Green Infrastructure Champions Program

This program is partially funded by the Rutgers New Jersey Agricultural Experiment Station, The Geraldine R. Dodge Foundation, NJ Sea Grant Consortium, The William Penn Foundation and is a collaboration of the Rutgers Cooperative Extension Water Resources Program and the Green Infrastructure Subcommittee of Jersey Water Works.

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Sea Grant
NJ Sea Grant Consortium

Please enter your full name and affiliation in the chat. This is how will take attendance.

The Geraldine R. DODGE FOUNDATION
IMAGINE A BETTER NEW JERSEY

JERSEY WATER WORKS
Smart infrastructure. Strong communities.

WILLIAM PENN FOUNDATION

Green Infrastructure Champion Training: Part 6
"Green Infrastructure Projects for Schools"

March 25, 2022
Virtual Class

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.

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New Jersey Agricultural Experiment Station

Water Resources Program

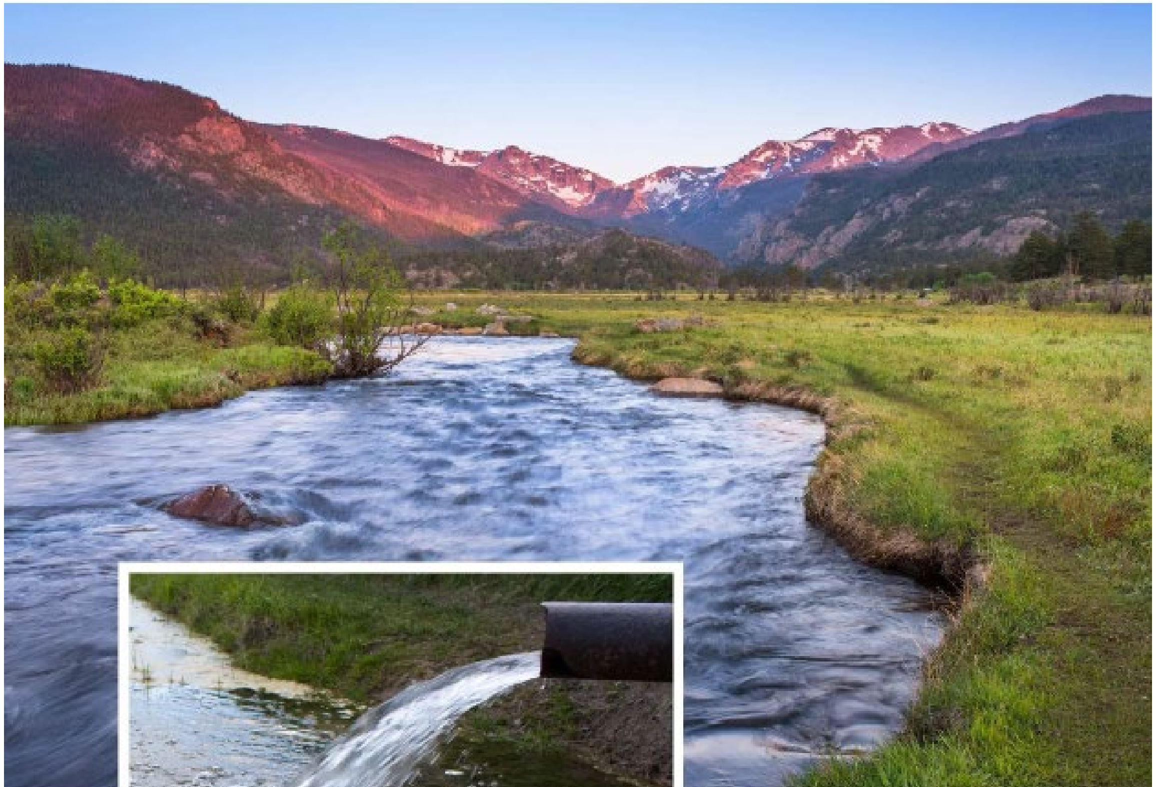
Water Resources Program

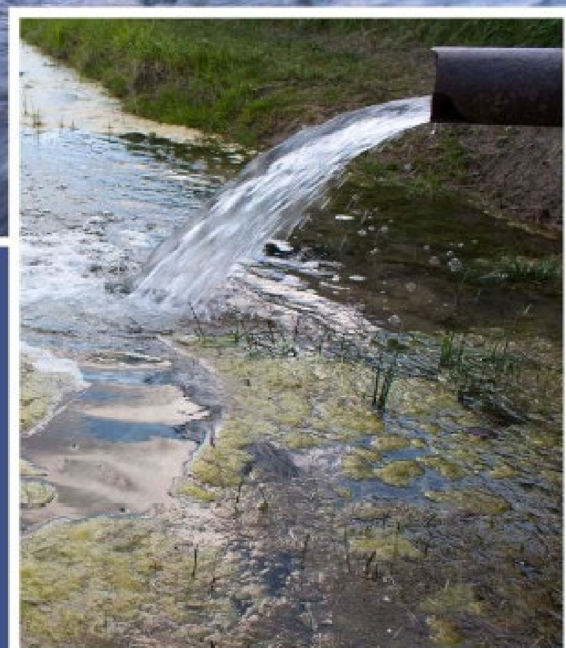
Our mission is to identify and address water resources issues by engaging and empowering communities to employ practical science-based solutions to help create a more equitable and sustainable New Jersey.

Happy 50th Anniversary, Clean Water Act!

Goals of the Federal Clean Water Act:

1. To eliminate the discharge of pollutants into the nation's waters (zero discharge of pollutants by 1985)
2. To achieve water quality levels that are fishable and swimmable by mid-1983





The Clean Water Act at 50:

Promises Half Kept at the Half-Century Mark

EIP ENVIRONMENTAL INTEGRITY PROJECT

EMBARGOED FOR RELEASE:
March 17, 2022

TABLE 1: U.S. WATERS CLASSIFIED AS "IMPAIRED" BECAUSE OF TOO MUCH POLLUTION

Waterbody Type (unit)	Total Assessed	Total Impaired	Percent Impaired
Rivers, Streams, and Creeks (miles)	1,401,320	703,417	50%
Lakes, Ponds, and Reservoirs (acres)	20,403,021	11,168,767	55%
Bays, Estuaries, and Harbors (sq. miles)	76,557	19,470	25%

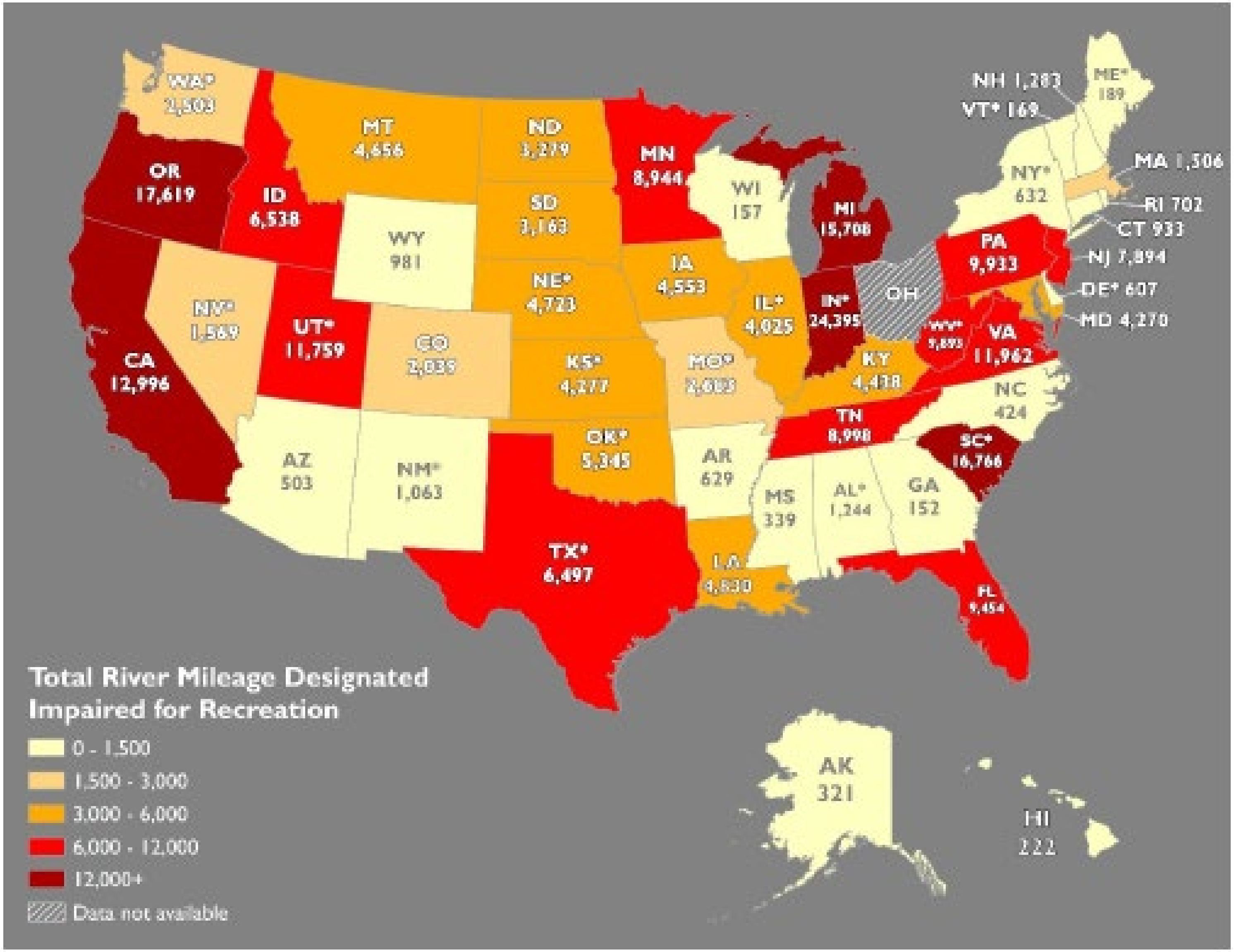
Source: The most recent available state Integrated Water Reports filed with EPA. Note: impairments include of waters assessed in the most recent cycle (six to 10 years, depending on the state), plus those assessed in earlier cycles.

TABLE 2: U.S. WATERS DESIGNATED AS IMPAIRED, BY USE

Designated Use	River & Stream		Lake & Reservoir		Bay & Estuary Square	
	Miles Assessed	% Impaired	Acres Assessed	% Impaired	Sq. Miles Assessed	% Impaired
Aquatic Life	1,174,369	42%	16,712,149	34%	33,026	40%
Drinking Water	337,339	29%	8,831,357	12%	-	-
Water Recreation	653,443	38%	15,373,880	25%	31,369	20%
Fish Consumption	419,403	47%	10,943,113	68%	25,069	43%

Source: Most recent state Integrated Reports filed with EPA. Percentage impaired is of assessed waterways.

MAP 1: RIVER & STREAM MILES CLASSIFIED AS IMPAIRED FOR SWIMMING AND WATER CONTACT RECREATION[19]



States with asterisks reported useable data only for swimming and other primary water contact recreation impairments, not for secondary water contact recreation, such as kayaking. Ohio is not included because it does not count impairments like the other states.

TABLE 8: STATES WITH MOST SQUARE MILES OF IMPAIRED ESTUARIES

State	Assessed (Sq. Miles)	Impaired (Sq. Miles)	% Impaired
Louisiana	6,079	5,574	91.7%
Florida	2,544	2,533	99.6%
Maryland	2,403	2,404	100.0%
Virginia	2,449	2,137	87.3%
Texas	2,610	1,248	47.8%
North Carolina	3,210	949	29.6%
California	836	834	99.8%
Delaware	775	775	100.0%
Alabama	784	634	81.0%
New Jersey	650	630	97.0%

Source: Most recent state Integrated Reports filed with EPA.

River and Stream Miles by State

State	For Any Designated Use				Specific Designated Uses		
	Total Miles	Miles Assessed for Any Use	% Assessed for Any Use	% Impaired for Any Use	Designated Use	Miles Assessed	% Impaired
New Jersey	19,425	19,425	100%	95%	Water Contact Recreation	19,426	41%
					Public Drinking Water	14,693	44%
					Aquatic Life	19,426	61%
					Fish Consumption	19,426	42%
New Mexico	95,172	6,250	7%	65%	Water Contact Recreation	4,529	23%
					Public Drinking Water	2,220	1%
					Aquatic Life	2,309	62%
New York	87,126	57,186	66%	11%	Water Contact Recreation	15,197	4%
					Public Drinking Water	7,157	5%
					Aquatic Life	57,186	7%
					Fish Consumption	57,186	2%

Lake and Reservoir Acres by State

State	For Any Designated Use				Specific Designated Uses		
	Total Acres	Acres Assessed for Any Use	% Assessed for Any Use	% Impaired for Any Use	Designated Use	Acres Assessed	% Impaired
New Hampshire*	188,545	167,462	89%	90%	Water Contact Recreation	148,175	42%
					Public Drinking Water	170,179	0%
					Aquatic Life	166,521	89%
					Fish Consumption	185,081	100%
New Jersey	47,620	47,620	100%	97%	Water Contact Recreation	47,619	46%
					Public Drinking Water	46,578	43%
					Aquatic Life	47,619	61%
					Fish Consumption	47,619	63%
New Mexico	89,042	68,381	77%	86%	Water Contact Recreation	61,054	0%
					Public Drinking Water	2,236	0%
					Aquatic Life	47,417	69%
New York	687,102	578,426	84%	55%	Water Contact Recreation	522,188	4%
					Public Drinking Water	393,039	5%
					Aquatic Life	578,426	3%
					Fish Consumption	578,426	39%


New Jersey

"The Clean Water Act at 50: Promises Half Kept at the Half-Century Mark." According to this document (see attached), NJ is ranked #2 behind Delaware in most impaired waterways at 95% (Delaware is 97%). When I started the Rutgers Cooperative Extension Water Resources Program 20-years ago, 95% of NJ Waterways were impaired. Here we are 20-years later and according to this report, we have made no headway. Now what? I guess we just must try harder. We need to up our game! Think about where we are and where we need to go. We have a big following of impressible stakeholders. Let's figure out how to engage these stakeholders to take action and clean up NJ's waters.

