RUTGERS UNIVERSITY
Water Resources Program
New Jersey Agricultural Experiment Station

Green Solutions for New Jersey Stormwater Issues

Presented to Trout Unlimited in Sussex County

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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

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.

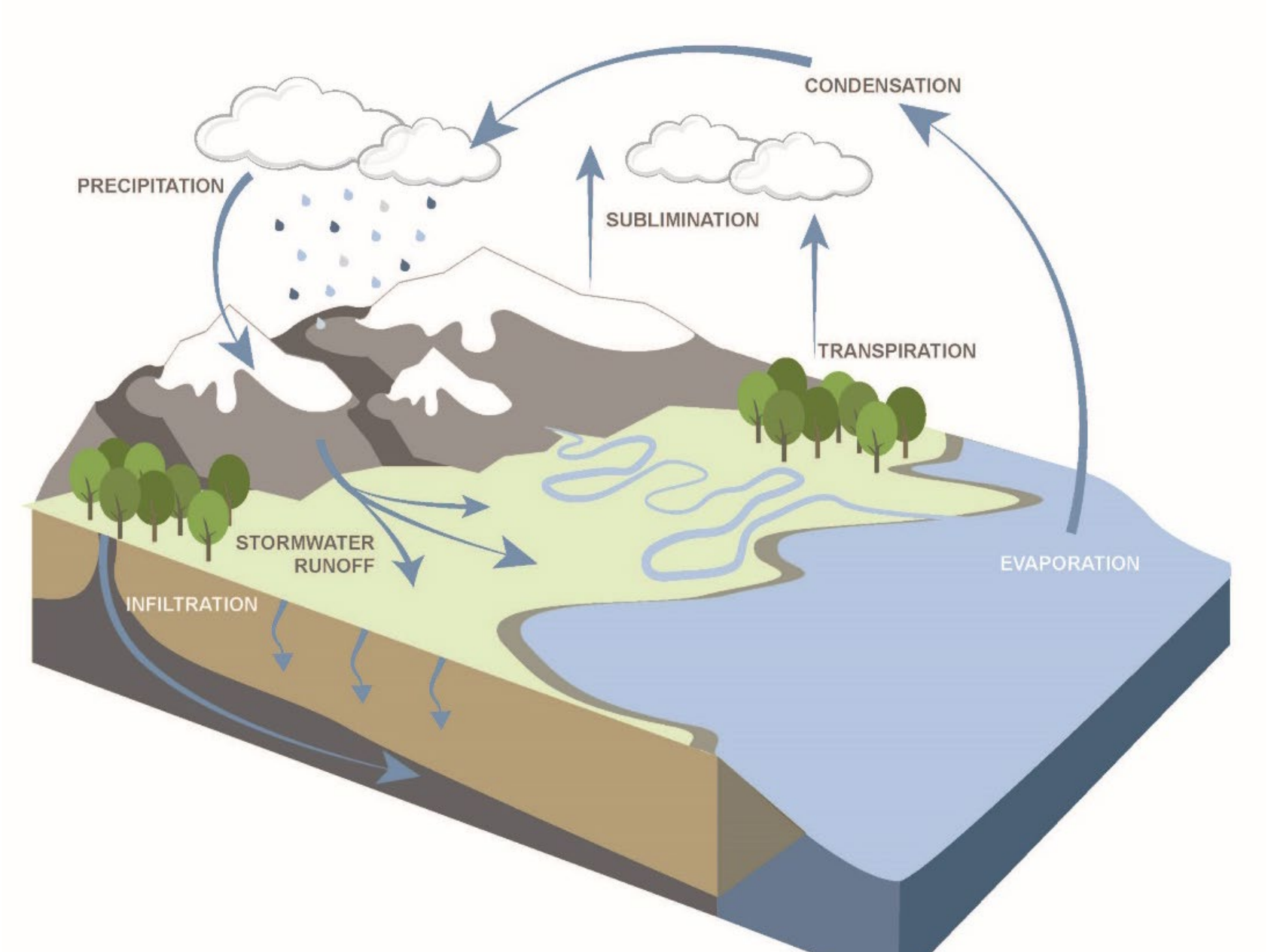
New Jersey

- Most densely populated state
- 21 counties, 565 municipalities
- 95% of our waterways are impaired
- 21 Combined Sewer Communities
- Harmful Algal Blooms (HABS) in many of our lakes
- Hammered by Ida, Henri, Sandy, and a bunch of nor'easters
- Climate change is real – more severe storms and sea level rise

What is stormwater?

Stormwater is the water from rain or melting snows that can become “runoff,” flowing over the ground surface and returning to lakes and streams.

