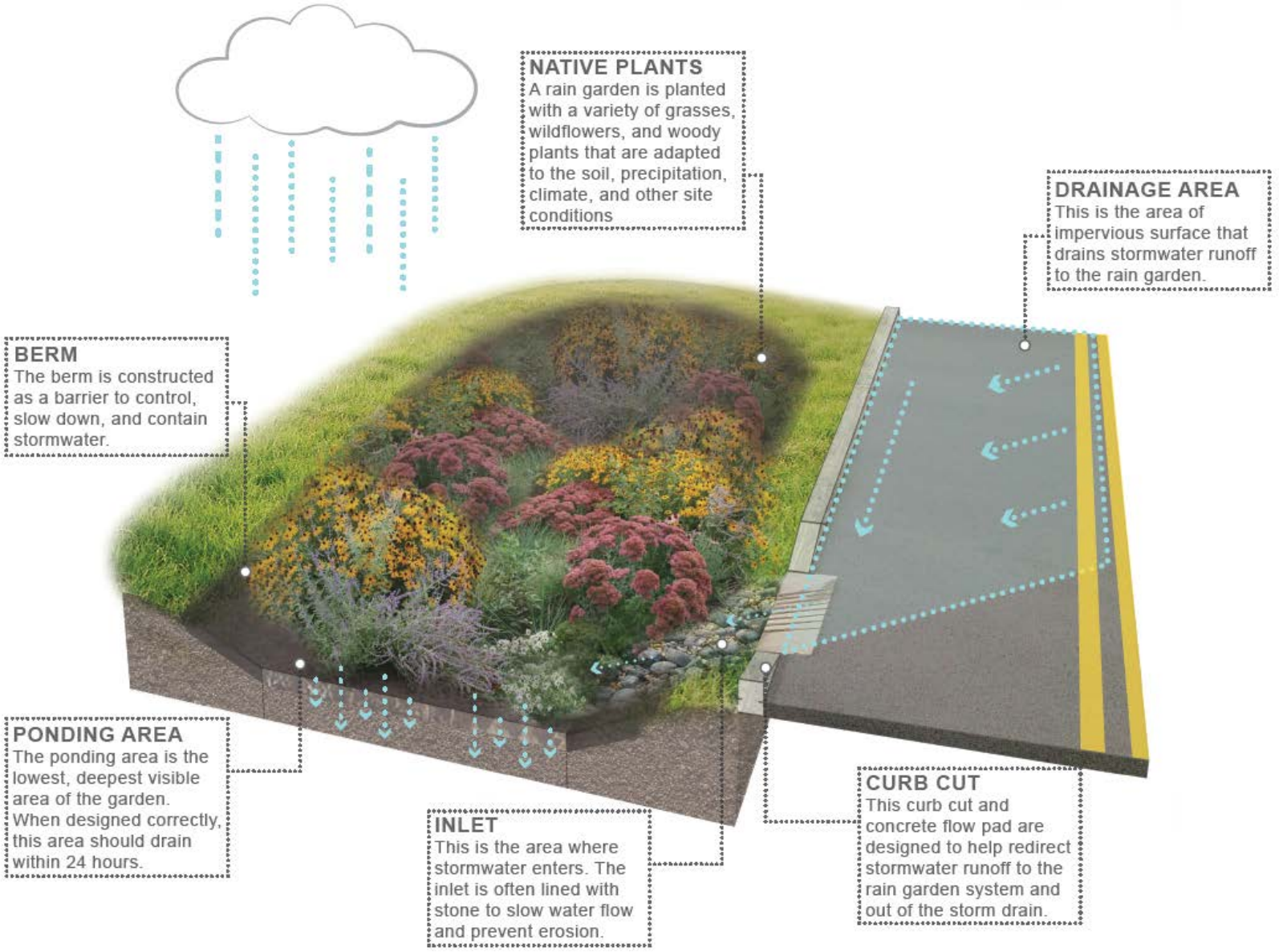

3M
Post-it

Disconnect to a Rain Garden



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

Bioretention Systems/Rain Gardens



Lots of Rain Gardens


10/12/2018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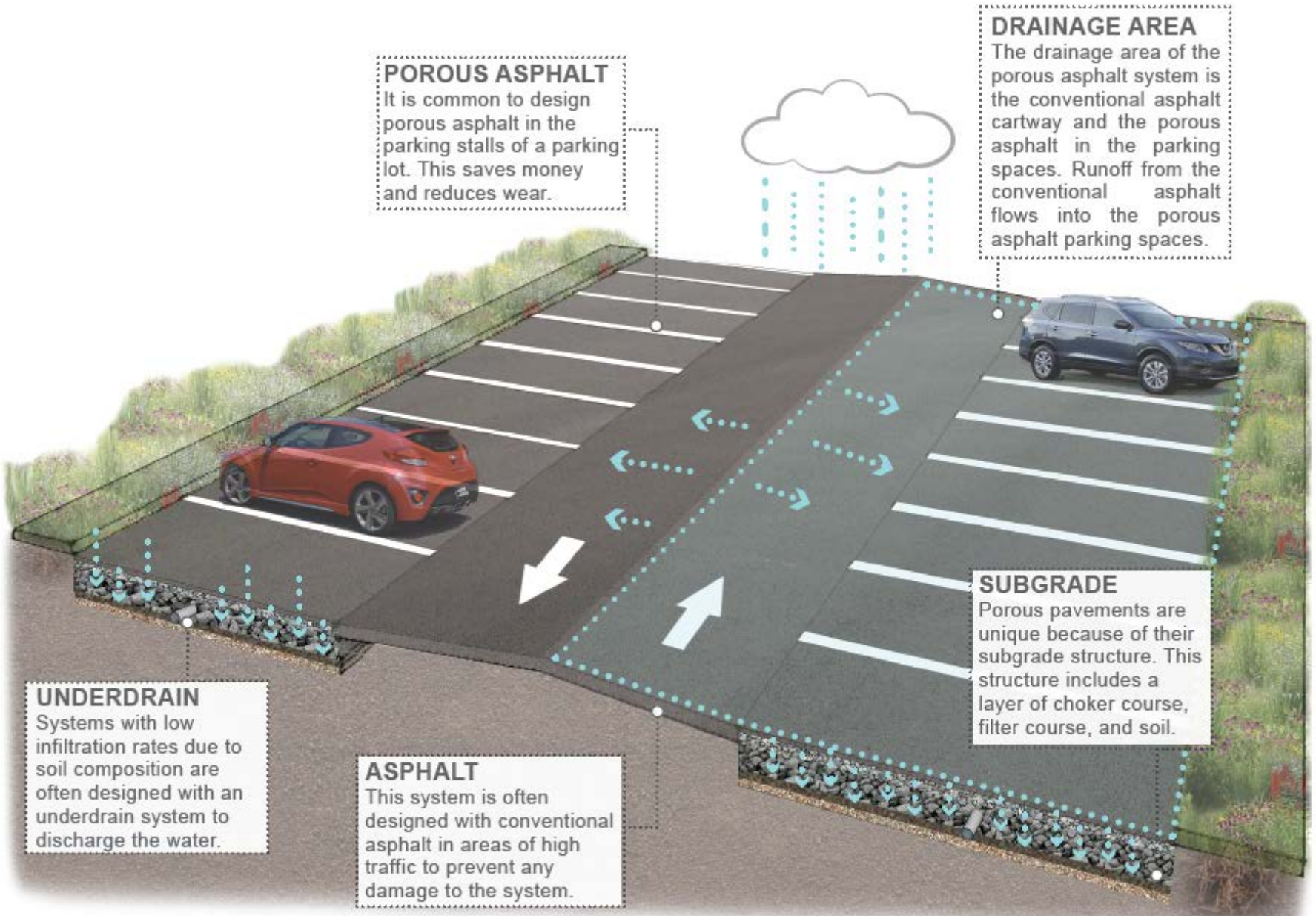
Step 3: Convert to Permeable Pavement



