How to identify green infrastructure projects in your town

Save Barnegat Bay NEMO Program

Rutgers Cooperative Extension Water Resources Program
Chris Obropta

RUTGERS
New Jersey Agricultural Experiment Station

Overview

- Stormwater Basics
- Green Infrastructure
- Bioretention (Rain Gardens)
- Permeable Pavements
- Rainwater Harvesting
- Site Selection

Stormwater Basics

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 Impact of Development on Stormwater Runoff

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

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

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

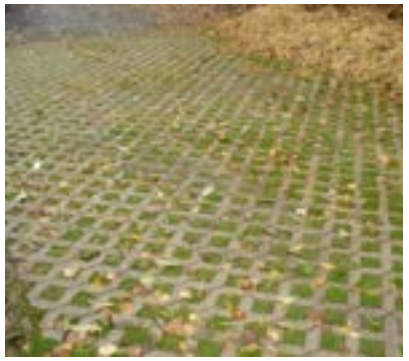
Dry Wells

Rooftop Systems

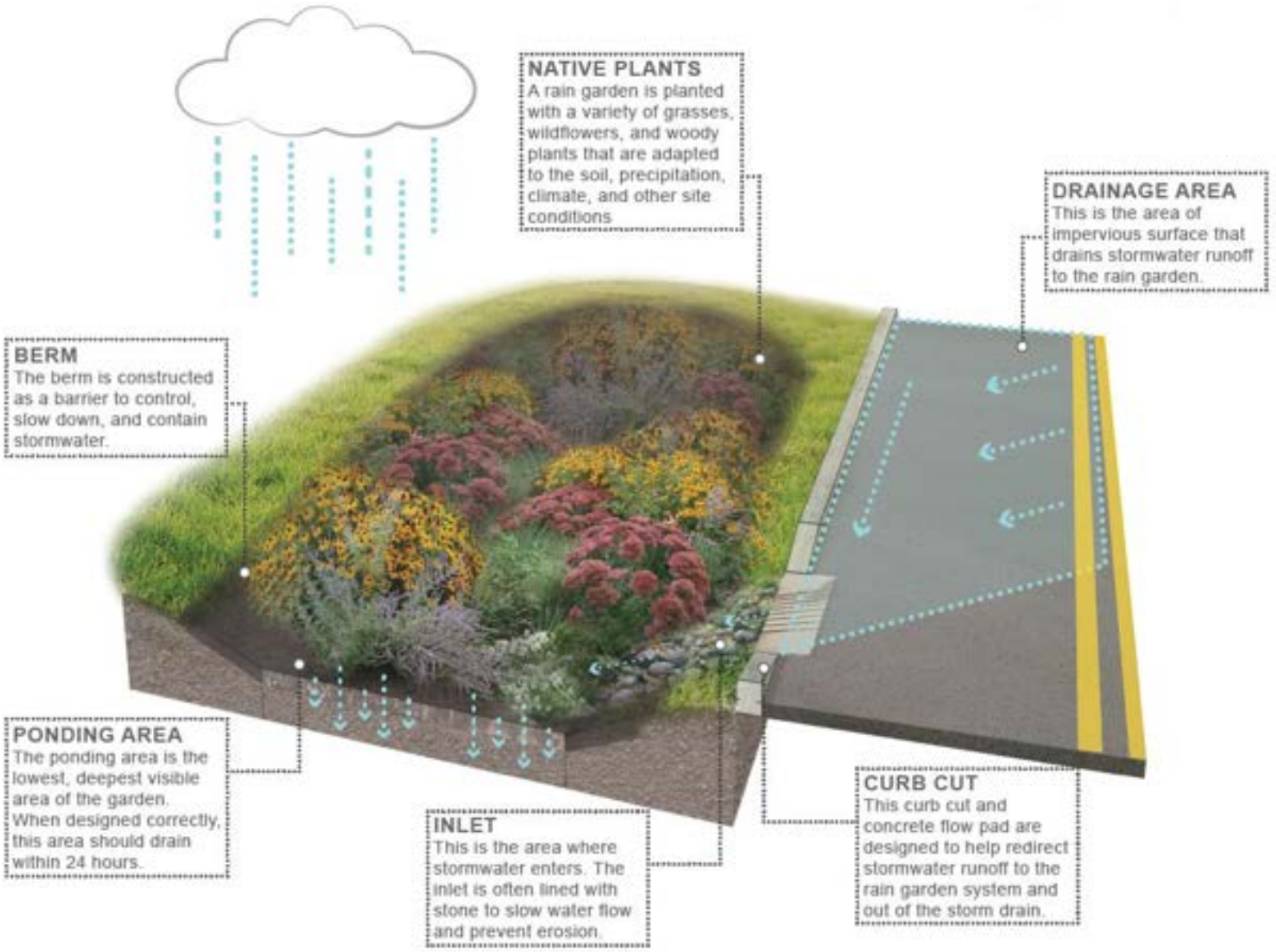
- Green Roofs
- Blue Roofs



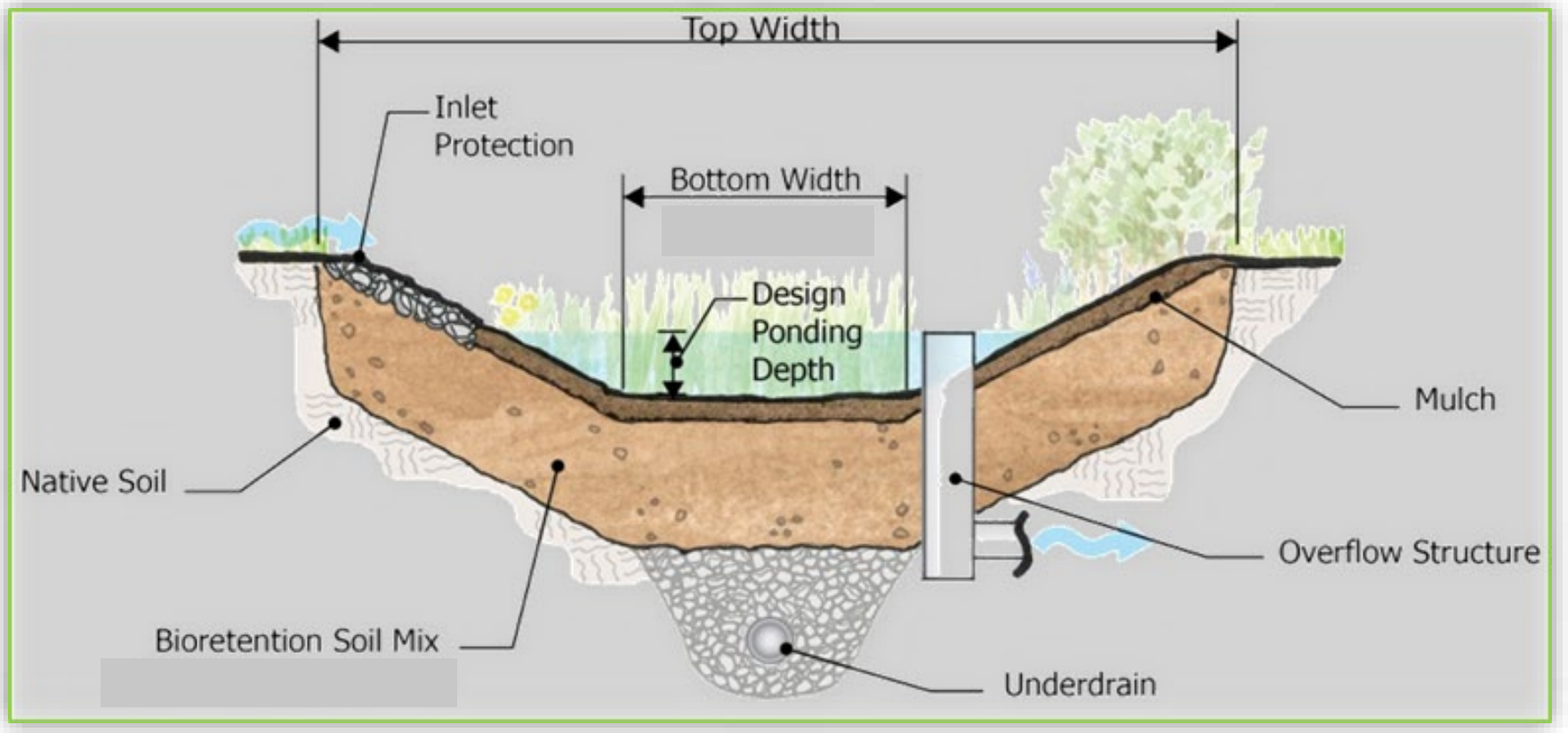





Rain Gardens



Rain Garden Cross-Section



Lots of Rain Gardens



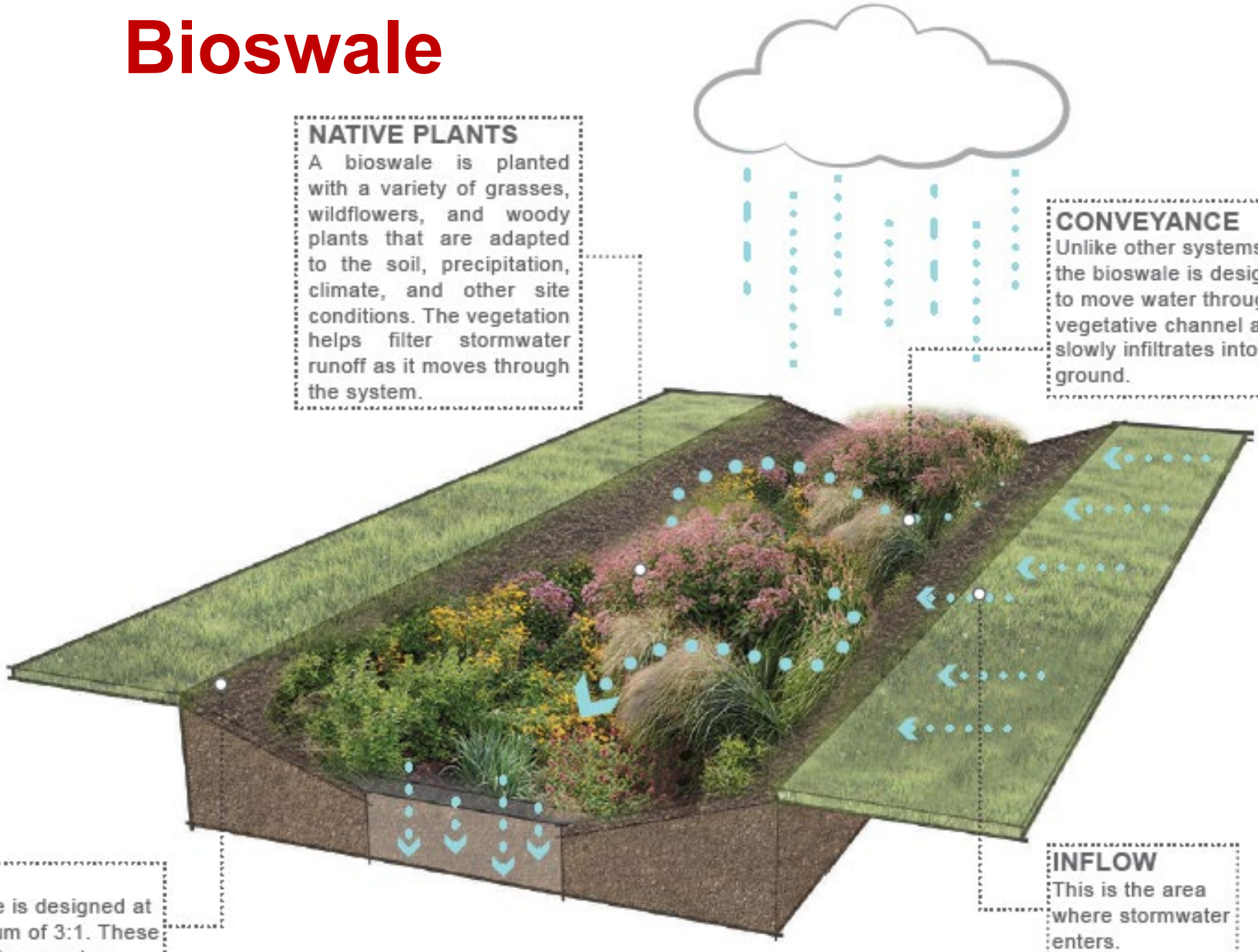