Chris

I agree, I think it's a good opportunity to take a step back and say what is really causing these waterways to be impaired and what solutions will actually clean them in a reasonable time period.

What needs to happen in research, planning, politics, and real world action to make that happen? I don't think real world solutions can happen without a combination of all of them, and we certainly have a role to play in each of them.

Why New Jersey Schools?

- 590 School Districts
- 2,526 Public Schools
  - 2,005 Elementary Schools
  - 511 Secondary Schools
- 88 Charter Schools
- Public School Enrollment = 1.37 million
- Charter School Enrollment = 45,982
- Full-time classroom teachers = 116,351

Need more math teachers at NJ Department of Education

More on “why schools”

- Mostly old buildings and parking lots with little or no stormwater management
- Dedicated source of funding ($11.6 billion in state aid in 2022-2023 + local property taxes)
- Educate the youth and the adults will follow
- Enhance all levels of teaching with outdoor education
- Innovative, interdisciplinary “outdoor classrooms”
- Highly visible sites
- Separate government – school board
- Free labor

It is all about controlling runoff from impervious surfaces

Step 1: Depave

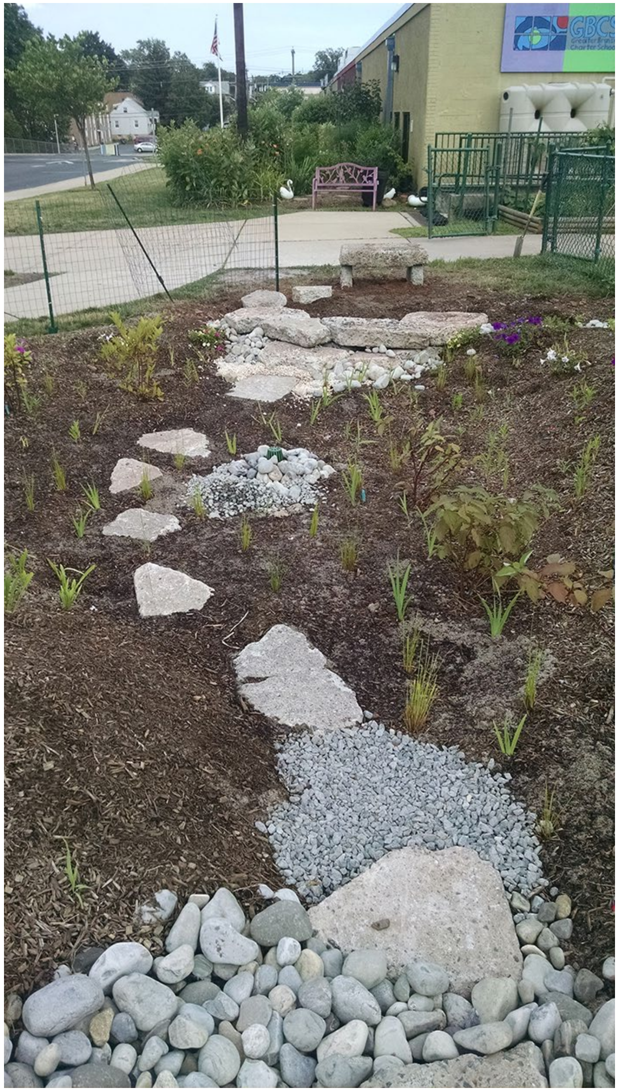





Make Something with your De-Pavement

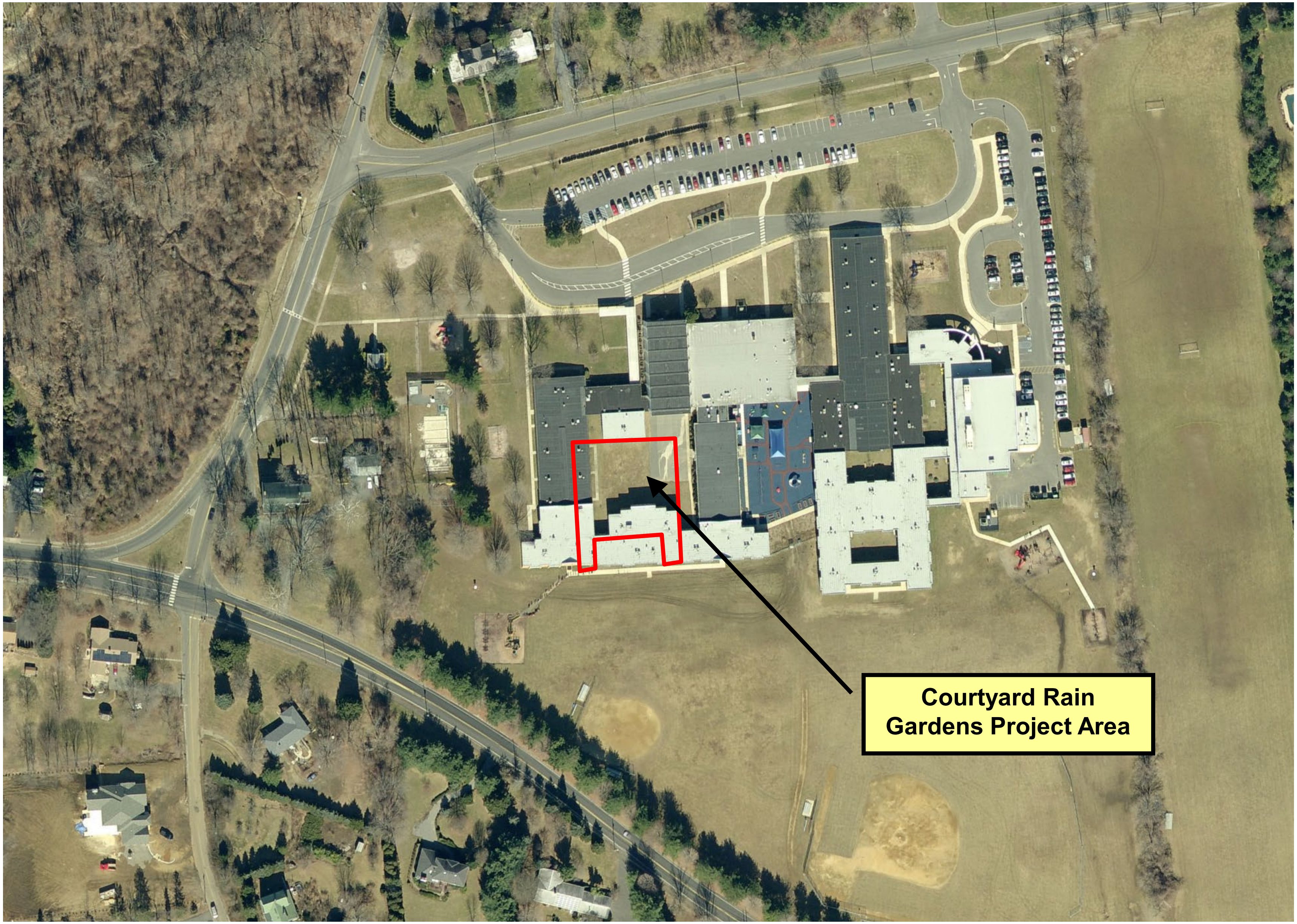
Greater Brunswick Charter School

Make Something with your De-Pavement



Greater Brunswick Charter School

Village Elementary School -



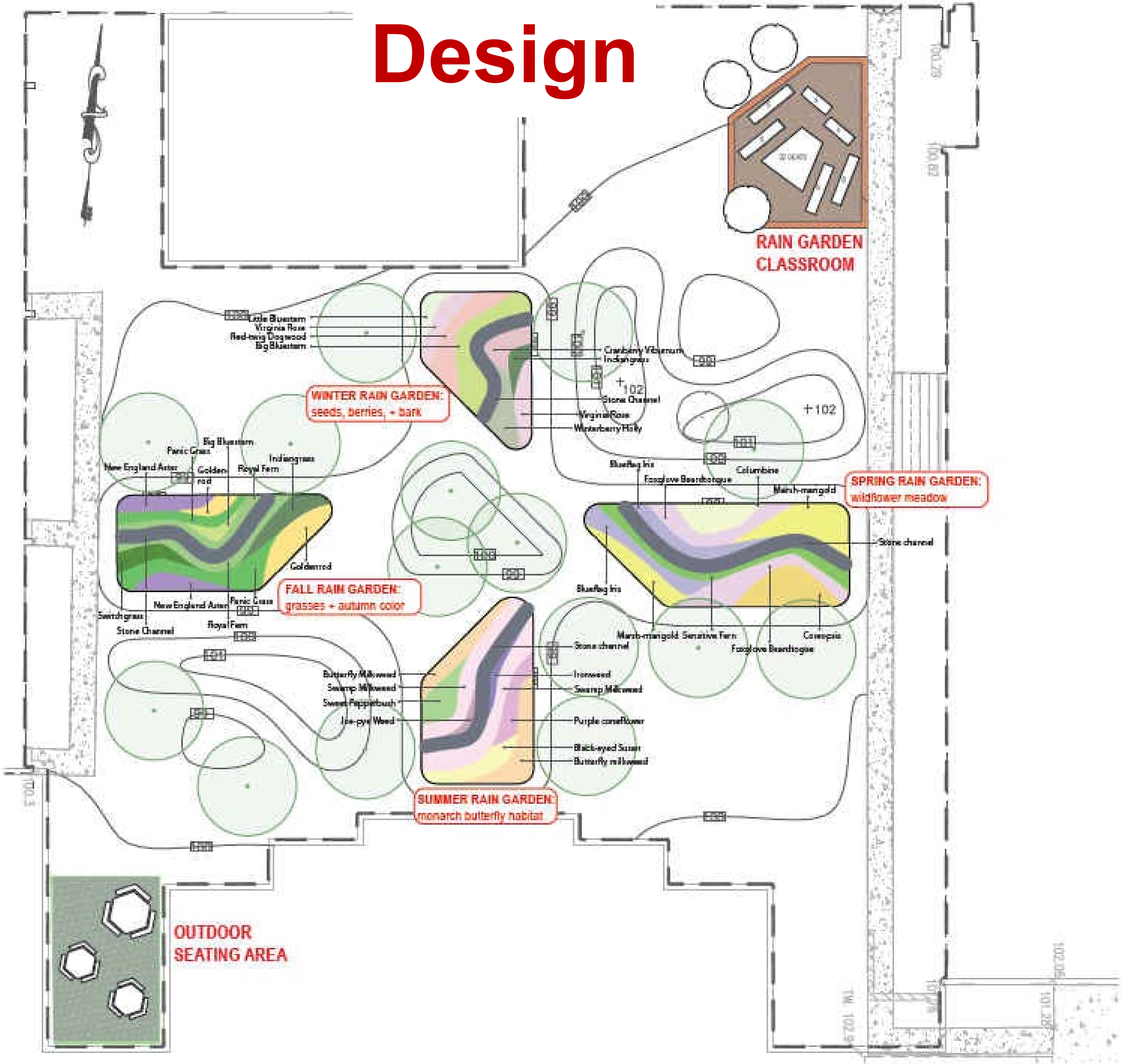
Existing Courtyard

Existing Courtyard

Existing Courtyard

Existing Courtyard

Design


RAIN GARDEN CLASSROOM
WINTER RAIN GARDEN: seeds, berries, + bark
Little Bluestem
Virginia Rose
Red-twig Dogwood
Big Bluestem
Cranberry Viburnum
Indiangrass
Stone Channel
Virginia Rose
Winterberry Holly
SPRING RAIN GARDEN: wildflower meadow
Blueflag Iris
Foxglove Beardtongue
Columbine
Marsh-marigold
Stone channel
Sensitive Fern
Coreopsis
FALL RAIN GARDEN: grasses + autumn color
Big Bluestem
Panic Grass
Indiangrass
New England Aster
Goldenrod
Royal Fern
Switchgrass
Stone Channel
SUMMER RAIN GARDEN: monarch butterfly habitat
Butterfly Milkweed
Swamp Milkweed
Sweet Pepperbush
Joe-pye Weed
Ironweed
Purple coneflower
Black-eyed Susan
Butterfly milkweed
OUTDOOR SEATING AREA


south garden


BRAVO, Livingstone Mouse!
It's Pumpkin Time!
BUS
Move
BIG RED TUB
LIBRARY MOUSE
A Place Called KINDERGARTEN
SCHOLASTIC