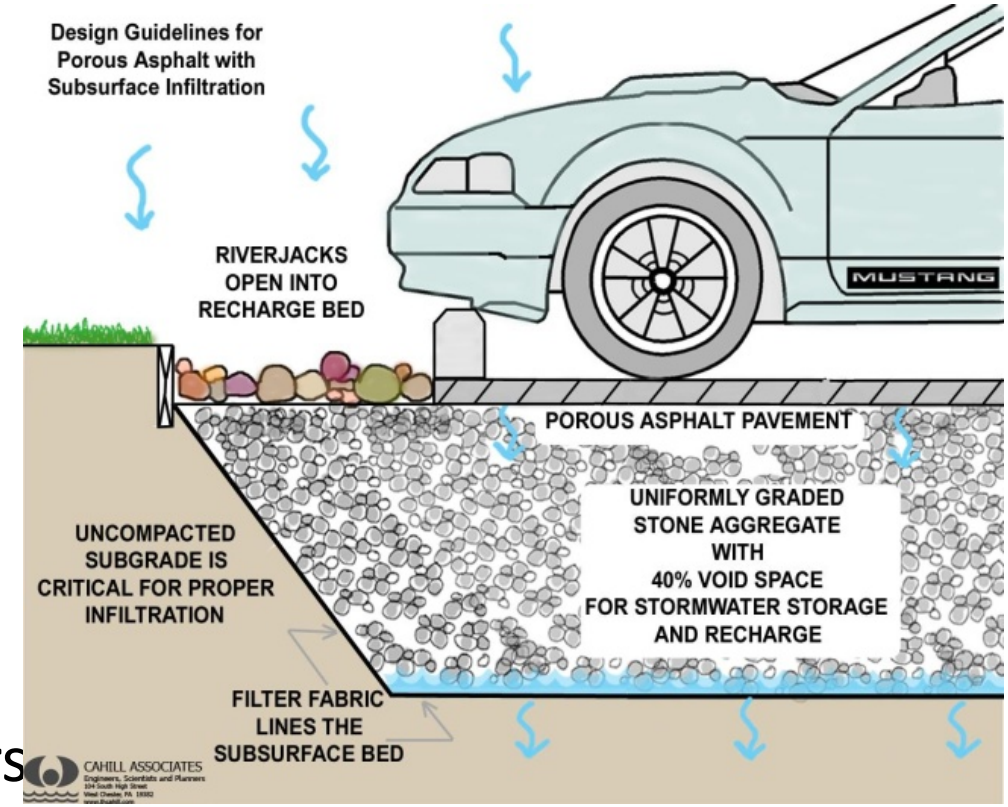
Permeable Pavements

- 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

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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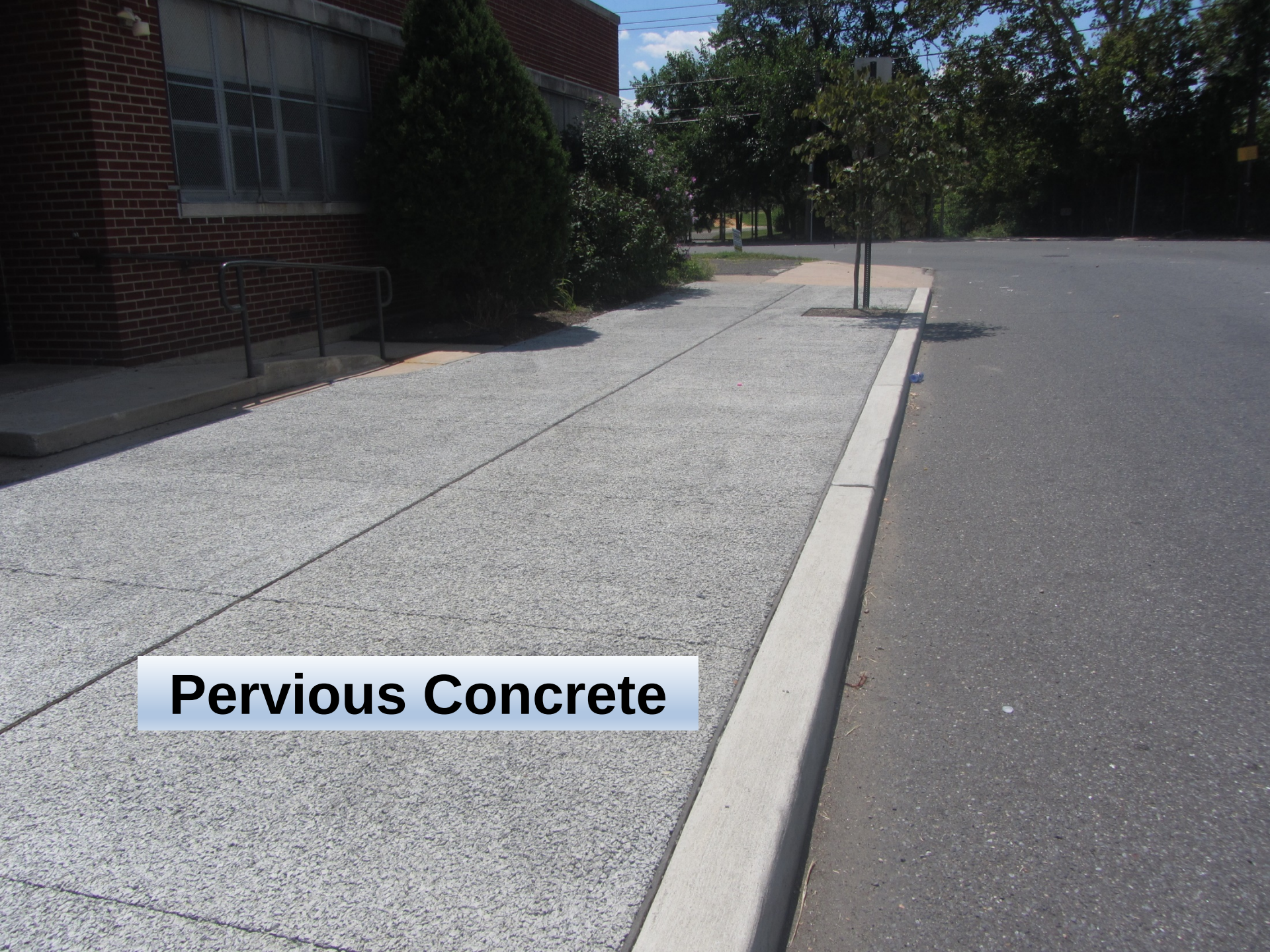

Pervious Concrete


Permeable Pavers


Grass Pavers

Next Steps

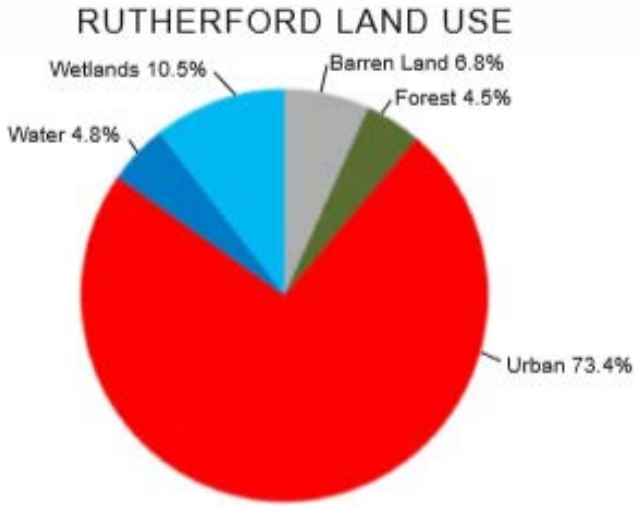
- Identify sites where stormwater management is needed
- Identify programs for homeowners so they can do their part
- Implement projects and programs