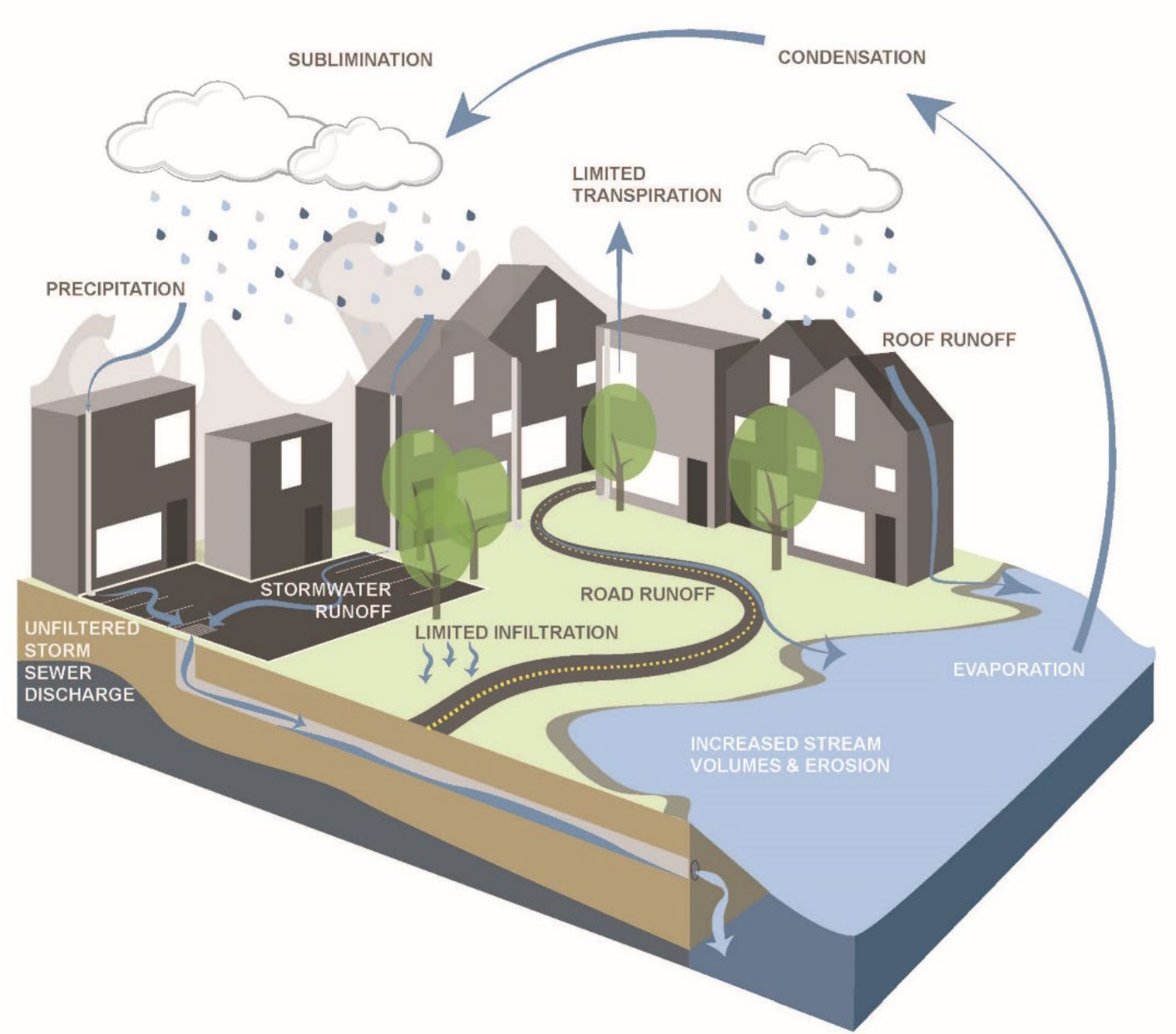
The Natural Water Cycle



The Impact of Development on Stormwater Runoff

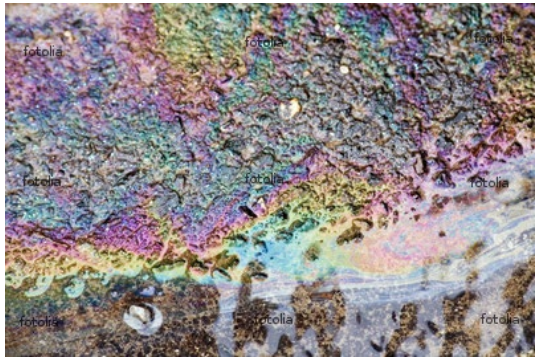
More development → *More impervious surfaces* → *More stormwater runoff*

The Urban Water Cycle



Non-Point Source Pollution

- Oil and grease from cars
- Fertilizers
- Animal waste
- Grass clippings
- Septic systems



- Sewage leaks
- Household cleaning products
- Litter
- Agriculture
- Sediment

Insight to current problem

- Stringent stormwater regulations on new development has not improved water quality
- We must retrofit existing older development with stormwater management to reduce impairments to our waterways
- Green infrastructure is a great tool to retrofit existing older development
- Local champions are needed to advocate for green infrastructure retrofits
- We need to create these champions where they don’t already exist

GREEN INFRASTRUCTURE IN NEW JERSEY

Green infrastructure is ...

…an approach to stormwater management that is cost-effective, sustainable, and environmentally friendly.

Green infrastructure projects:

- capture,
- filter,
- absorb, and
- reuse

stormwater to restore the natural water cycle.

Green Infrastructure

Stormwater management practices that protect, restore, and mimic the native hydrologic condition by providing the following functions:

- Infiltration
- Filtration
- Storage
- Evaporation
- Transpiration

Green Infrastructure Practices

Bioretention Systems

- Rain Gardens
- Bioswales
- Stormwater Planters
- Curb Extensions
- Tree Filter Boxes