HOLMDEL
EST 1857


GO FISH


41
HOLMDEL


25

ZANE NORTH ELEMENTARY

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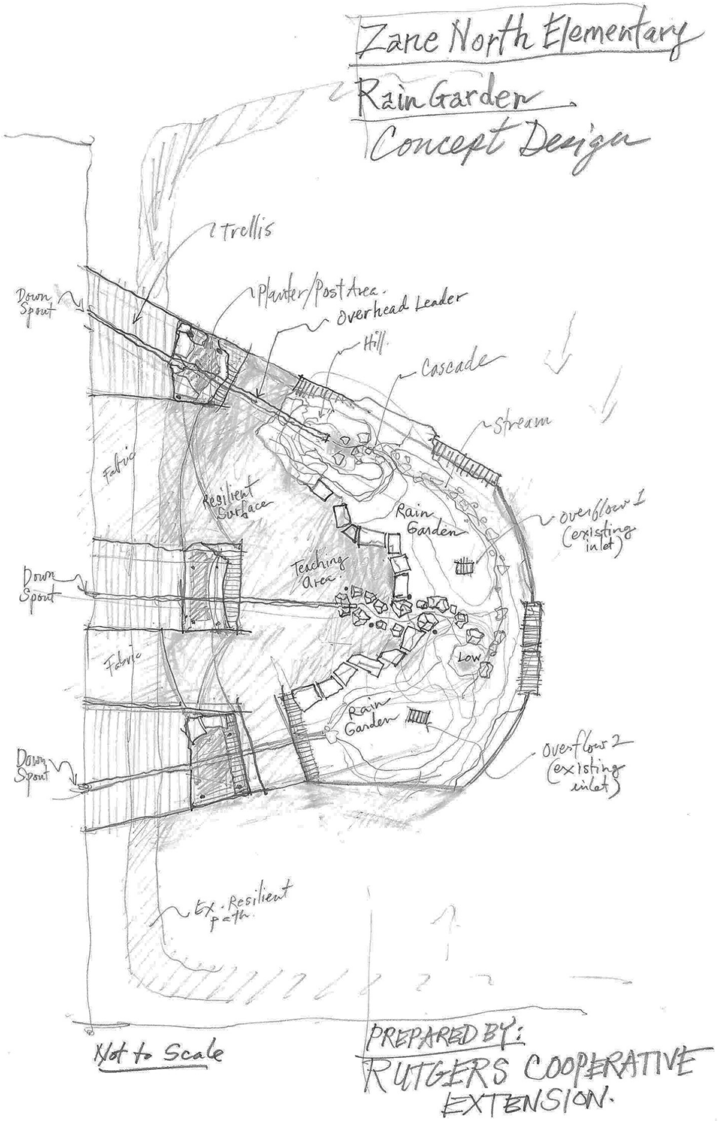
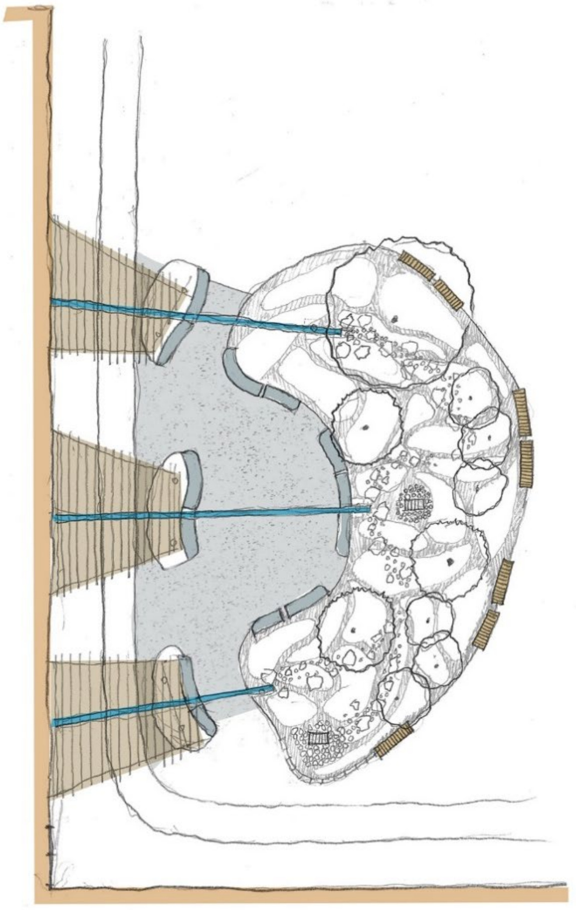
ZANE NORTH ELEMENTARY





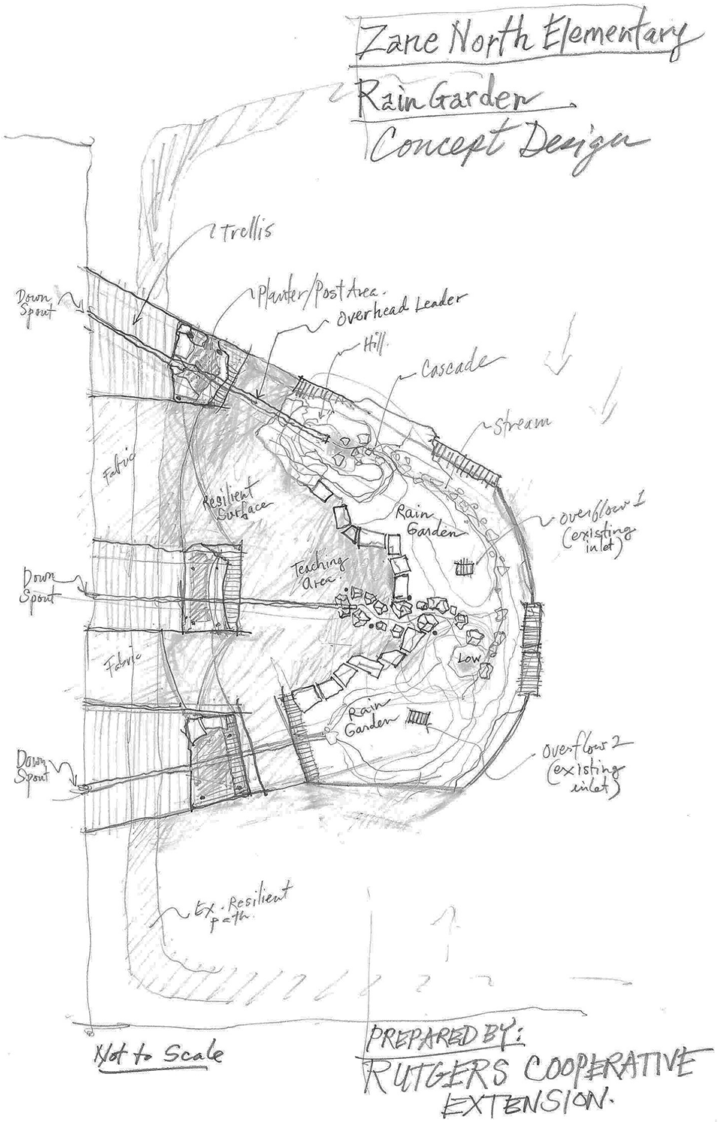
Site Elements: Infrastructure/Furnishings

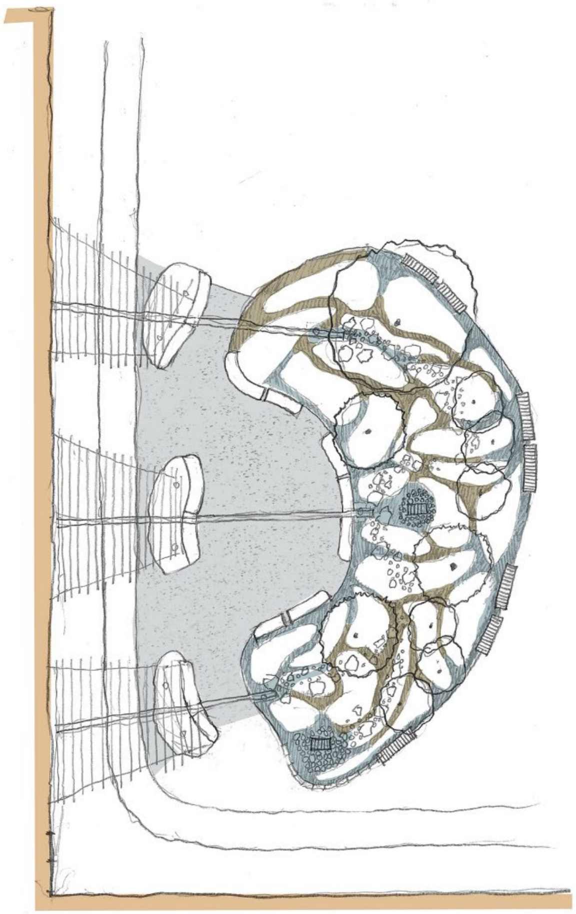
Not to Scale
Dimensions to be Verified in the Field

Zane North Elementary School
Rain Garden Project
Rutgers Cooperative Extension
April 20, 2017

RUTGERS
New Jersey Agricultural Experiment Station

ZANE NORTH ELEMENTARY





Narrow Garden Paths: Mulch and Gravel

Not to Scale
Dimensions to be
Verified in the Field

Zane North Elementary School
Rain Garden Project
Rutgers Cooperative Extension
April 20, 2017

RUTGERS New Jersey Agricultural Experiment Station

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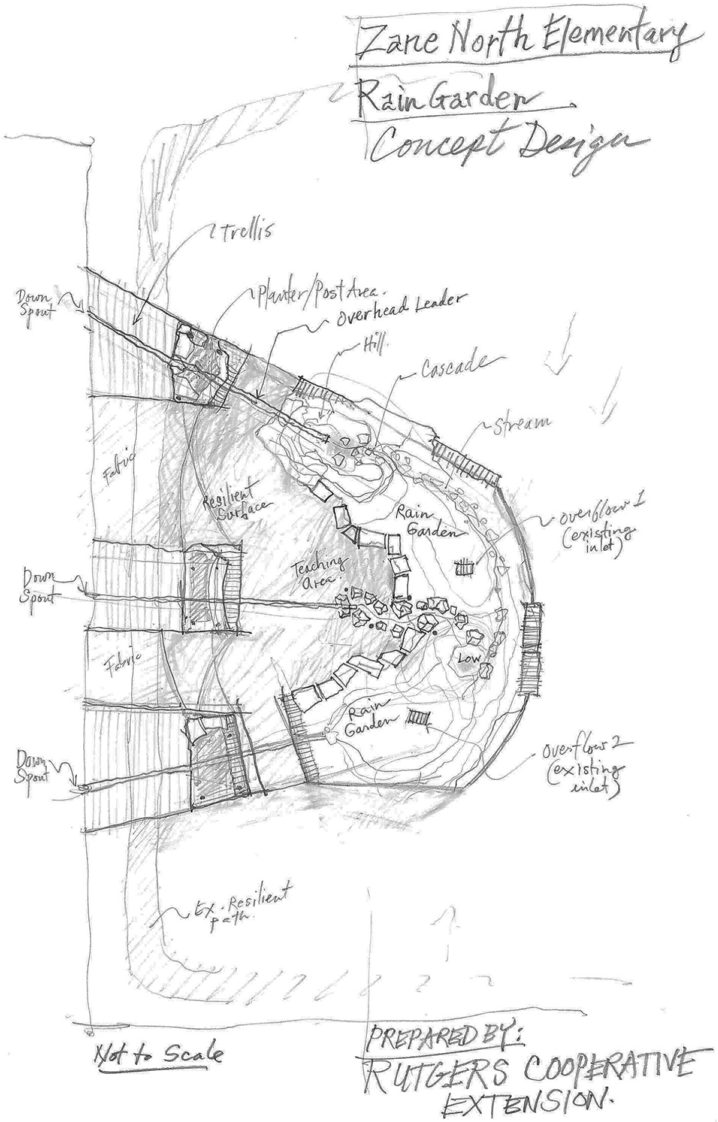

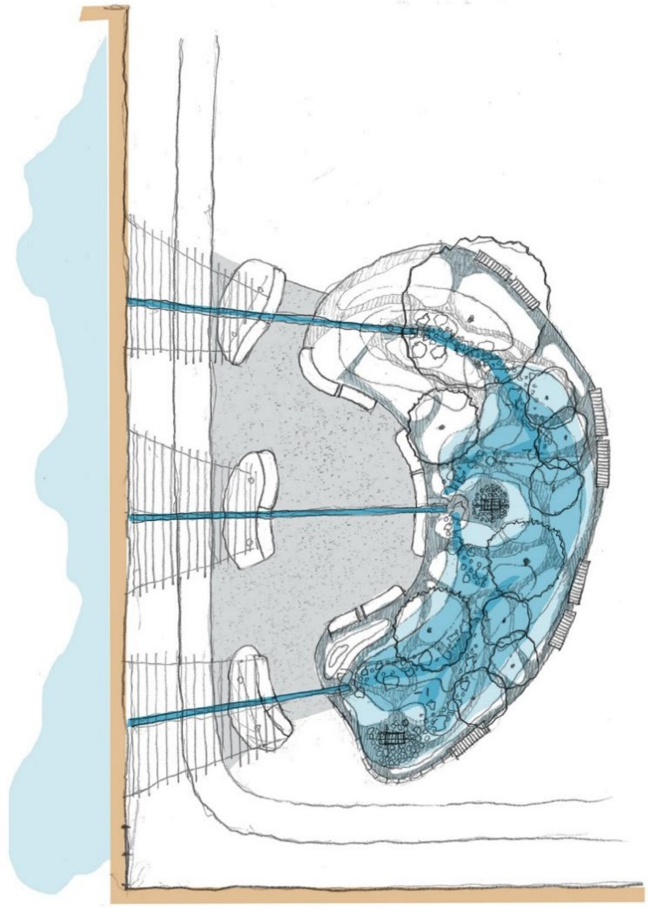

Water Flow and Infiltration Diagram

Not to Scale
Dimensions to be Verified in the Field

Zane North Elementary School
Rain Garden Project
Rutgers Cooperative Extension
April 20, 2017