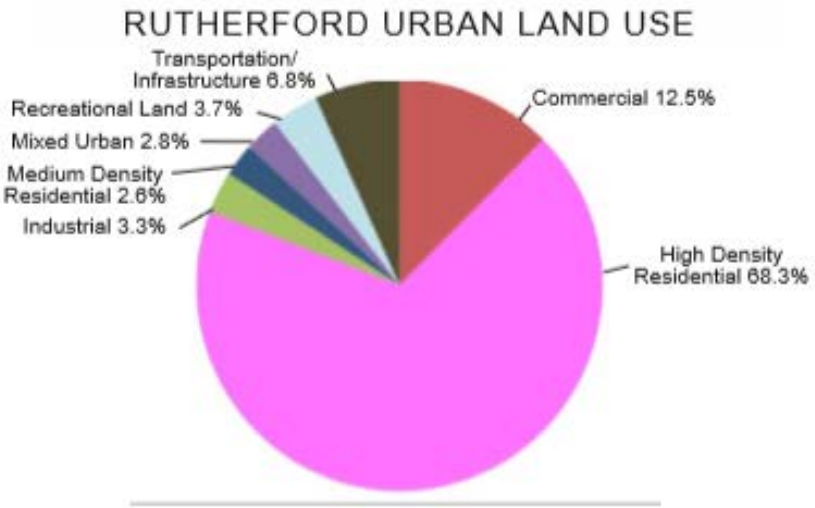
Impervious Cover Assessment (ICA)

A tool to draw attention to stormwater problems and obtain Sustainable Jersey Points

LAND USE IN RUTHERFORD

Rutherford is dominated by urban land uses. A total of 73.4% of the municipality's land use is classified as urban. Of the urban land in Rutherford, high density residential is the dominant land use. Urban land uses tend to have a high percentage of impervious surfaces.