Permeable Pavements

Rainwater Harvesting

- Rain Barrels
- Cisterns

Dry Wells

Rooftop Systems

- Green Roofs
- Blue Roofs







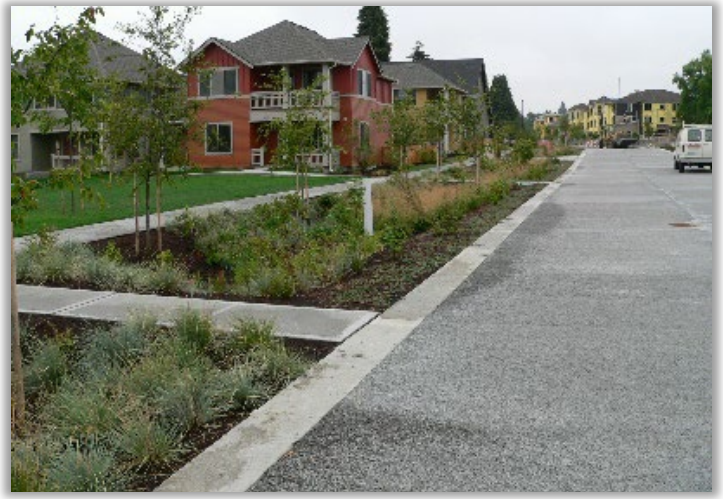

TYPES OF BIORETENTION

Rain Gardens

- Single-family lots
- Small commercial areas

Planters & Planter Boxes

- Highly urban areas
- Right-of-way and adjacent to buildings



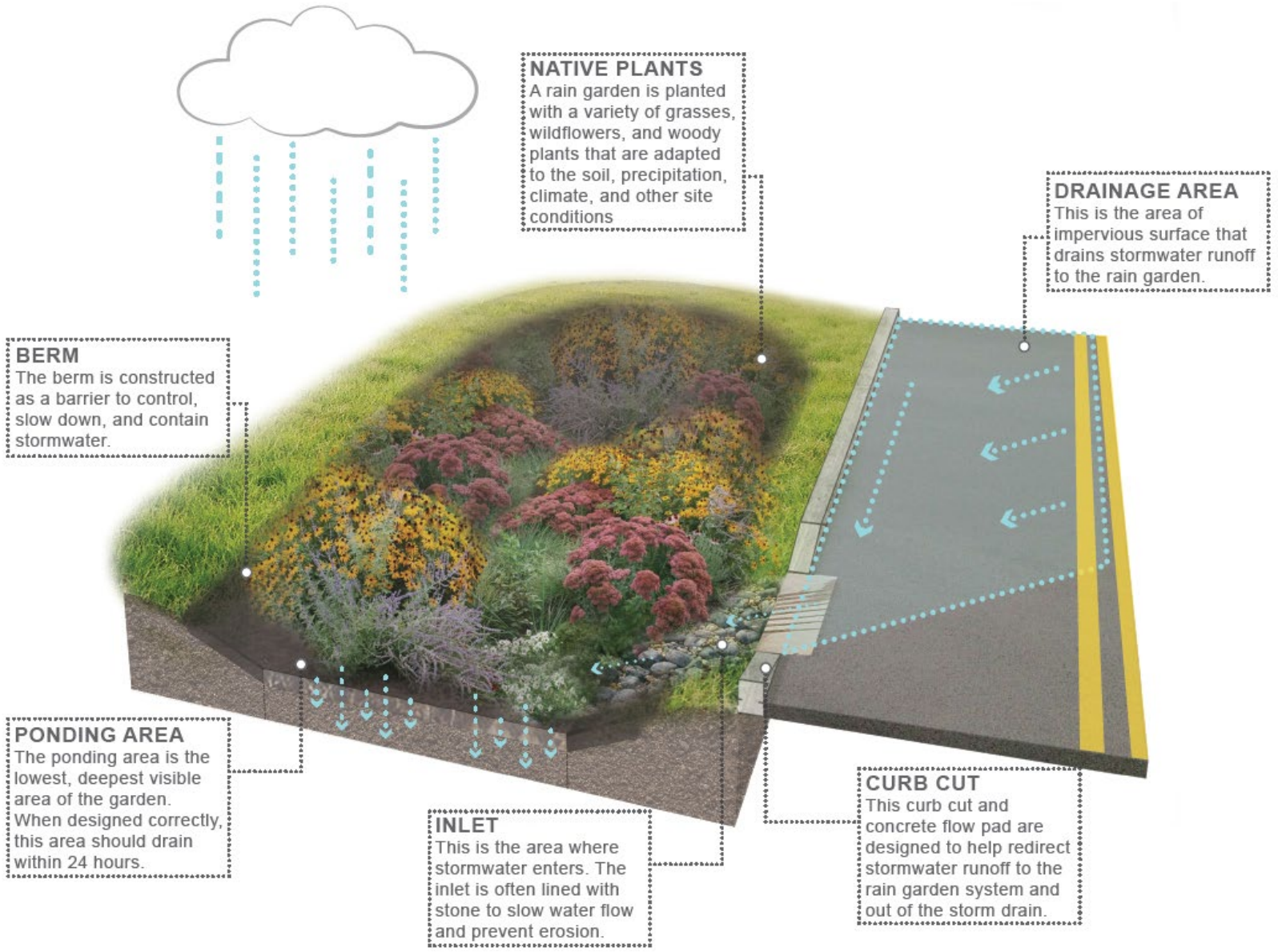
Bioretention Swales/ Bioswales/Vegetated Swales