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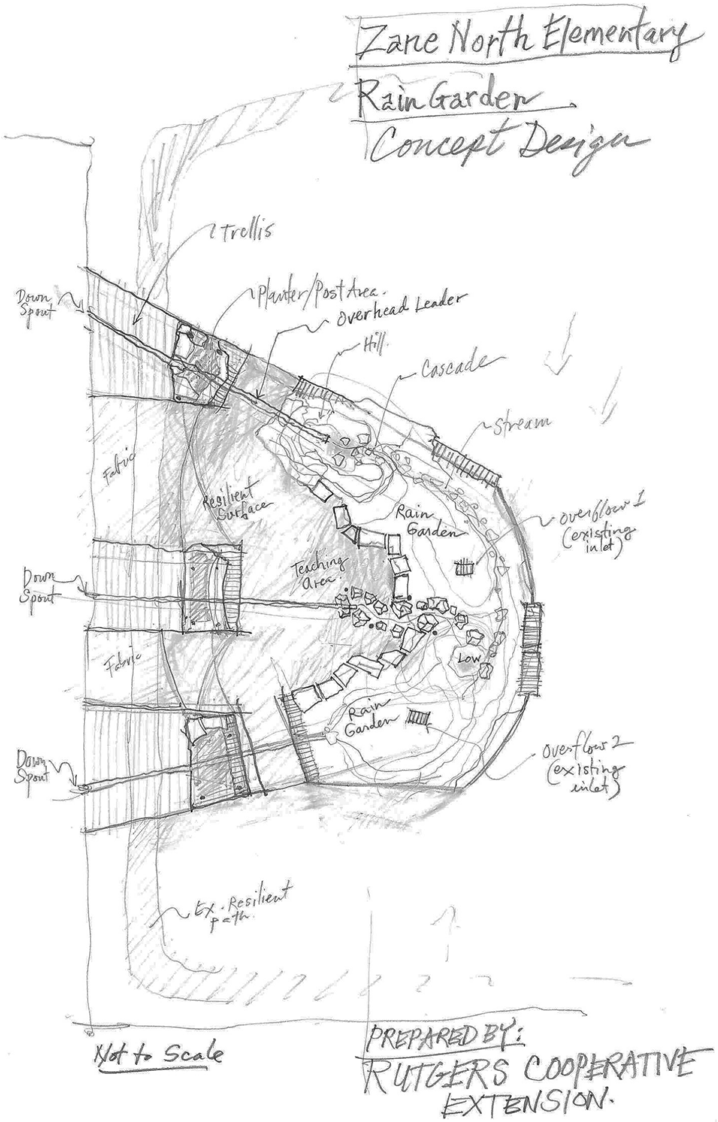

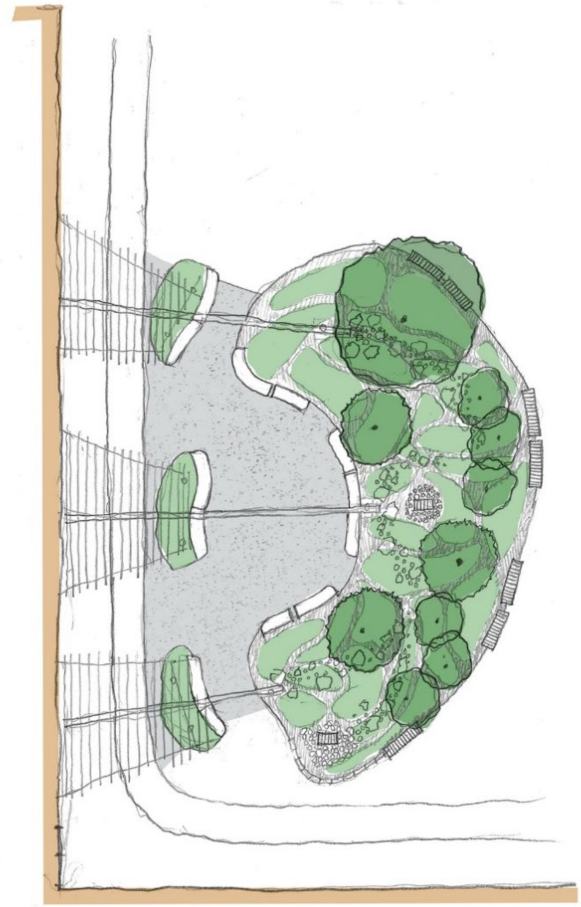

Planting

Not to Scale
Dimensions to be
Verified in the Field

Zane North Elementary School
Rain Garden Project
Rutgers Cooperative Extension
April 20, 2017

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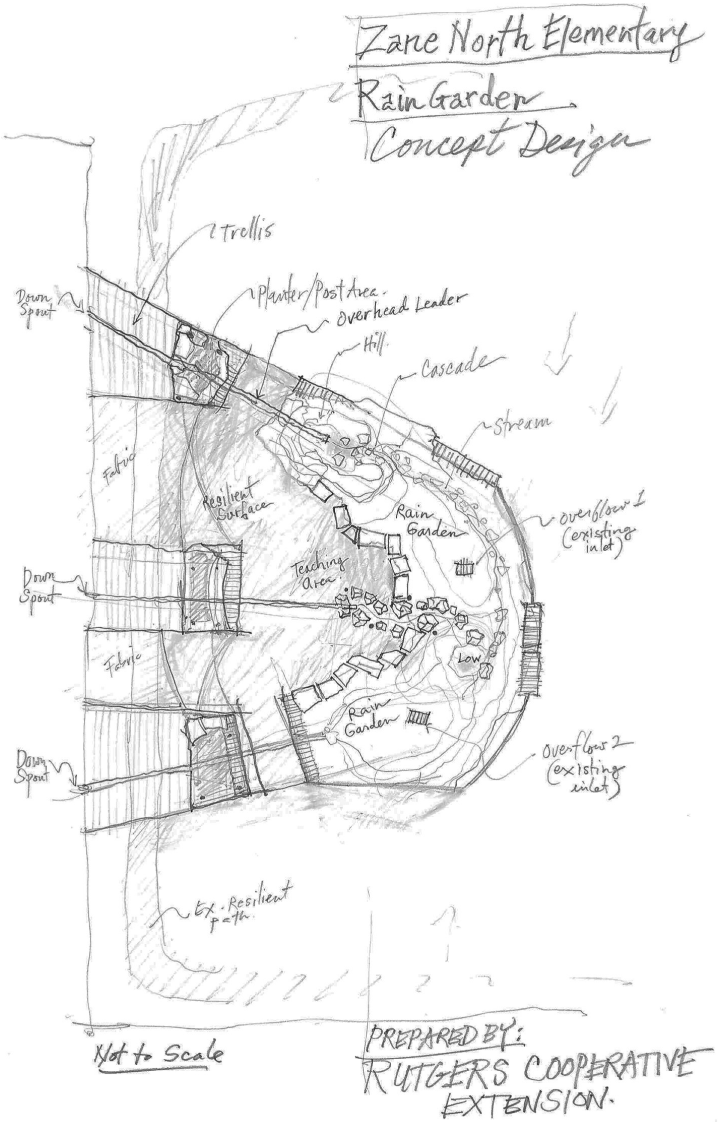
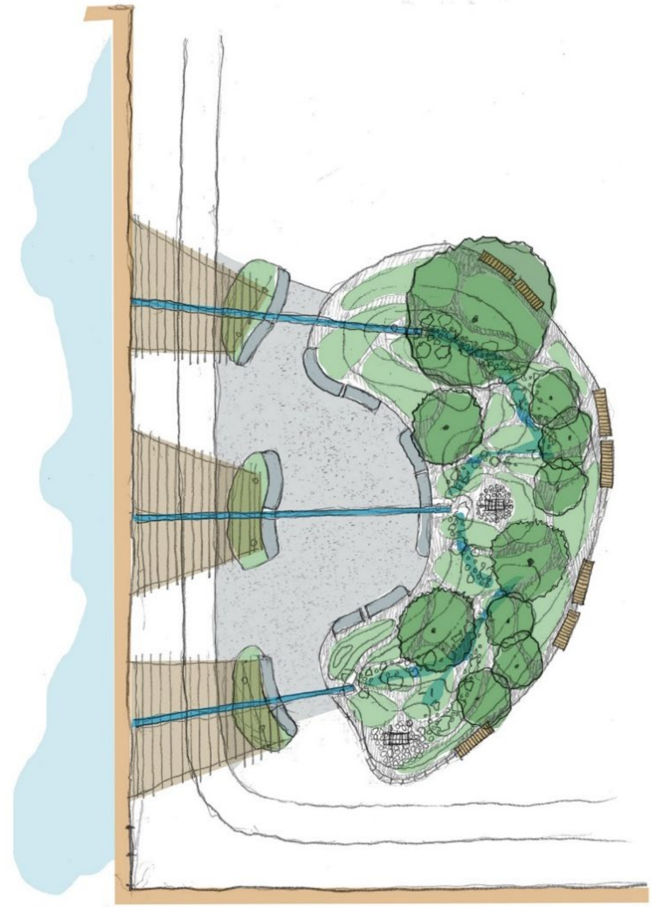
ZANE NORTH ELEMENTARY





Composite Plan

Not to Scale
Dimensions to be Verified in the Field

Zane North Elementary School
Rain Garden Project
Rutgers Cooperative Extension
April 20, 2017