RUTHERFORD SUBWATERSHEDS

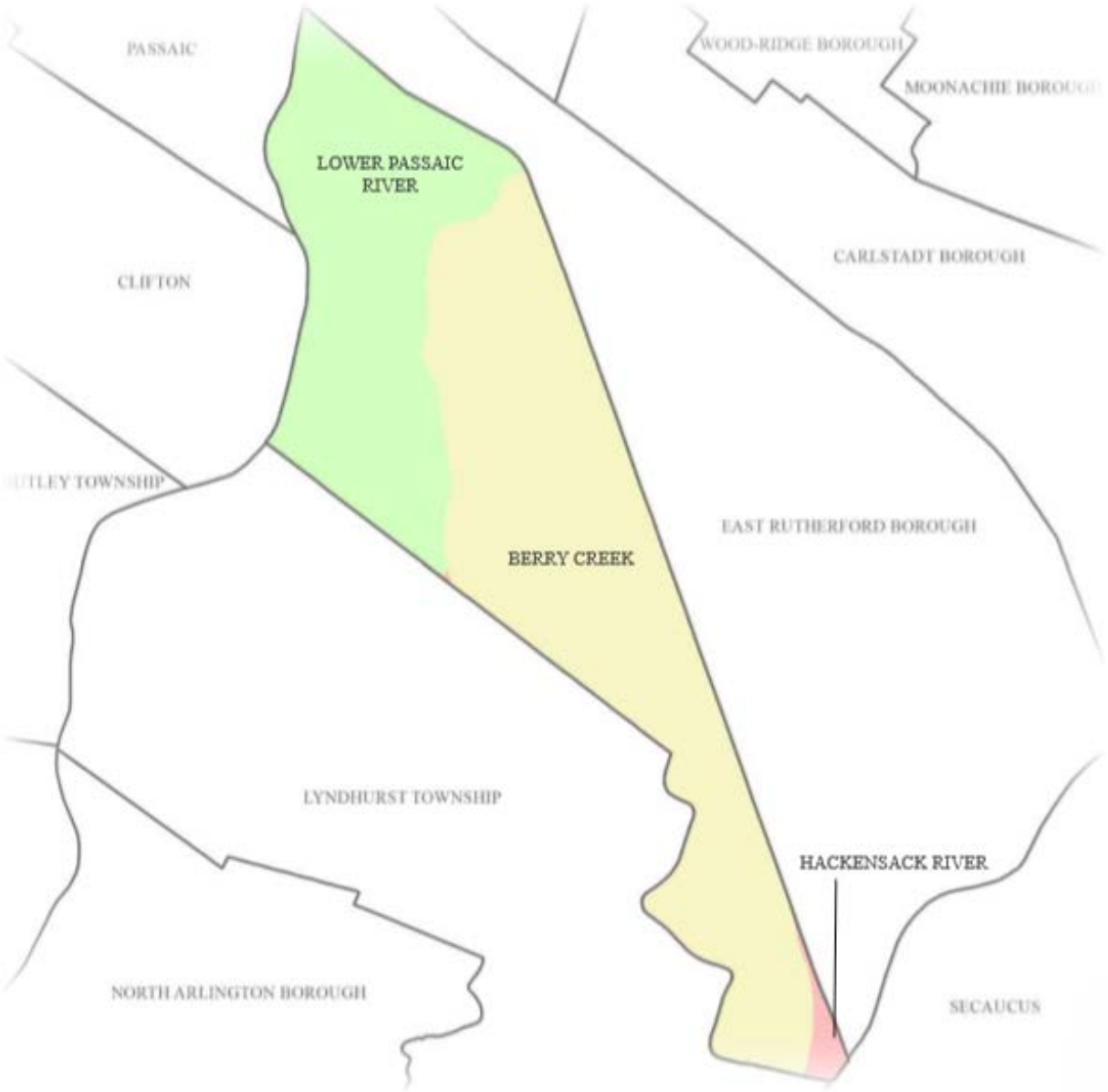


TABLE 1. IMPERVIOUS COVER ANALYSIS BY SUBWATERSHED FOR RUTHERFORD

Subwatershed	Total Area	Land Use Area	Water Area	Impervious Cover	
	(ac)	(ac)	(ac)	(ac)	(%)
Berry Creek	1,125.0	1,075.2	49.8	388.7	36.2%