- Typically in right-of-way

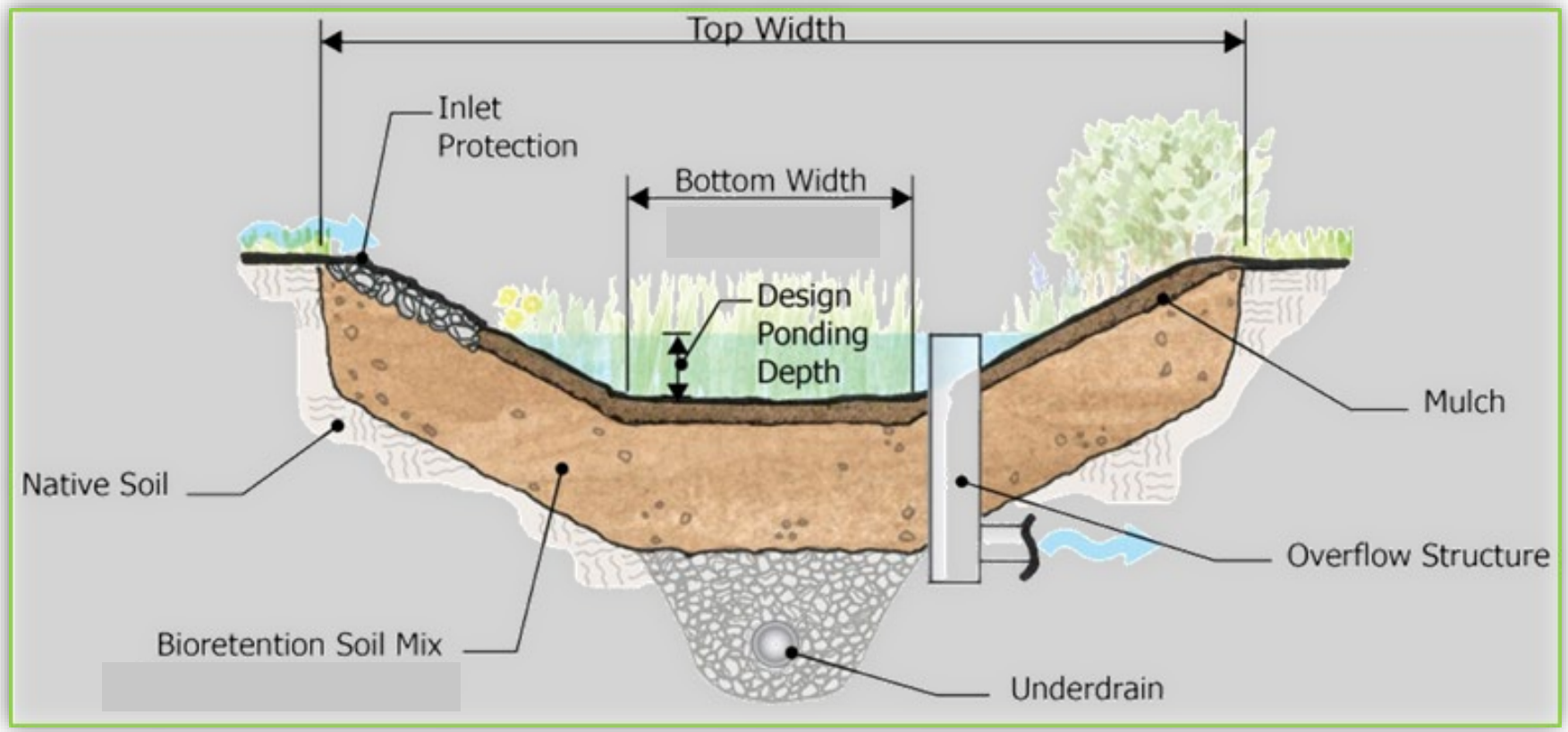
Vegetated Curb Extensions

- Bioretention incorporated into right-of-way in urban and suburban areas

Rain Gardens



Rain Garden Cross-Section

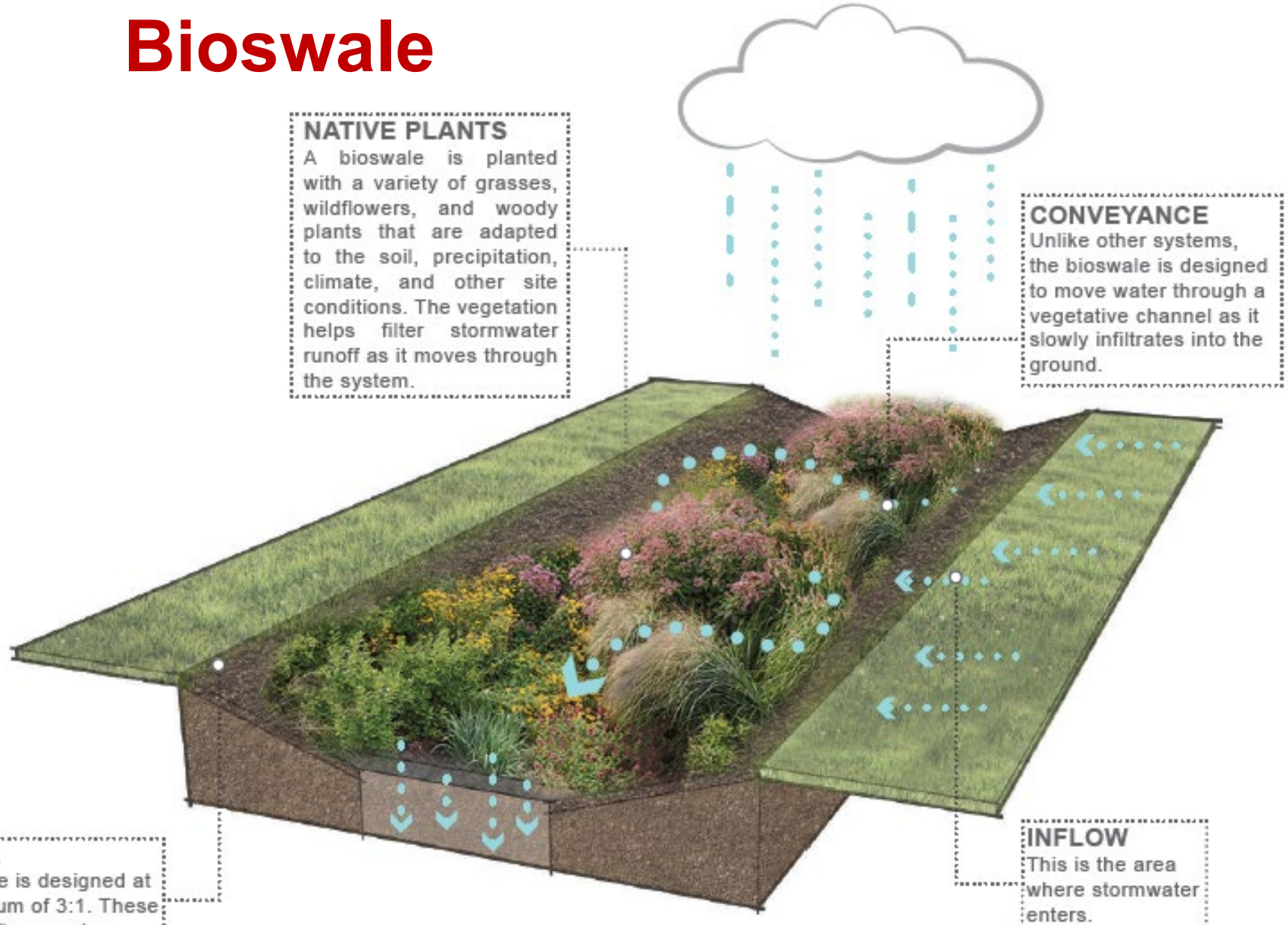



8.2 AM

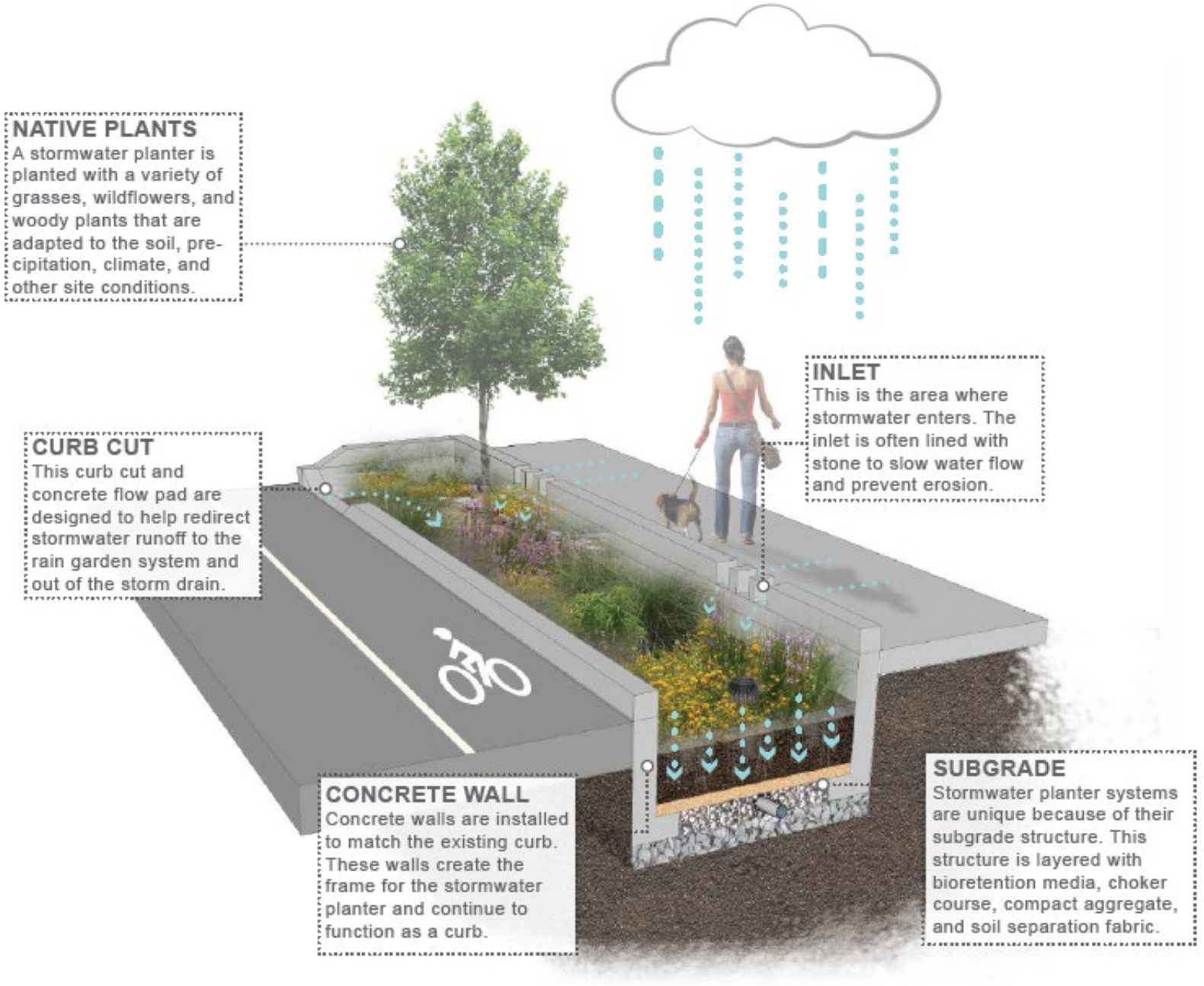
Lots of Rain Gardens


116

Bioswale

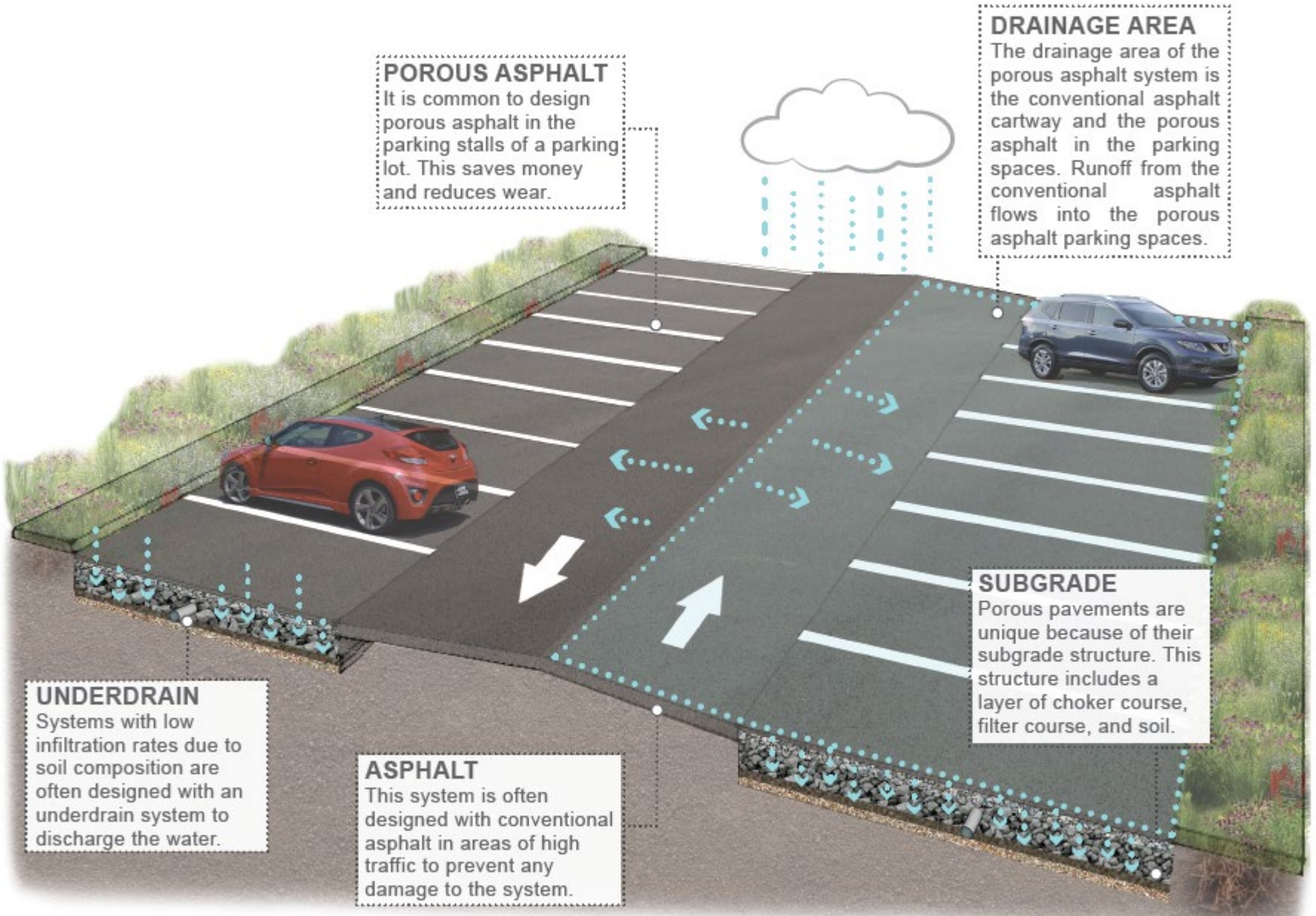

NATIVE PLANTS
A bioswale is planted with a variety of grasses, wildflowers, and woody plants that are adapted to the soil, precipitation, climate, and other site conditions. The vegetation helps filter stormwater runoff as it moves through the system.
CONVEYANCE
Unlike other systems, the bioswale is designed to move water through a vegetative channel as it slowly infiltrates into the ground.
SLOPE
The slope is designed at a maximum of 3:1. These slopes often require erosion control materials for stabilization.
INFLOW
This is the area where stormwater enters.