Bioswale



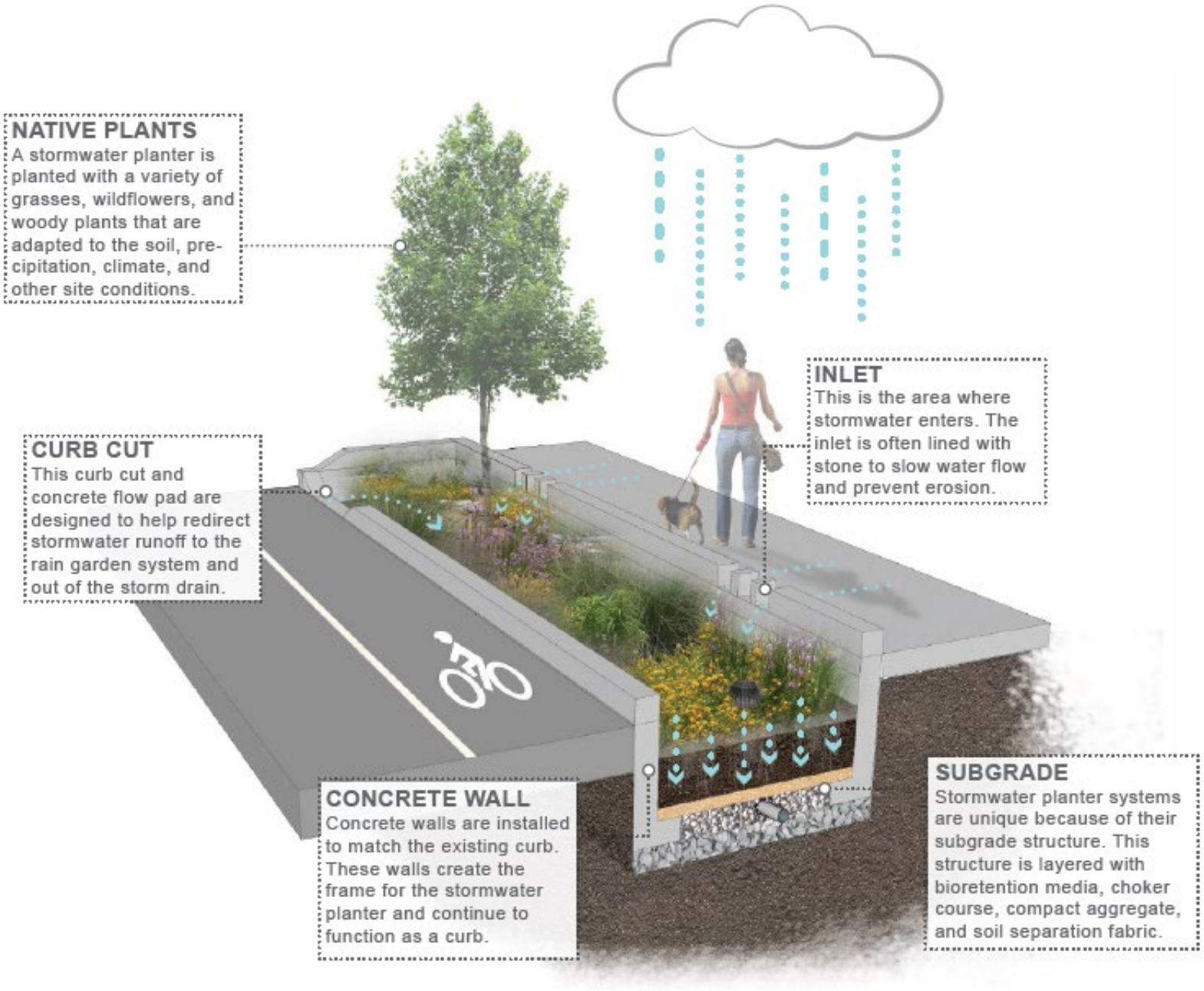
NATIVE PLANTS
A bioswale is planted with a variety of grasses, wildflowers, and woody plants that are adapted to the soil, precipitation, climate, and other site conditions. The vegetation helps filter stormwater runoff as it moves through the system.