Hackensack River	23.6	11.9	11.7	0.6	5.2%
Lower Passaic River	701.1	674.6	26.5	280.4	41.6%
Total	1,849.7	1,761.7	88.0	669.7	38.0%

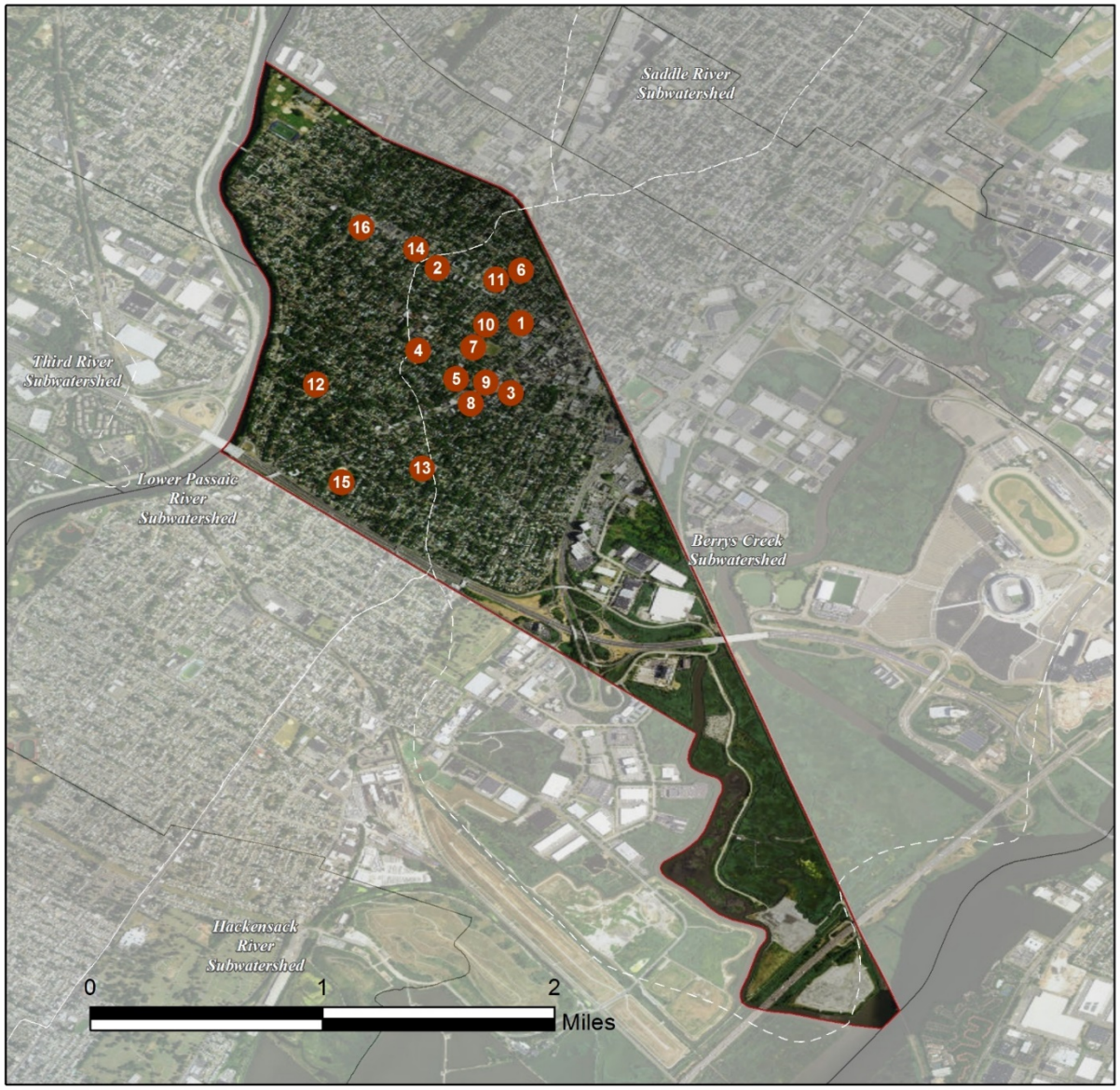
TABLE 2. STORMWATER RUNOFF VOLUMES FROM IMPERVIOUS SURFACES BY SUBWATERSHED IN RUTHERFORD