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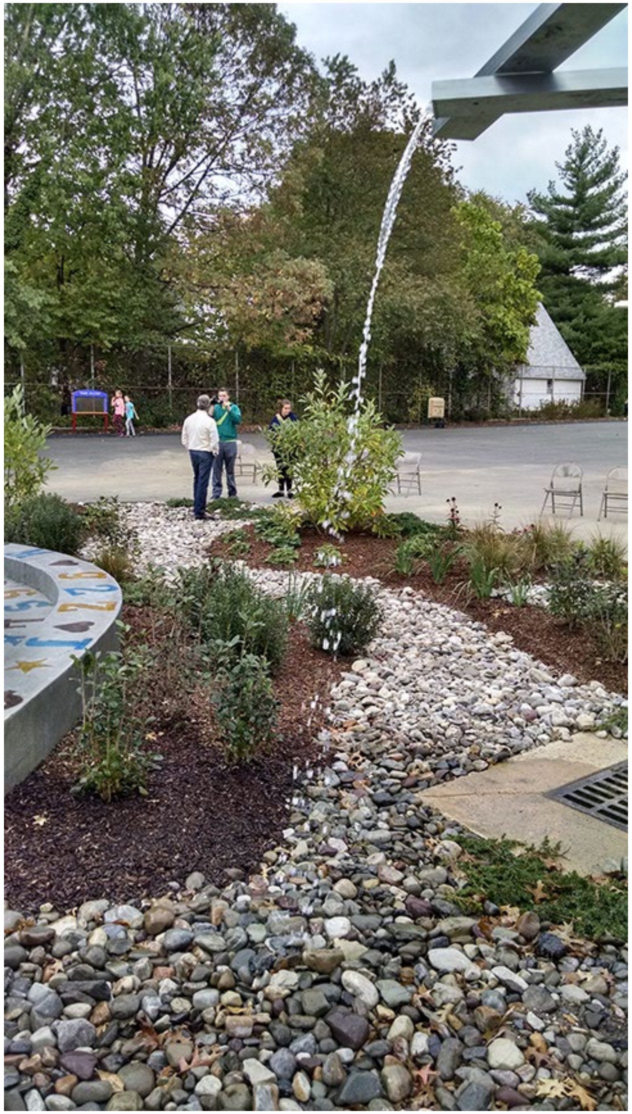
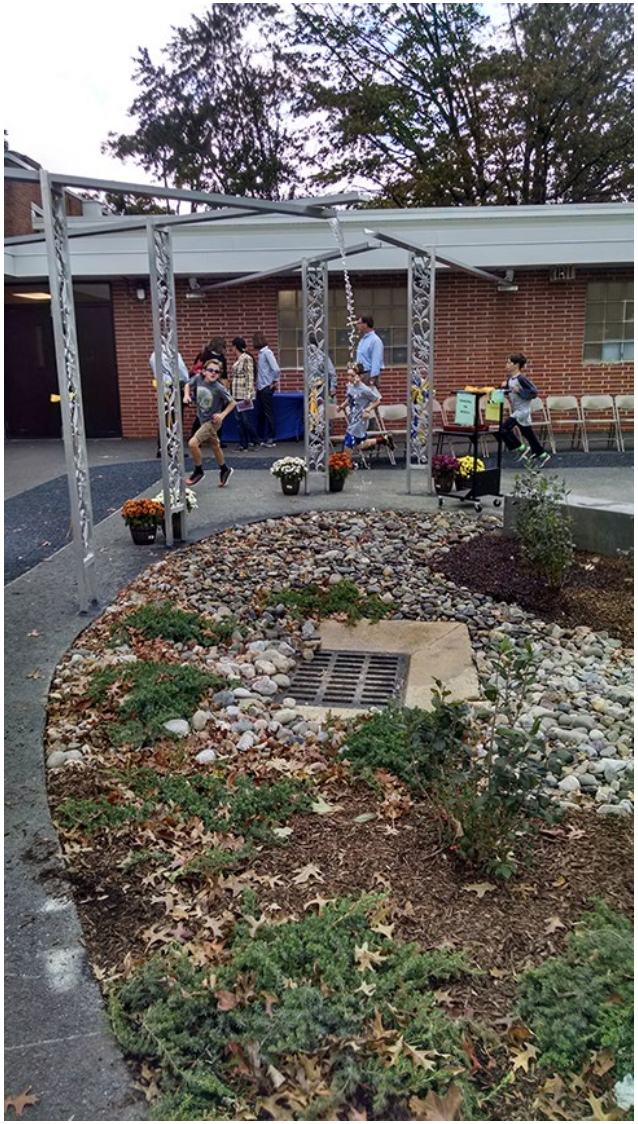
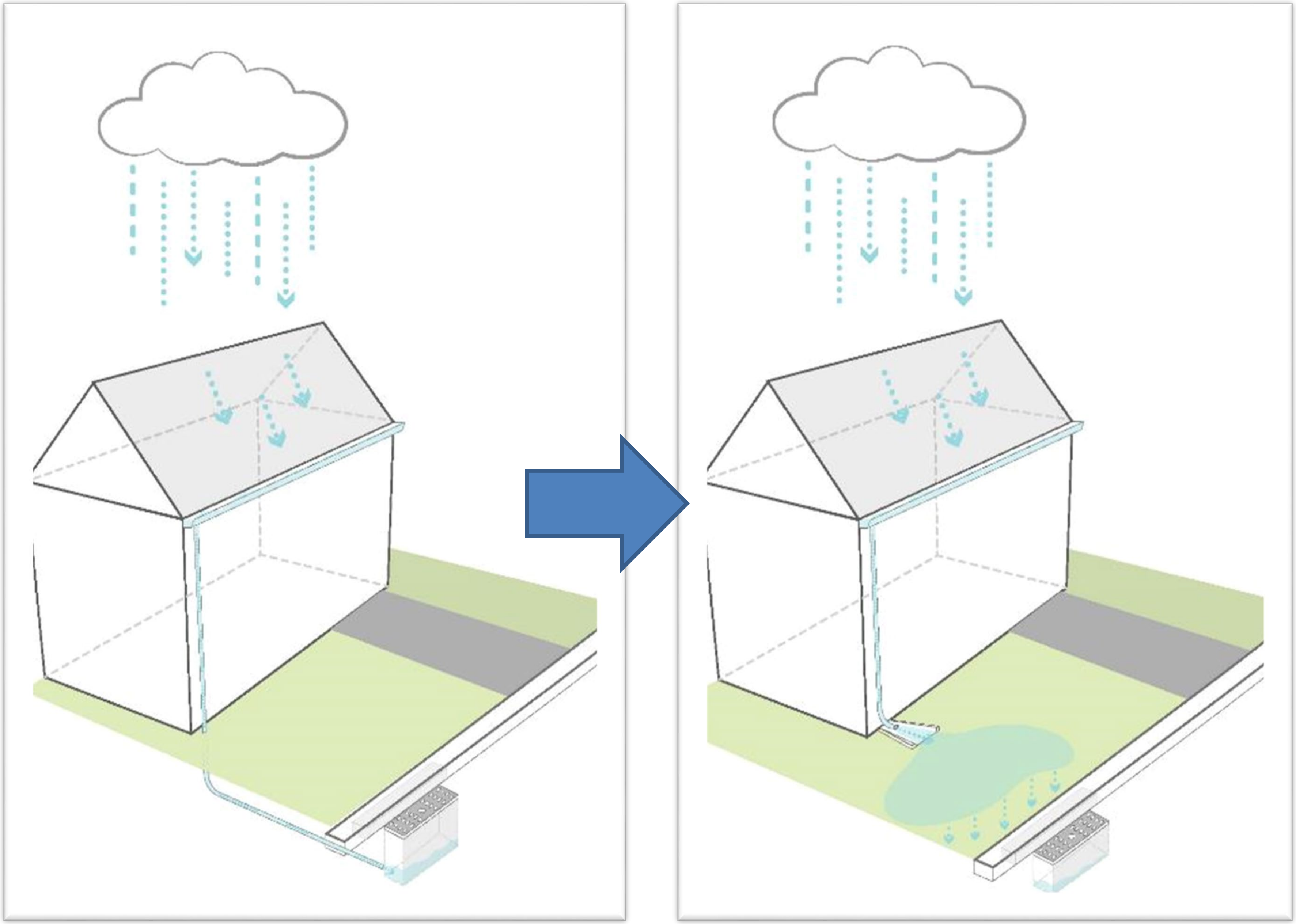
ZANE NORTH ELEMENTARY

ZANE NORTH ELEMENTARY

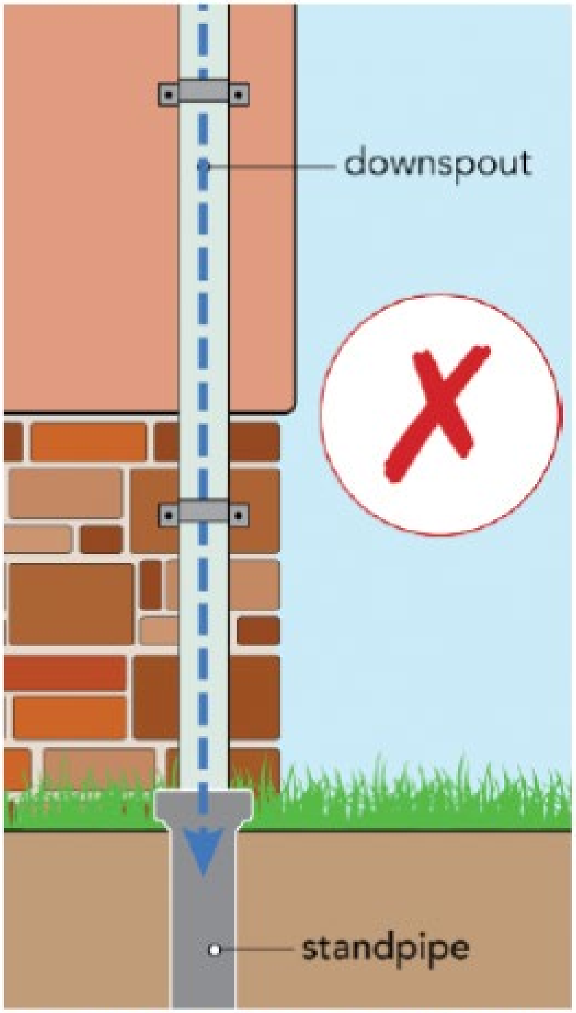




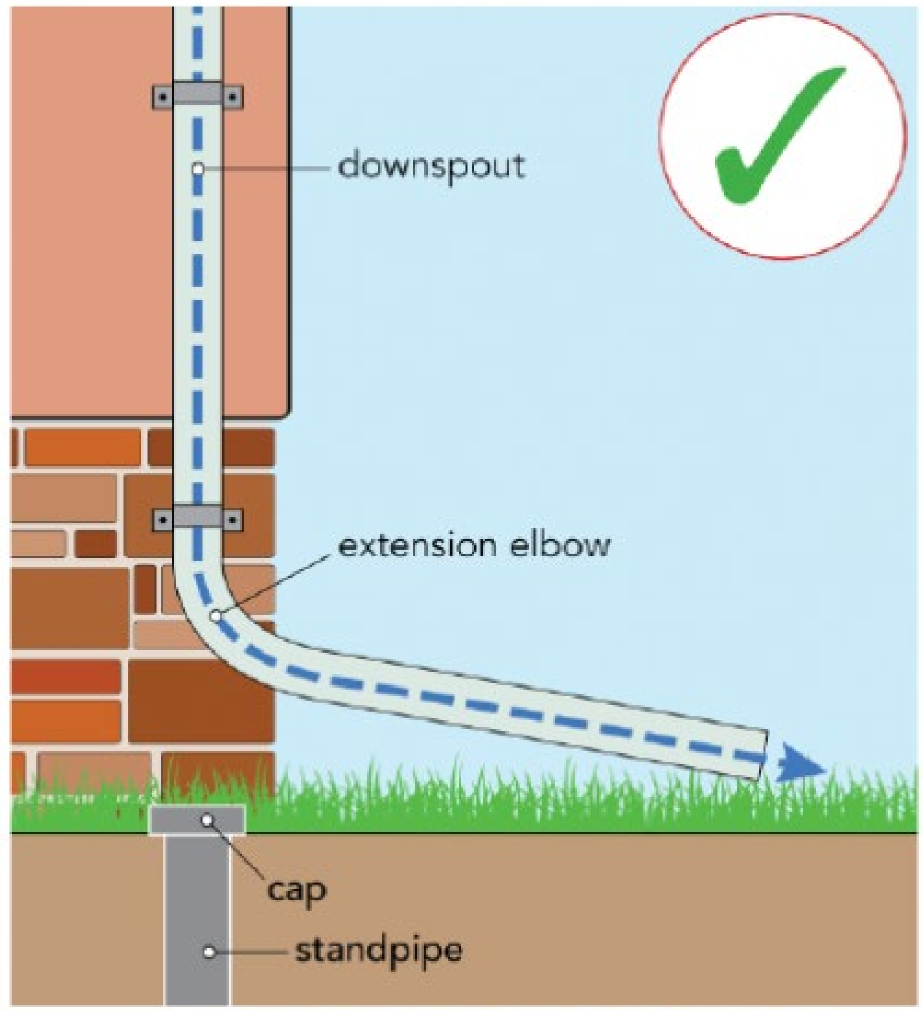
Step 2: Simple Disconnection



Downspout Disconnection

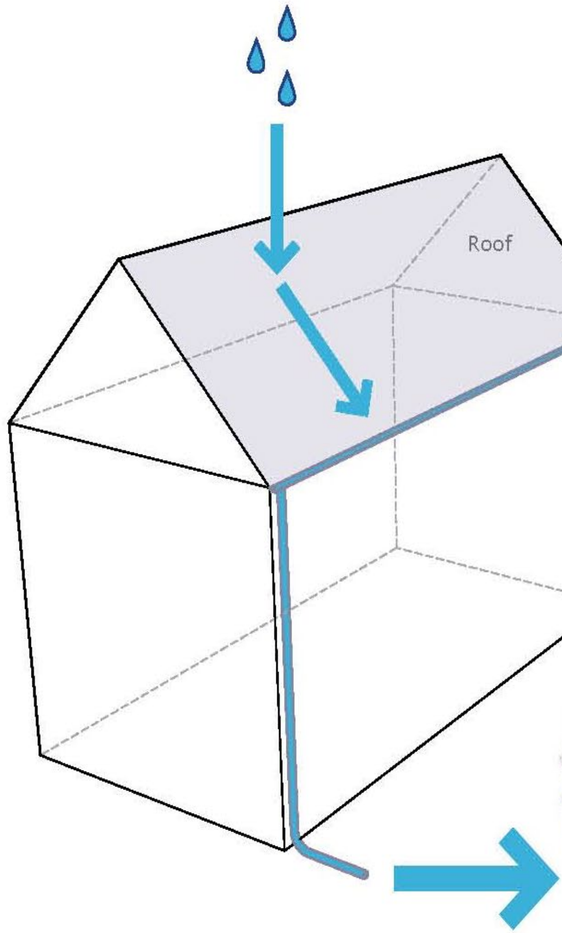


DOWNSPOUT CONNECTED
TO SEWER SYSTEM

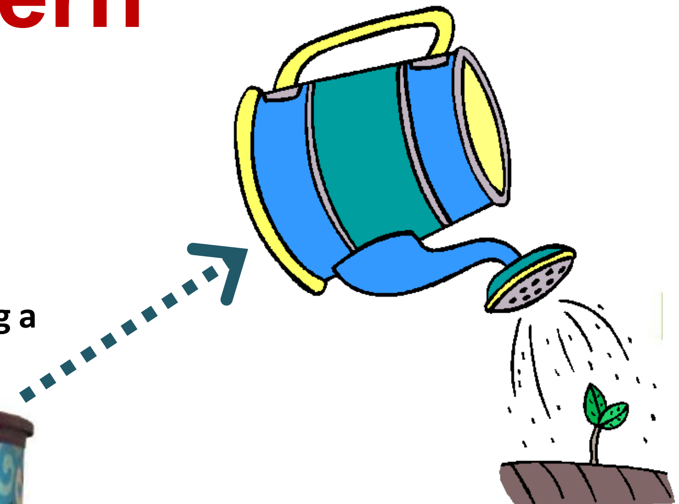


DOWNSPOUT DISCONNECTED
FROM SEWER SYSTEM

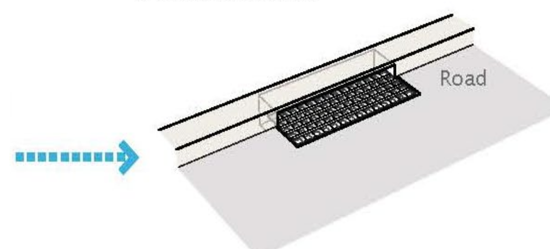
Useful Water: Disconnect to a Rain Barrel or Cistern