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.

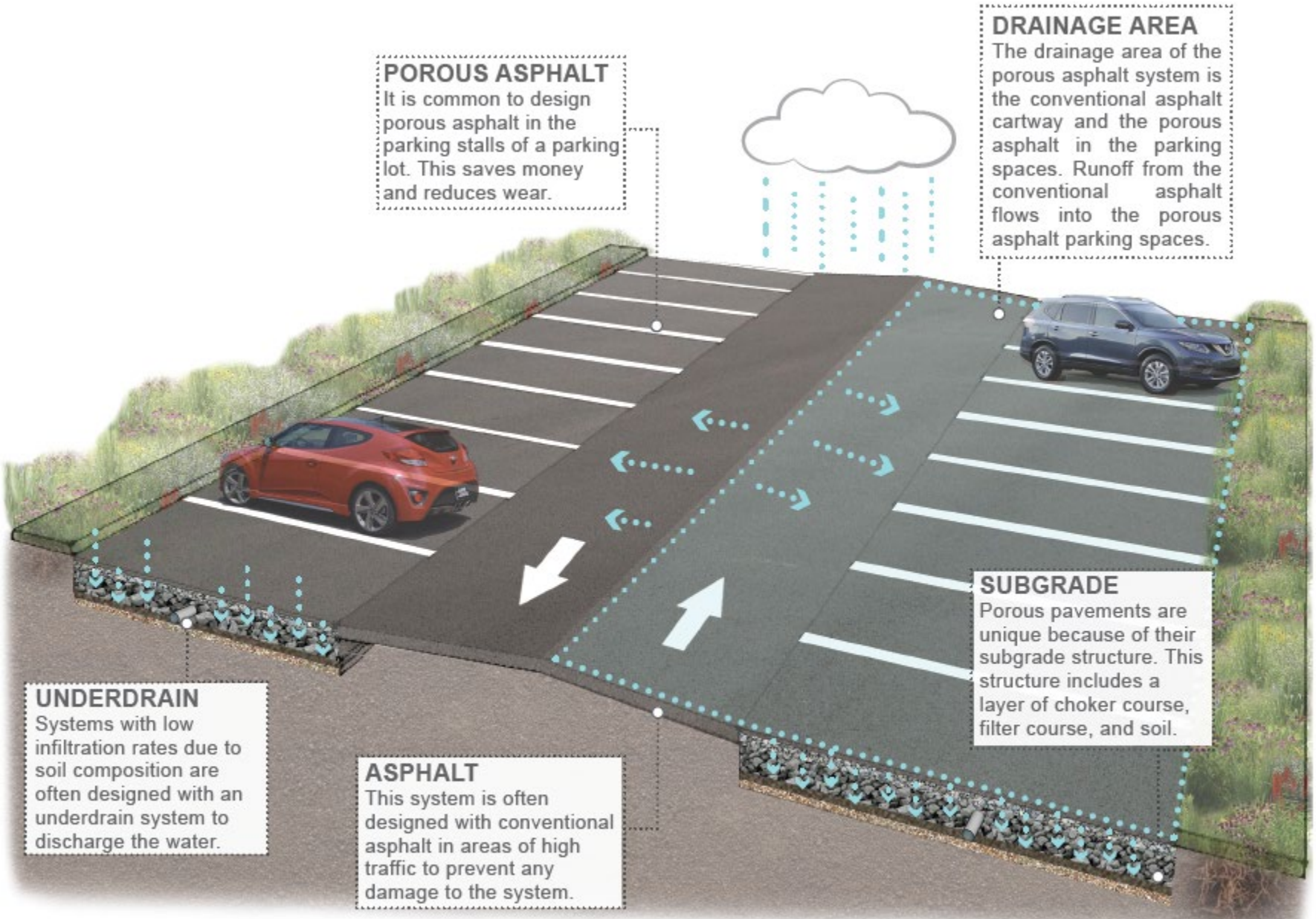
INFLOW
This is the area where stormwater enters.