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 (3.3") (Mgal)	Total Runoff Volume for the 10-year Design Storm (5.1") (Mgal)	Total Runoff Volume for the 100 Year Design Storm(8.4") (Mgal)
Berry Creek	13.2	464.4	34.8	53.8	88.6
Hackensack River	0.0	0.7	0.1	0.1	0.1
Lower Passaic River	9.5	335.0	25.1	38.8	64.0
Total	22.7	800.1	60.0	92.7	152.7

Impervious Cover Reduction Action Plan (RAP)

A tool to identify project sites and obtain Sustainable Jersey Points

RUTHERFORD BOROUGH: GREEN INFRASTRUCTURE SITES



SITES WITHIN THE BERRYS CREEK SUBWATERSHED:2

1. Abundant Grace Christian Church
2. Canaan Presbyterian Church
3. First Presbyterian Church of Rutherford
4. Grace Episcopal Church
5. Living Gospel Baptist Church
6. Mt Ararat Baptist Church
7. Rutherford High School
8. Rutherford Municipal Court
9. Schoolhouse Early Learning LLC
10. St. John's Lutheran Church
11. Washington School

SITES WITHIN THE PASSAIC RIVER SUBWATERSHED:

12. Licoln School
13. Pierrepont School
14. Rutgerford Congragation Church
15. Tamblyn Field
16. Union Elementary School

bioretention system

rainwater harvesting

drainage area

property line

2015 Aerial: NJOIT, OGIS

0' 20' 40'

FIRST PRESBYTERIAN CHURCH OF RUTHERFORD

1 East Passaic Avenue
Rutherford, NJ 07070

Two rain gardens can be installed adjacent to the building to capture, treat, and infiltrate roof runoff. Rainwater can be harvested by installing a cistern to the west of the building. The water can then be used for watering gardens, washing vehicles, or for other non-potable uses. 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	From the 1.25" Water Quality Storm	For an Annual Rainfall of 44"
75	28,777	1.4	14.5	132.1	0.022	0.79

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	0.100	17	7,458	0.28	950	$4,750
Rainwater harvesting	0.034	6	2,498	0.09	2,500 (gal)	$5,000

CURRENT CONDITION

CONCEPT DESIGN

Residential Programs

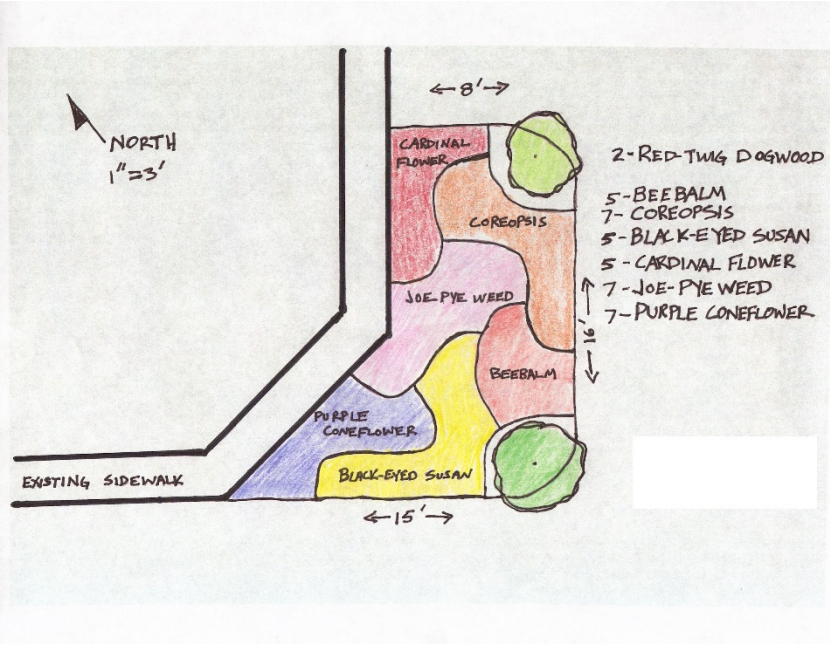
- Rain Garden Program
  - Rebate Program
  - Neighborhood Rain Garden Program
- Rain Barrel Program
  - Build-A-Rain Barrel Workshop
  - Rain Barrel Rebate Program
  - One Barrel at a Time Co-op