Disconnect your downspout by installing a rain barrel

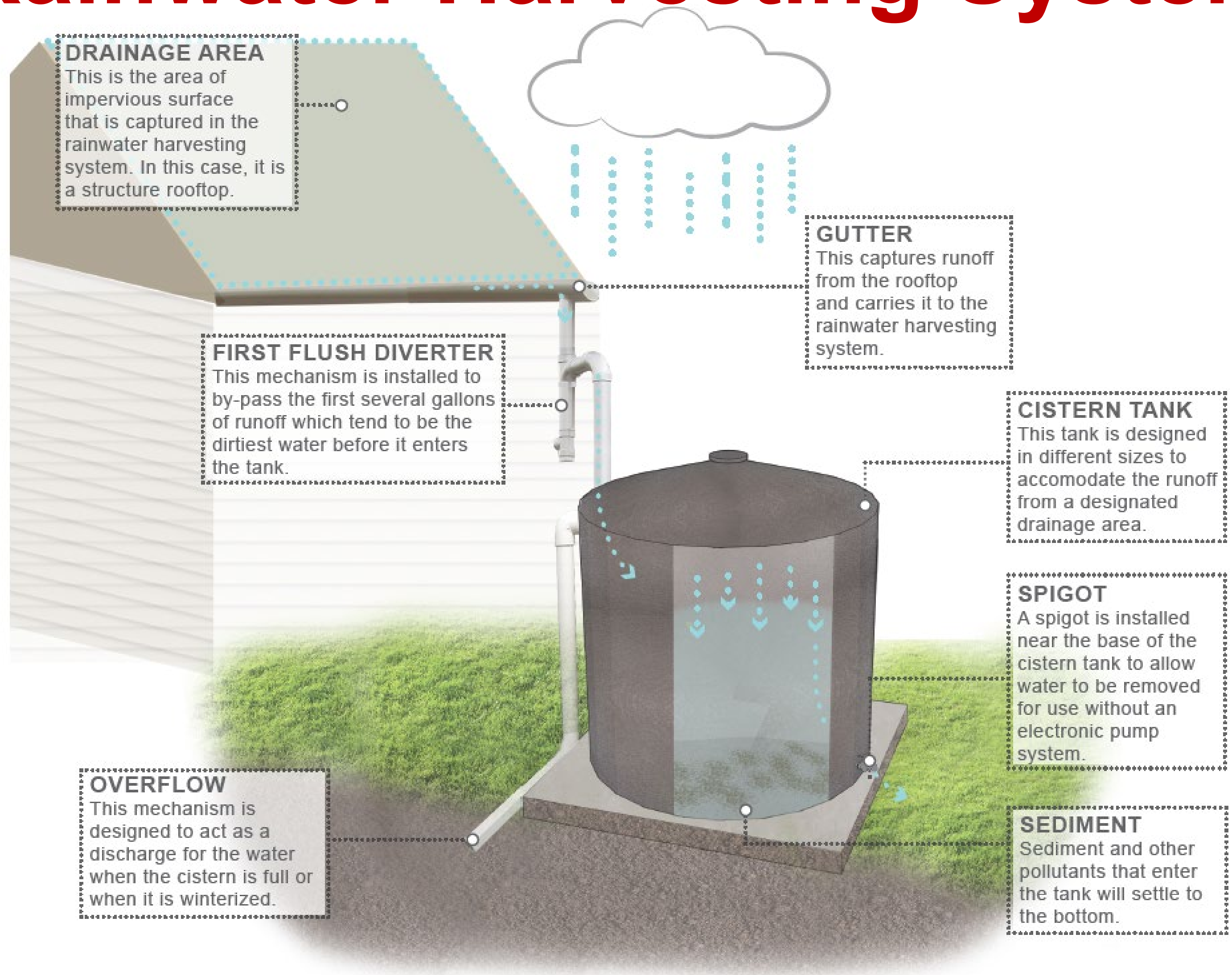


REDUCE THE AMOUNT OF RUNOFF ENTERING STORM SEWERS



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

Useful Water:
Rainwater Harvesting Systems



From Problem to Utility


DEERE



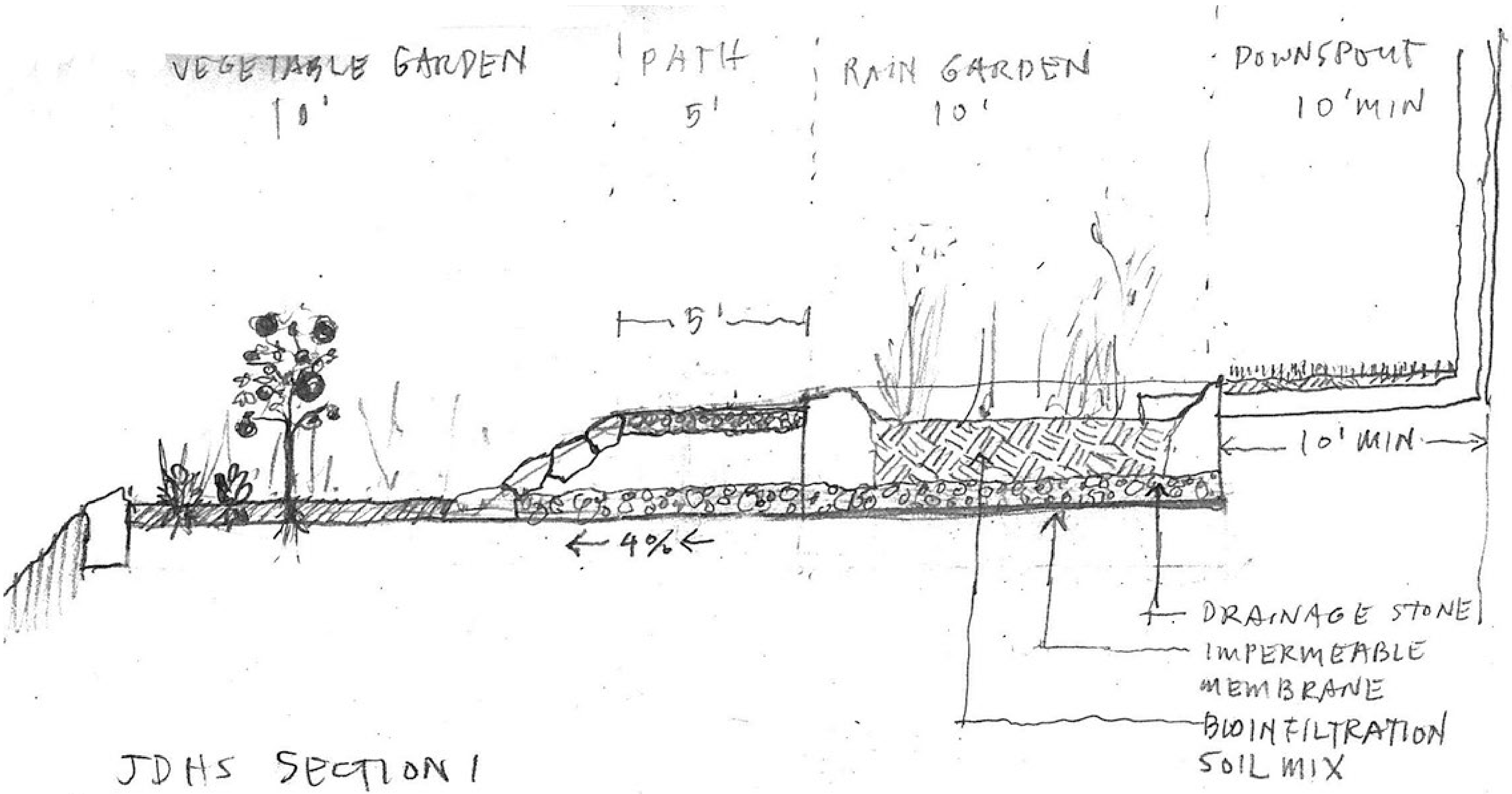
Rain Garden
Water Quality and Wildlife Habitat Enhancement Project
This garden is designed to capture, treat, and infiltrate stormwater at the source before it becomes runoff. It helps prevent nonpoint source pollutants from entering nearby waterways. The plants are native to the region and attract wildlife.
Rain gardens are beautiful, low-maintenance, and inexpensive gardens that you can install at home.
www.water.rutgers.edu
RUTGERS
NFWF


Kirby

Useful Water: Filter stormwater through rain garden to roots - water food beds

Jonathan Dayton High School Courtyard

Useful Water: Filter stormwater through rain garden to roots - water food beds



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Useful Water: Filter stormwater through rain garden to roots - water food beds

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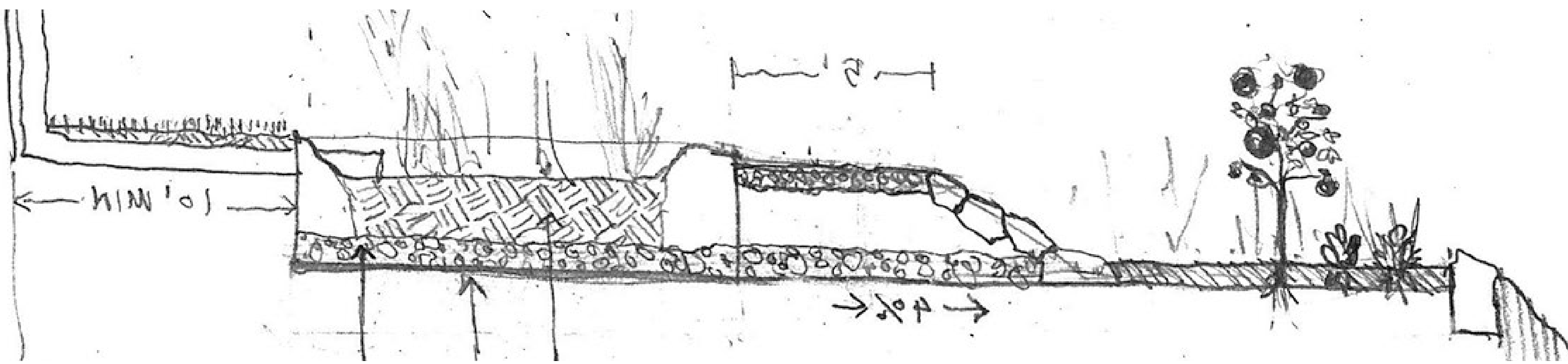
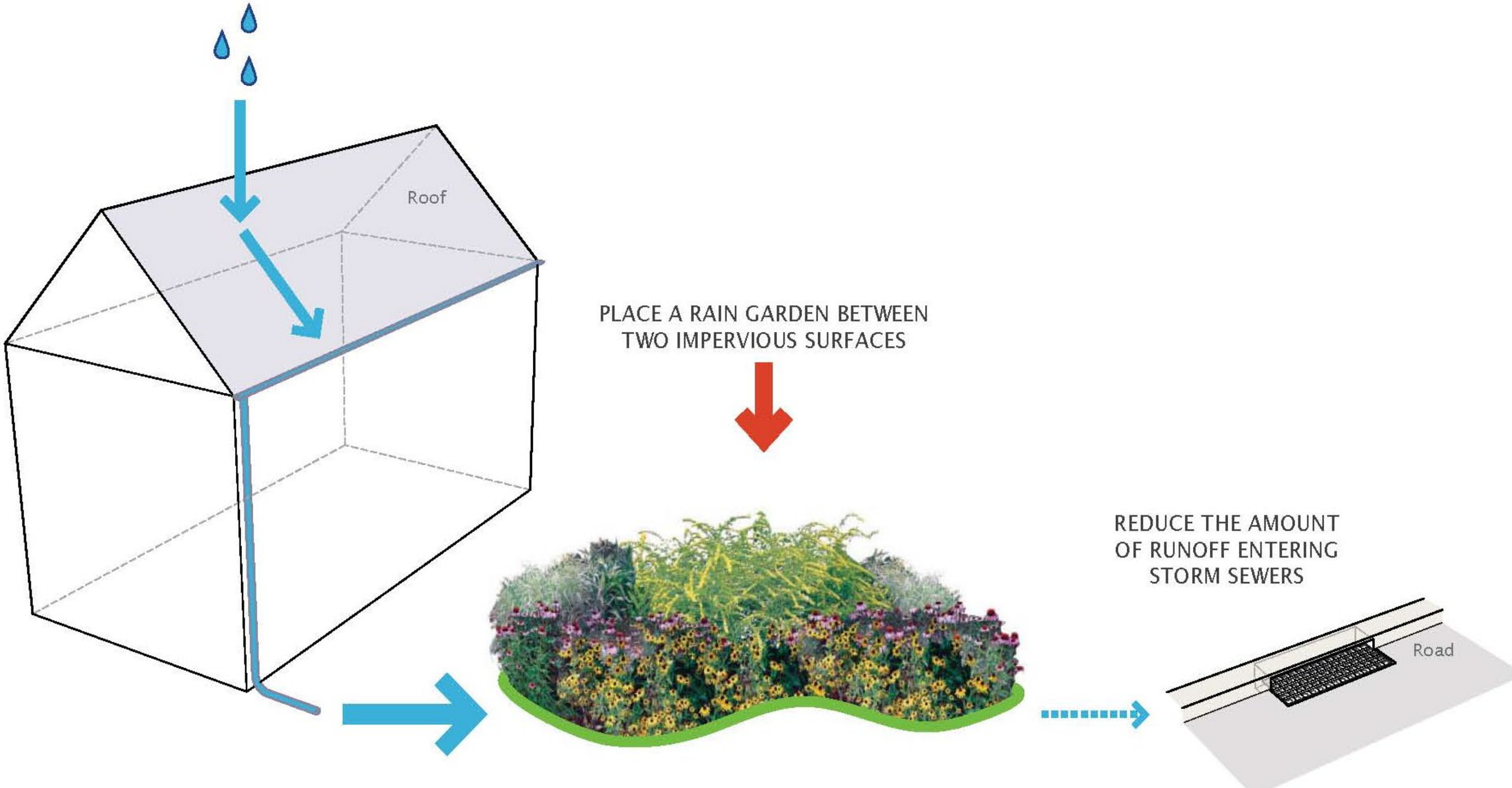
Useful Water: Filter stormwater through rain garden to roots - water food beds