Stormwater Planters



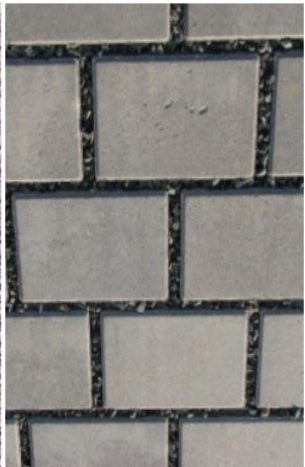
Curb Extensions

Permeable Pavement



Permeable Pavements

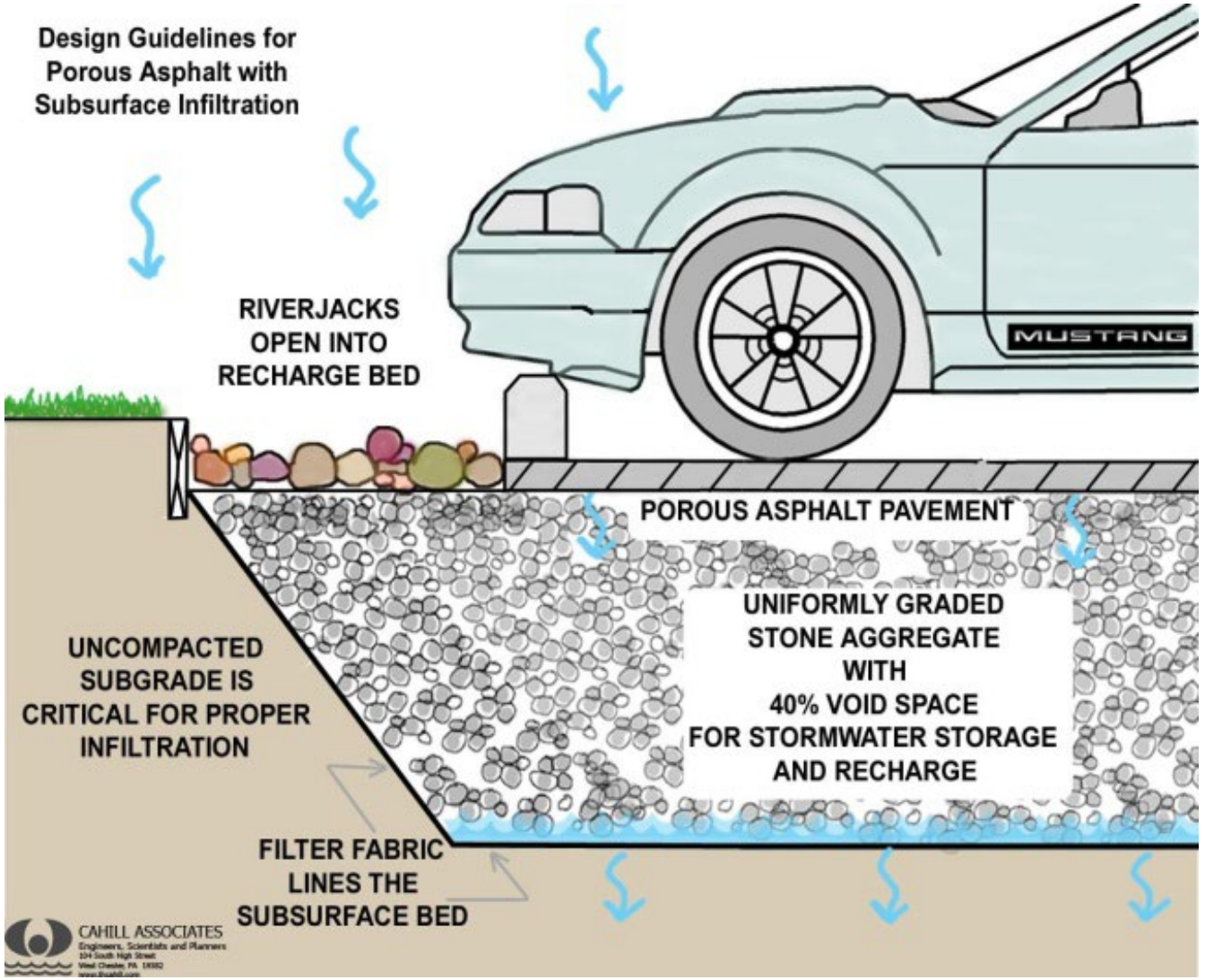
- Underlying stone reservoir
- Porous asphalt and pervious concrete are manufactured without "fine" materials to allow infiltration
- Grass pavers are concrete interlocking blocks with open areas to allow grass to grow
- Permeable paver systems are concrete pavers with infiltration between the spaces of the pavers
- 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