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

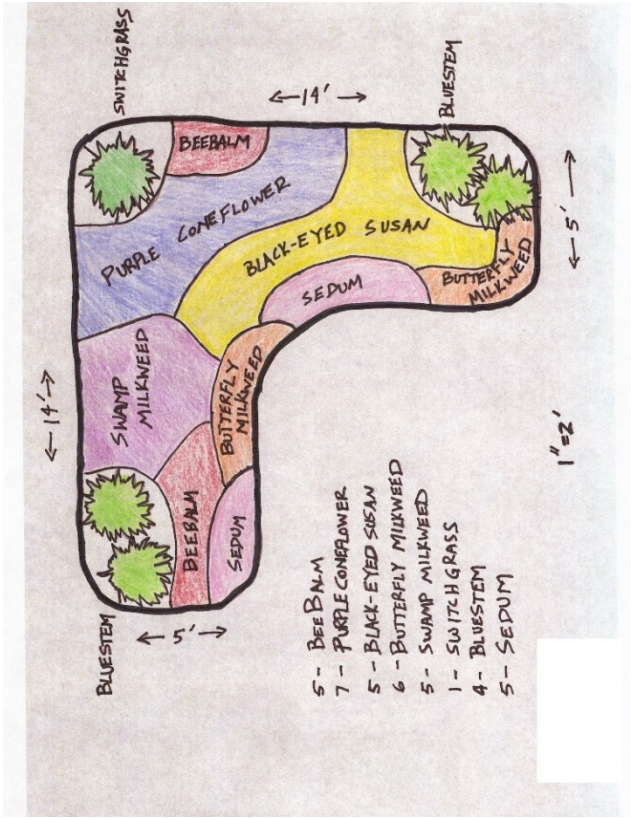
Design



Installed Rain Garden

Design Example for Parking Lot Runoff

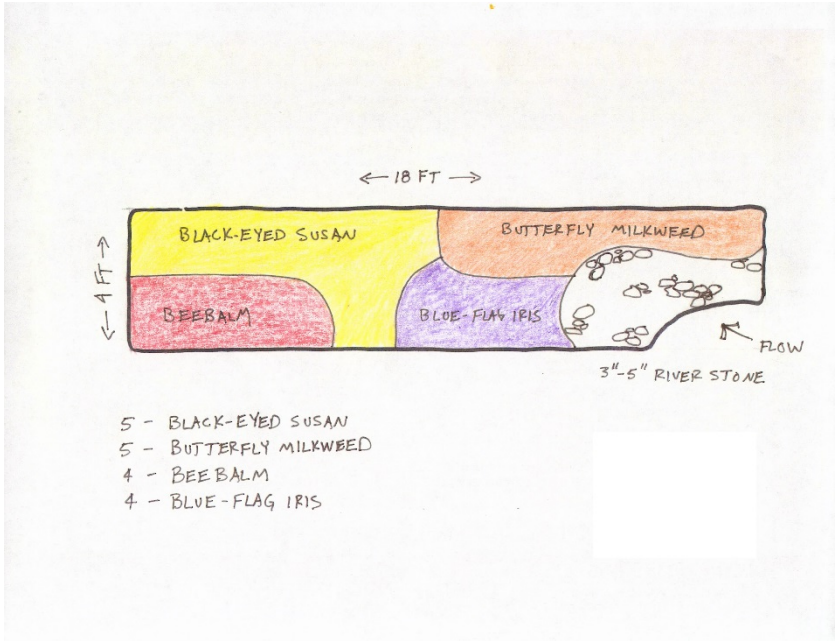
Design



Installed Rain Garden

Roof, Sump Pump and Driveway Runoff – WOW!