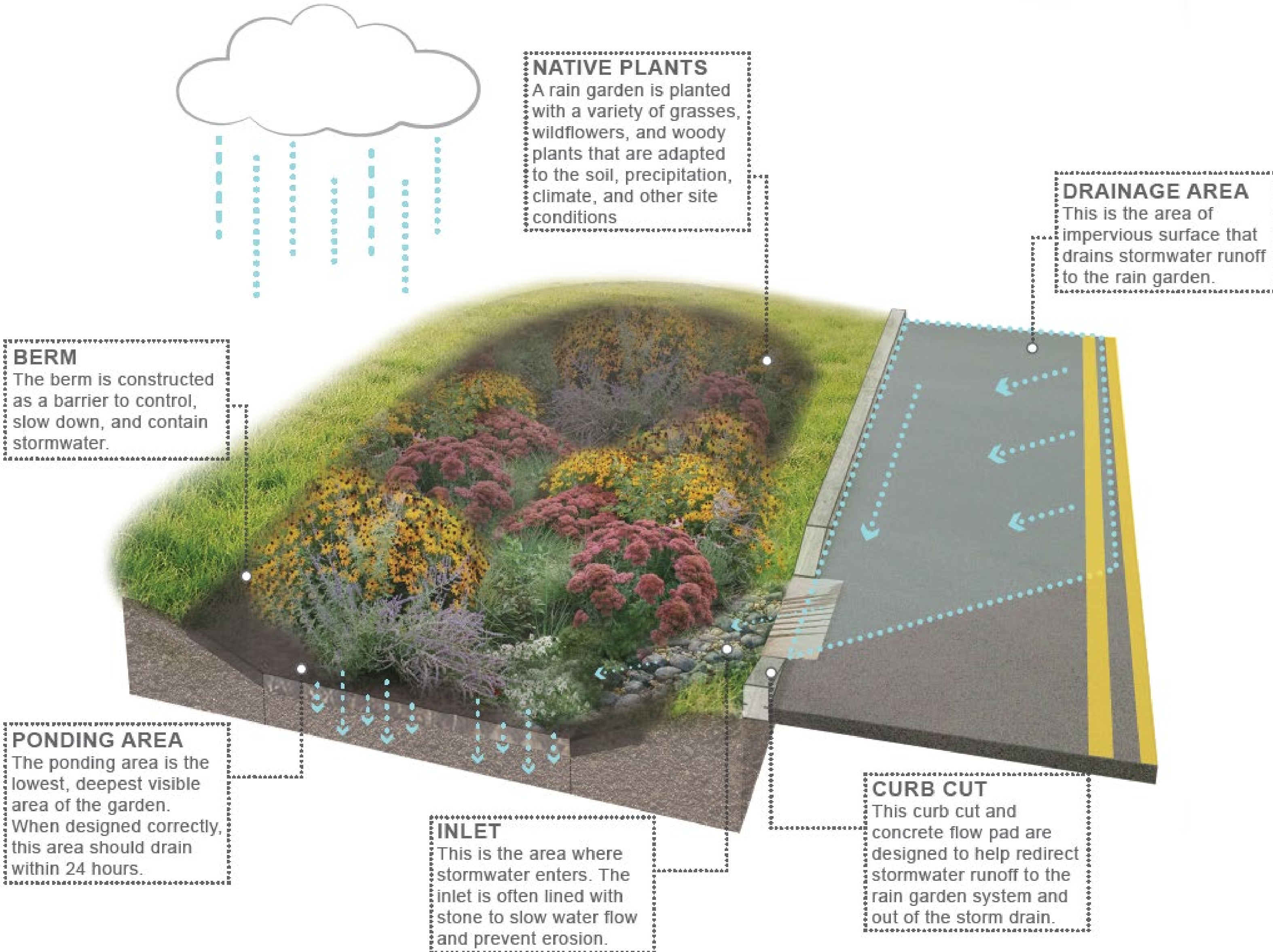


Disconnect to a Rain Garden

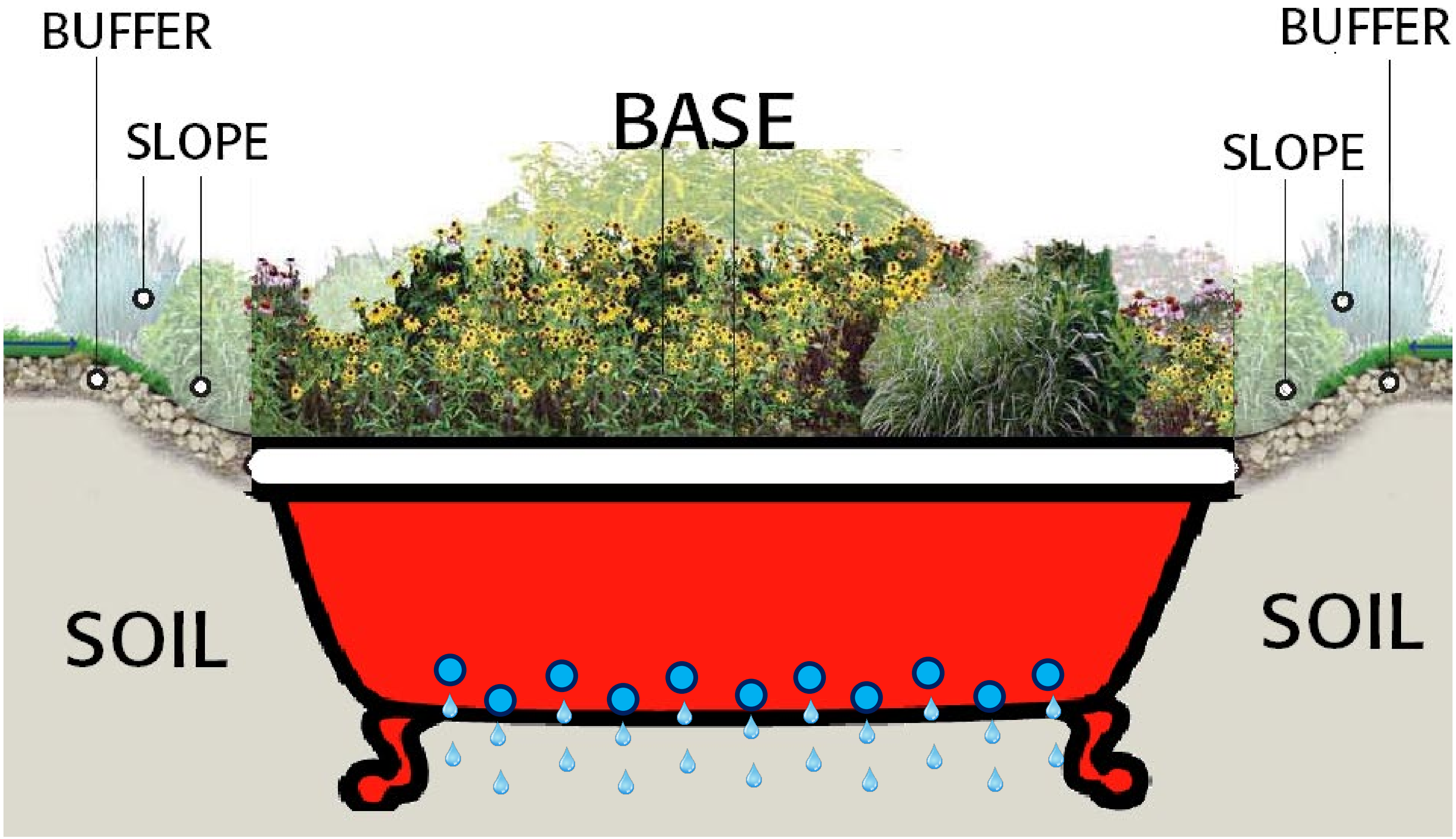


Rooftop runoff is now ***"disconnected"*** from flowing directly into the storm sewer system

Bioretention Systems/Rain Gardens



PARTS OF A RAIN GARDEN



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Lots of Rain Gardens

HAMILTON HIGH SCHOOL WEST

Mark out
April 2014

2014
- Installed rain garden with assistance from the DPW
- Educated students about rain gardens and planted with them

2016
- Returned to conduct maintenance

Planting
June 2014

Post Maintenance August 2016

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HAMILTON HIGH SCHOOL WEST

October 2018

- Educated the Life Skills students about nonpoint source pollution, rain gardens, and how to do maintenance
- Conducted hands on maintenance with the students

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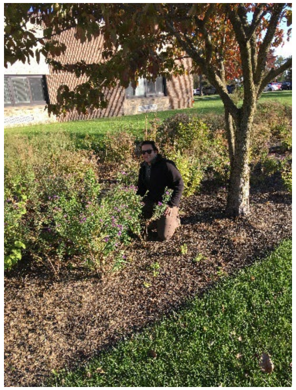
TABERNACLE MIDDLE SCHOOL

January 2018

October 2018

April 2018

October 2018



October 2018

October 2018

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WOODS ROAD ELEMENTARY SCHOOL

Site visit March 2011

Post excavation April 2011

Post planting May 2011

Follow up site visit June 2011

WOODS ROAD ELEMENTARY SCHOOL

Site inspection August 2017

Maintenance August 2017

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ETHEL JACOBSON ELEMENTARY SCHOOL

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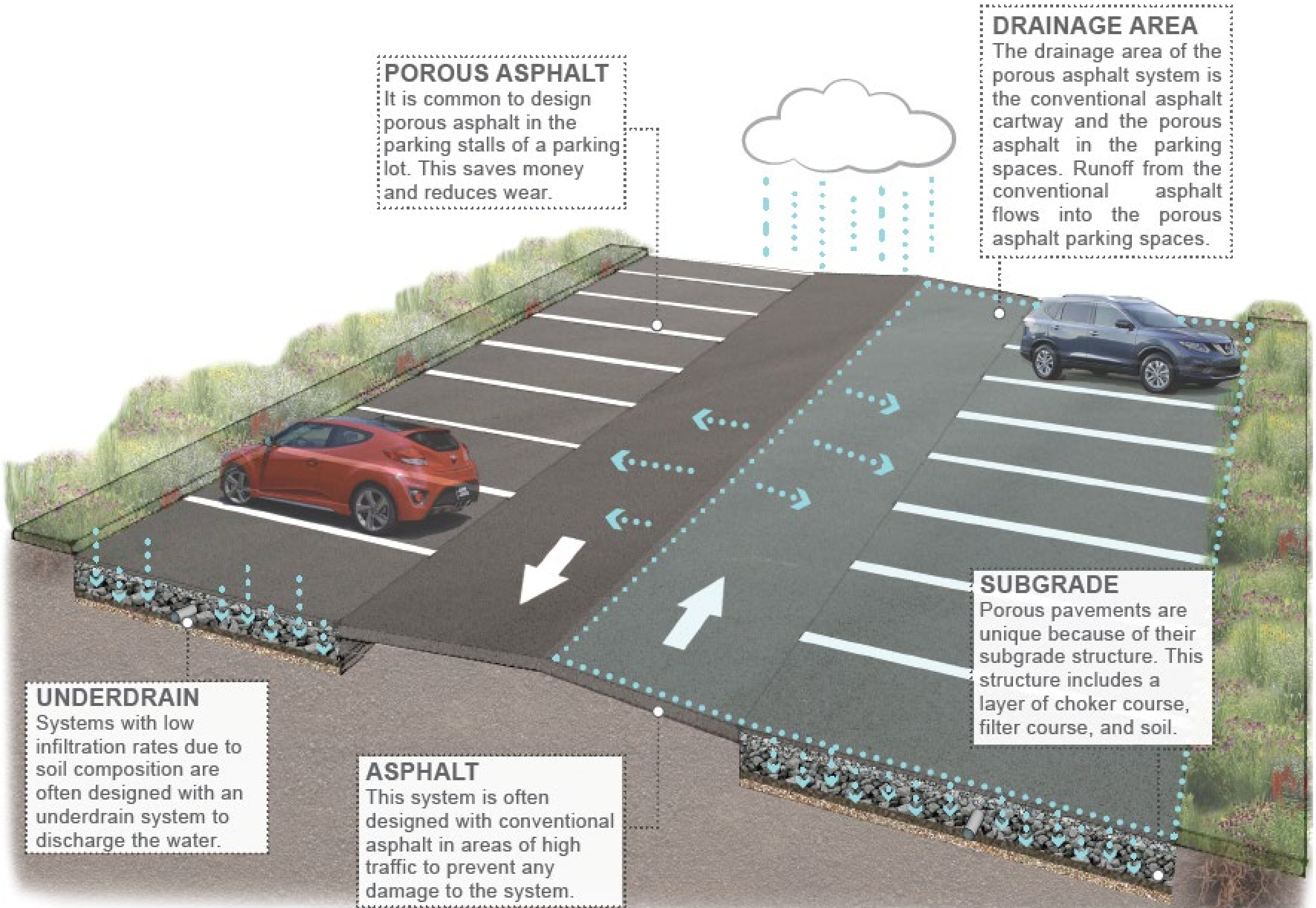
Rain garden at Catto School in Camden, NJ