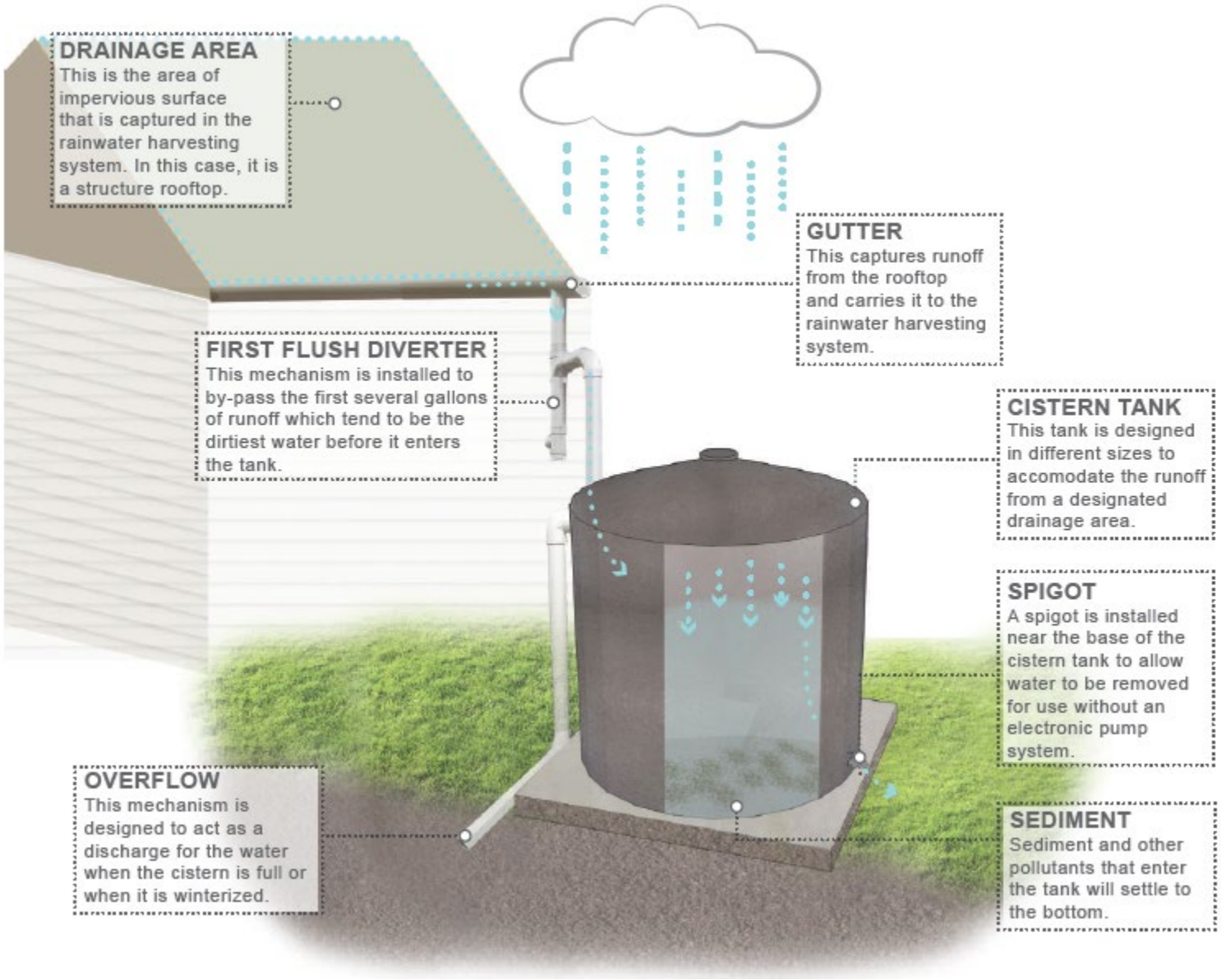
Porous Asphalt


Pervious Concrete


Permeable Pavers

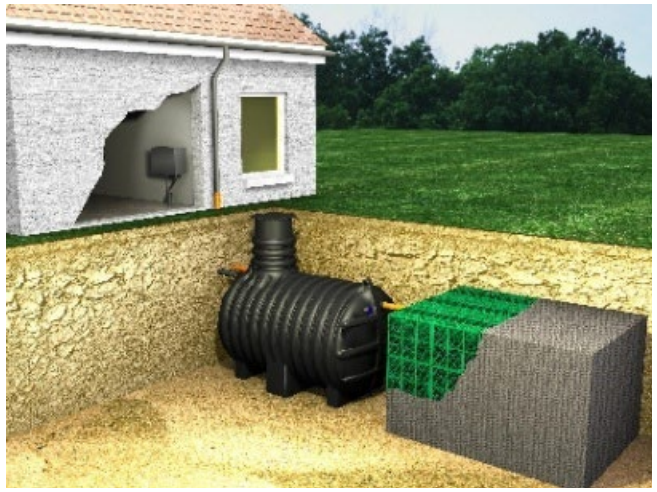

Grass Pavers

Rainwater Harvesting Systems



Rain Barrels

Cisterns



Green Infrastructure Champions

Green Infrastructure Champions are key players in implementing green infrastructure as a stormwater management approach in their community.

Cheryl Reardon works for the Association of New Jersey Environmental Commissions

Nathaniel Sajdak works for the Wallkill River Watershed Management Group

Laura McBride created the Deal Lake Watershed Alliance

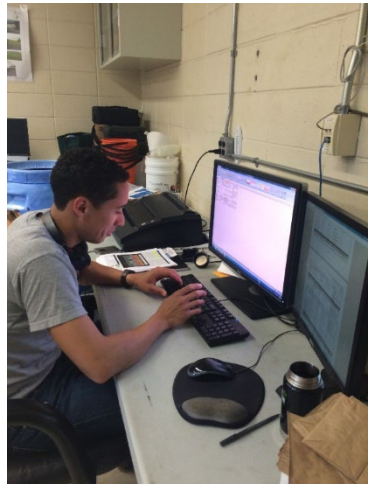
Rutgers inputs to the Green Infrastructure Champion Training Program

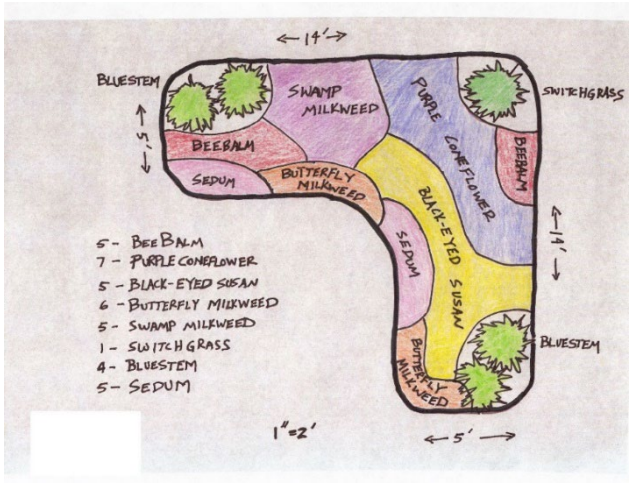
- 10 training classes on various aspects of green infrastructure planning and implementation
- Professional staff to provide technical support to develop a design for a green infrastructure demonstration project
- Networking opportunities with other Green Infrastructure Champions for mutual support
- Assistance with grant writing and submission