Design

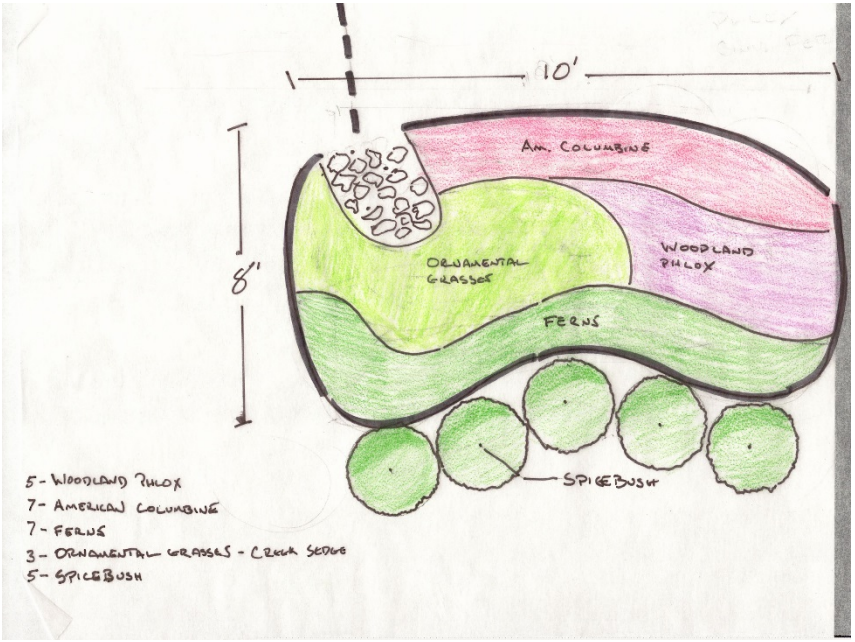


Installed Rain Garden


IVAN ST

Another Roof Runoff Example

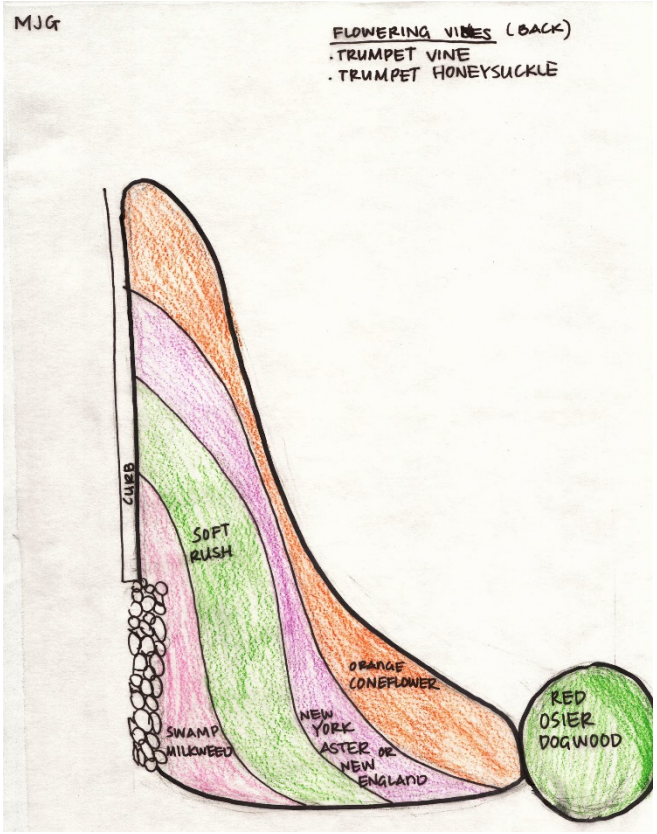
Design



Installed Rain Garden

Another Driveway Runoff Example

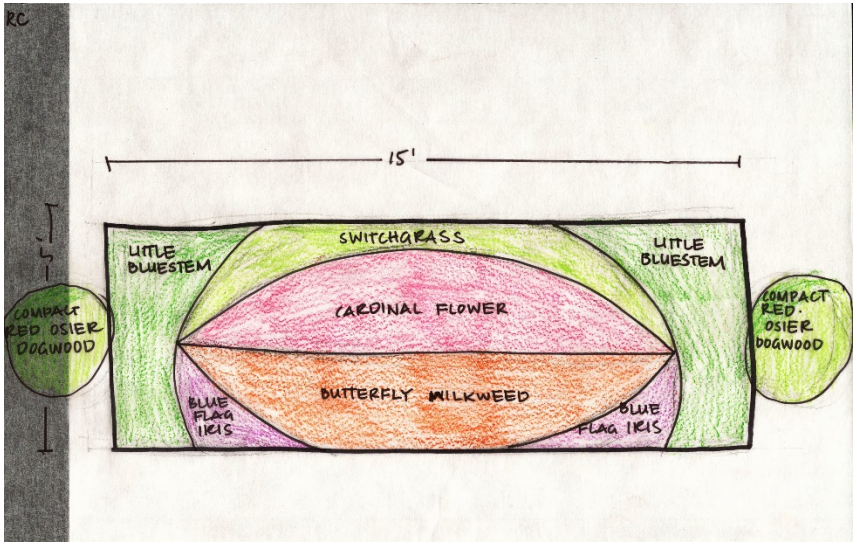
Design



Rain Garden Installed

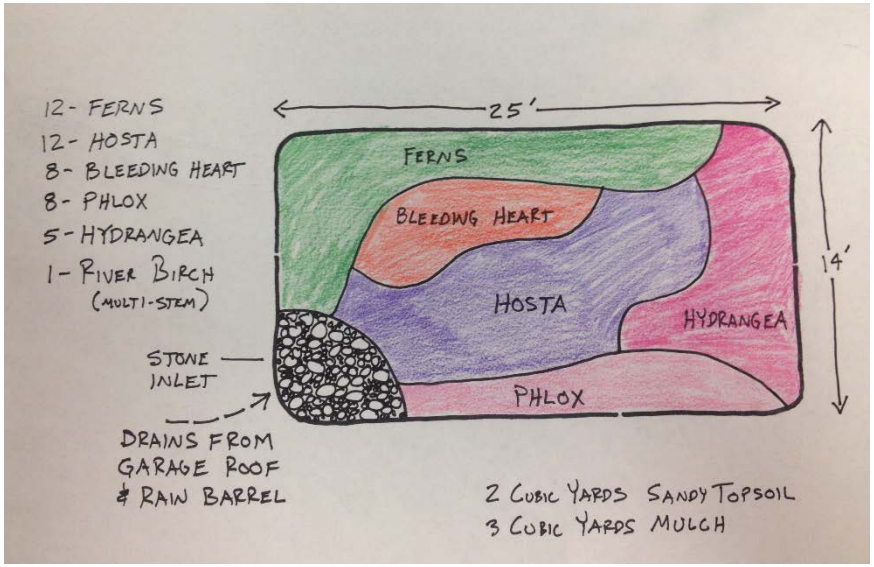
Roof Runoff from Rain Barrel Overflow

Design



Installed Rain Garden

Garage Roof Runoff and Rain Barrel Overflow Example



1189 Jefferson Garden

1244 Briarcliff

School Programs

Final Thoughts

- Local champions are needed to implement projects and to maintain the longevity of the program including maintenance of projects
- Rutgers has a “Green Infrastructure Champion” Training Program
- Go to: www.water.rutgers.edu


QUESTIONS?