Step 3: Convert to Permeable Pavement



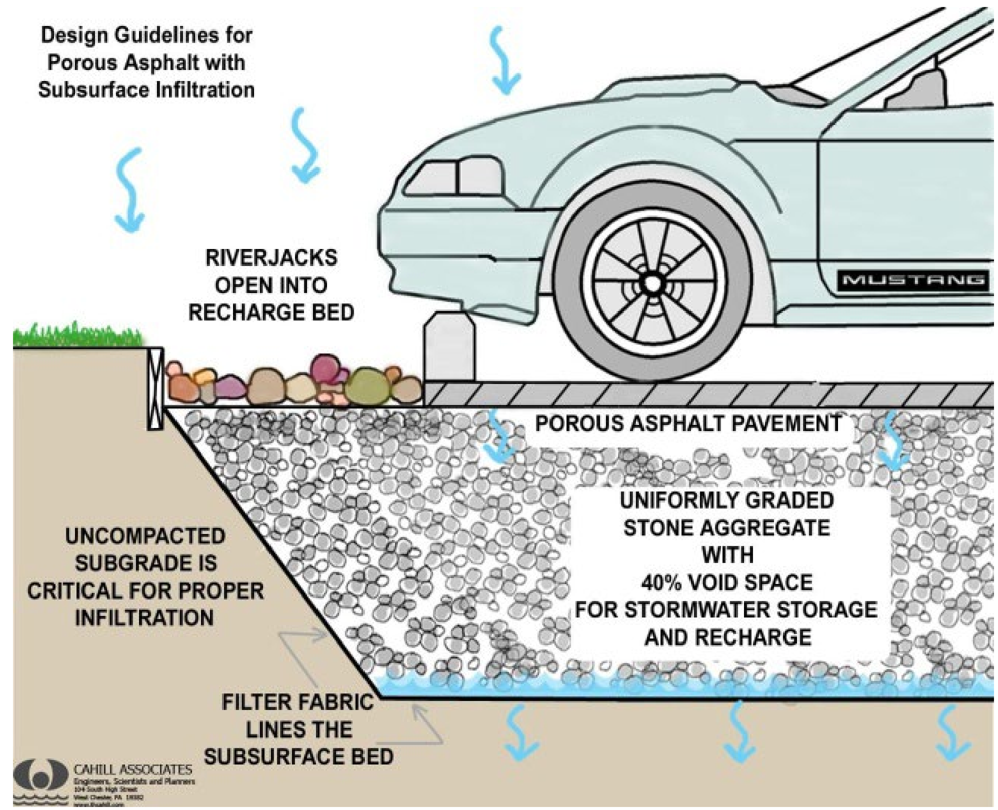
Permeable Pavements

- 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




DICAL ARTS HIGH SCHOOL


PAPER
BOTTLES & CANS

How do we get started?

- Be clear about what you have to offer the school and why you want to work with them
- Ensure them that you are not going to make more work for the teachers or administrators
- Do not scare them with a lengthy discussion on maintenance but inform them of the tasks
- Tell them how the work will be funded, don't be afraid to ask for funding but make sure they know you have skin in the game

Educational Programming

- Educational program can vary in length
- Community-Based Project Learning was eight weeks – one day in the classroom per week and then building and planting a rain garden
- You can also educate the students when they plant the garden
- Students can continue these efforts beyond the classroom – Eagle Scout Project, National Honor Society, or simply a college resume builder

Jonathan Dayton High School Springfield

a) NJ Physiography modeled in the garden
b) Interpretive Design
c) Embedded Narrative
d) Local Aesthetics
e) Built with Town DPW and Board of Education Facilities Personnel

“Physiography/Geology Teaching Garden”

Design Goals:

Demonstrate a rain garden that:

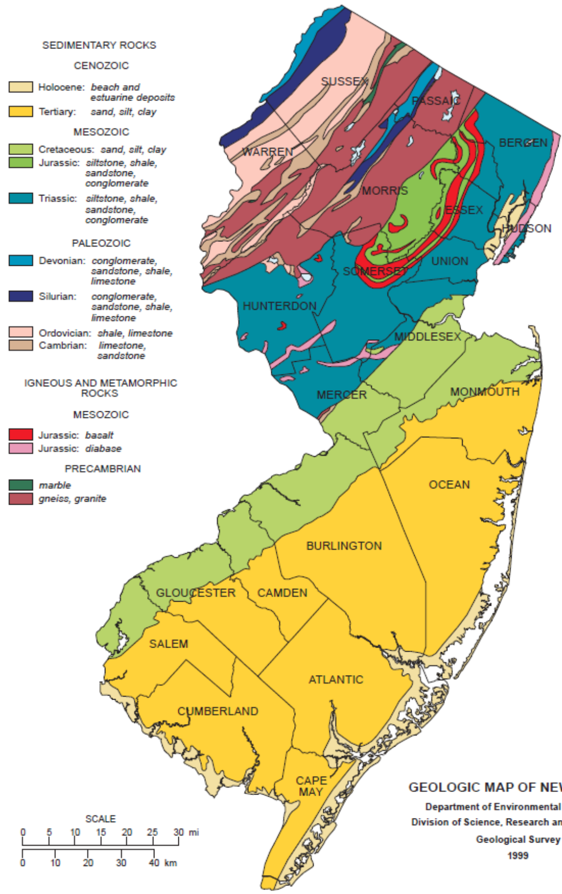
Is useful as a teaching tool specific to place

Highlight New Jersey’s geology, and how it is connected to water and plants

Demonstrate the relationship between paving (imperviousness) and unpaved areas

Create interest in “real” landscapes by reference and mimicry in the garden

Beyond Water Control: Connecting with Geology, Soils, and Plant Communities



GEOLOGIC MAP OF NEW JERSEY
Department of Environmental Protection
Division of Science, Research and Technology
Geological Survey
1999

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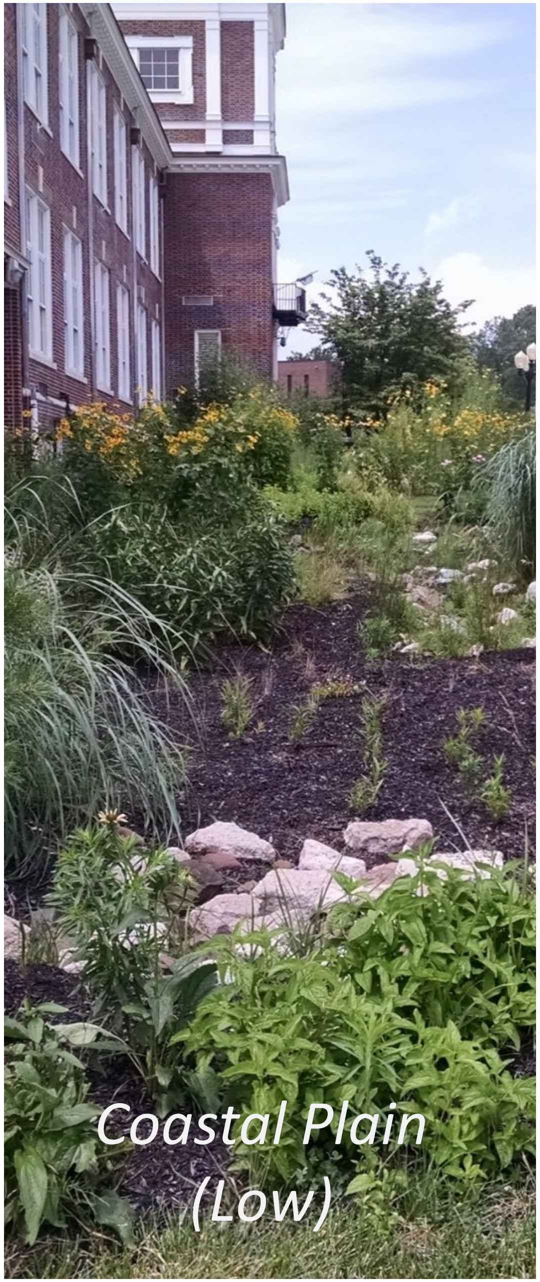
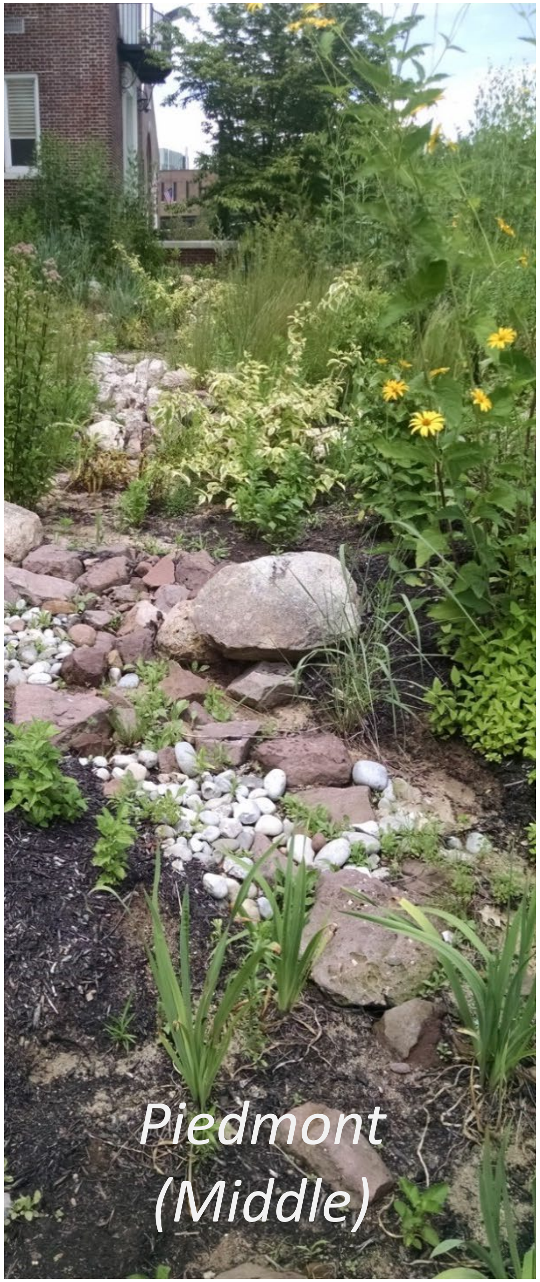
Beyond Water Control: Educational Garden

Rutgers Landscape Architecture, NJAES, Springfield Township





RUTGERS
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Experiment Station

Rutgers New Jersey Agricultural Experiment Station

Paterson Elementary School #28

The Enviroscape Model

- Great for all ages
- Simple to use and conveys all the necessary concepts
- Easy to clean up
- The students can jump right in and make it rain


BRAVO, Livingstone Mouse!
It's Pumpkin Time!
Move
BIG RED TUB
LIBRARY MOUSE
A Place Called Kindergarten
Love Songs of the Little Bear
two friends

Stormwater Management in Your Schoolyard Program

http://water.rutgers.edu/Projects/SWMIYSchoolyard/SWMIYSchoolyard.html#K8

Sustainable Jersey for Schools

Two Actions (10 points each):

- **Green Infrastructure Assessment & Plan**
- **Green Infrastructure Installation**

What's next?

- Many of the ICAs, RAPs, and green infrastructure feasibility studies have identified opportunities at schools
- Check if the school is registered in Sustainable Jersey for Schools: http://www.sustainablejerseyschools.com/actions-certification/participating-districts-and-schools/
- Reach out to the school and see if they are interested in green infrastructure planning or installing a practice

Let's go Peacocks!

Photo by Jamie Sabau, Getty Images

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