Green Infrastructure Champions Classes

1. How to identify green infrastructure projects in your town

2. Moving from planning to implementation of green infrastructure





Green Infrastructure Champions Classes

3. Maintaining green infrastructure practices/projects

4. Stormwater management regulations, policies, and ordinances



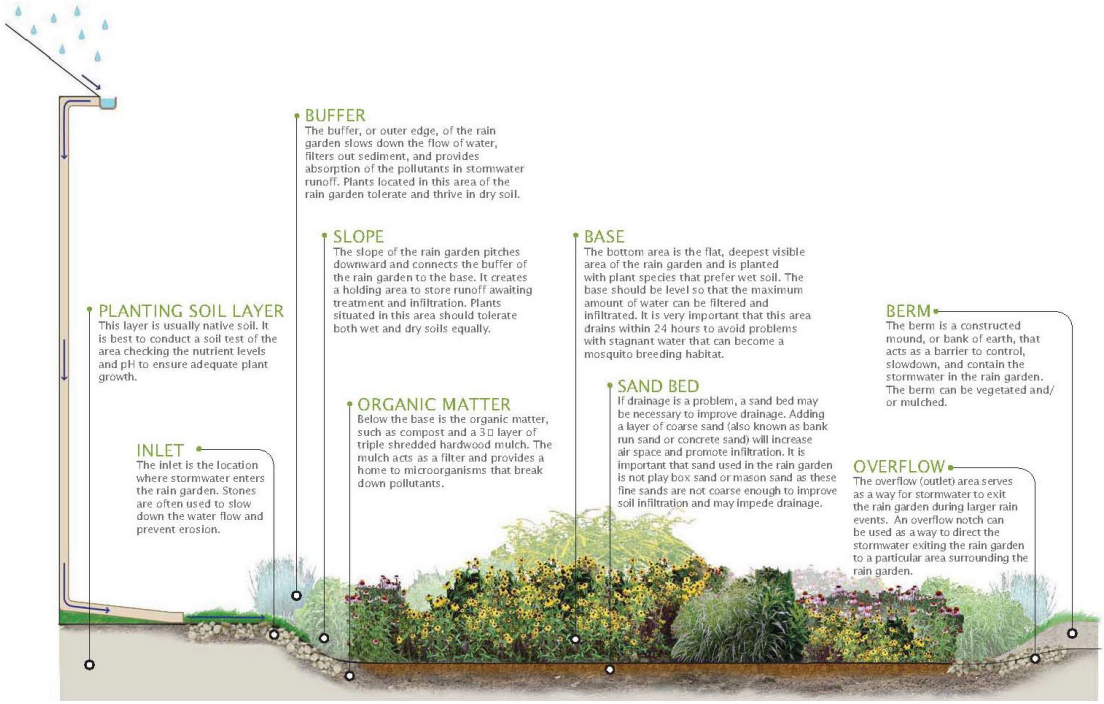

Green Infrastructure Champions Classes

5. Green infrastructure planning and implementation for Sustainable Jersey points

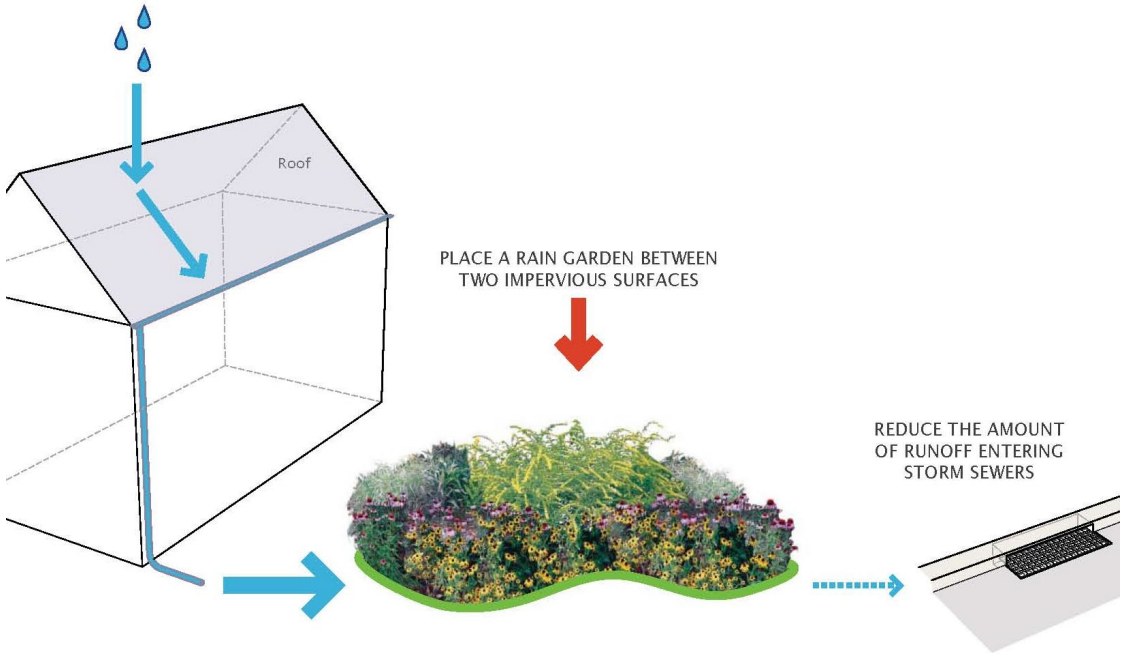
6. Green infrastructure projects for schools

Green Infrastructure Champions Classes

7. How to design and build a rain garden



8. Retrofitting traditional detention basins with green infrastructure



Green Infrastructure Champions Classes

9. Developing green infrastructure master plans for an entire site or neighborhood

10. Using green infrastructure to promote climate resiliency

Short-term results/impacts
Green Infrastructure Champions will:

- Increase their knowledge and awareness about green infrastructure practices, planning, and implementation
- Gain a skill set to allow them to engage community leaders, schools, and non-governmental organizations (NGOs) and advocate for green infrastructure as a stormwater management solution
- Identify funding opportunities and secure funding for green infrastructure

Long-term results/impacts

- Green infrastructure practices are installed throughout the community
- Green infrastructure becomes a standard in the community for addressing stormwater problems
- Localized flooding is reduced
- Water quality improves
- Community become more resilient to extreme weather events

793 certified Green Infrastructure Champions in the first six years of

Examples:

- Ann and Jane, Council members in Caldwell, NJ received a $20k grant to complete green infrastructure plans for the municipality and to build two rain gardens.

- Laura McBride created the Deal Lake Alliance and developed a Green Infrastructure Study for Deal Lake Watershed. Also, she installed green infrastructure to protect Deal Lake.

- Britta and Karen, members of Save the Barnegat Bay are using our presentation we provided them to give rain garden talks to local groups and municipalities about how rain gardens are beneficial.

Examples:

- Doriann Kerber of Milltown is supporting 10 green infrastructure projects (½ in her town and ½ in other surrounding towns). She recently accepted the position of the State Environmental Chair of the Lions Club Int'l where she will dramatically broaden her influence.
- Ila Vassallo, Chair of the Evesham Environmental Commission, lead the installation of green infrastructure projects in her community and helped pass stormwater ordinances to protect local waterways. She also has engaged many township departments, community groups, and the utilities authority in her green infrastructure projects.

Examples:

David Kois is a municipal planner and zoning official. He helped develop a green infrastructure master plan for the Hillsborough Municipal Complex. He led the effort to install five rain gardens and naturalize a detention basin. He has secured over $100K for green infrastructure projects in his town. David has changed the culture of the municipal government employees to embrace green infrastructure. He created the first rain garden maintenance easement template and requires homeowners to install green infrastructure to offset increases in impervious cover.

"Learning about grant writing and budgeting through the course has been integral to the work of fostering functional and lasting projects and partnerships. Involving students in green infrastructure management today is allowing for succession planning necessary toward the success of the projects put into play into the future."

- Rachel Dawn Davis – Public Policy & Justice Organizer, Waterspiritn (Paterson, 147,000 residents, Perth Amboy, 50,000 residents)

Next Steps

- Advance classes
  - Integrating gray with green to manage large storms
  - Living shorelines, floodplain restoration, and stormwater wetlands
  - Advocacy strategies for green infrastructure
- Green infrastructure program for youth
- Dedicated demonstration project funding for GI Champions
- Create online learning tools
- Hands-on workshops

Green Solutions for New Jersey Stormwater Issues

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