Stormwater Planters



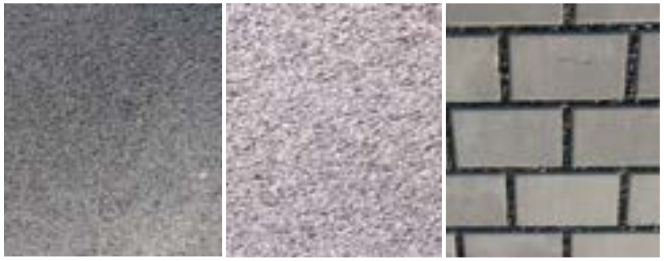
Curb Extensions

Permeable Pavement



Permeable Pavements

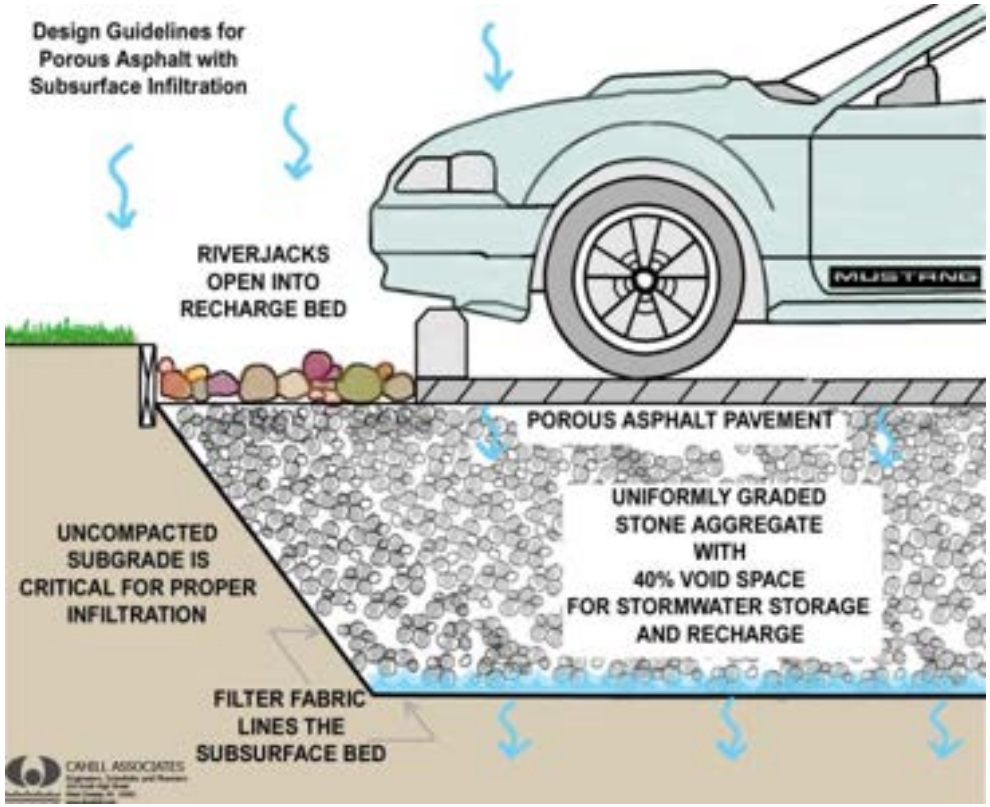
- Underlying stone reservoir
- Porous asphalt and pervious concrete are manufactured without "fine" materials to allow infiltration
- Grass pavers are concrete interlocking blocks with open areas to allow grass to grow
- Permeable paver systems are concrete pavers with infiltration between the spaces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



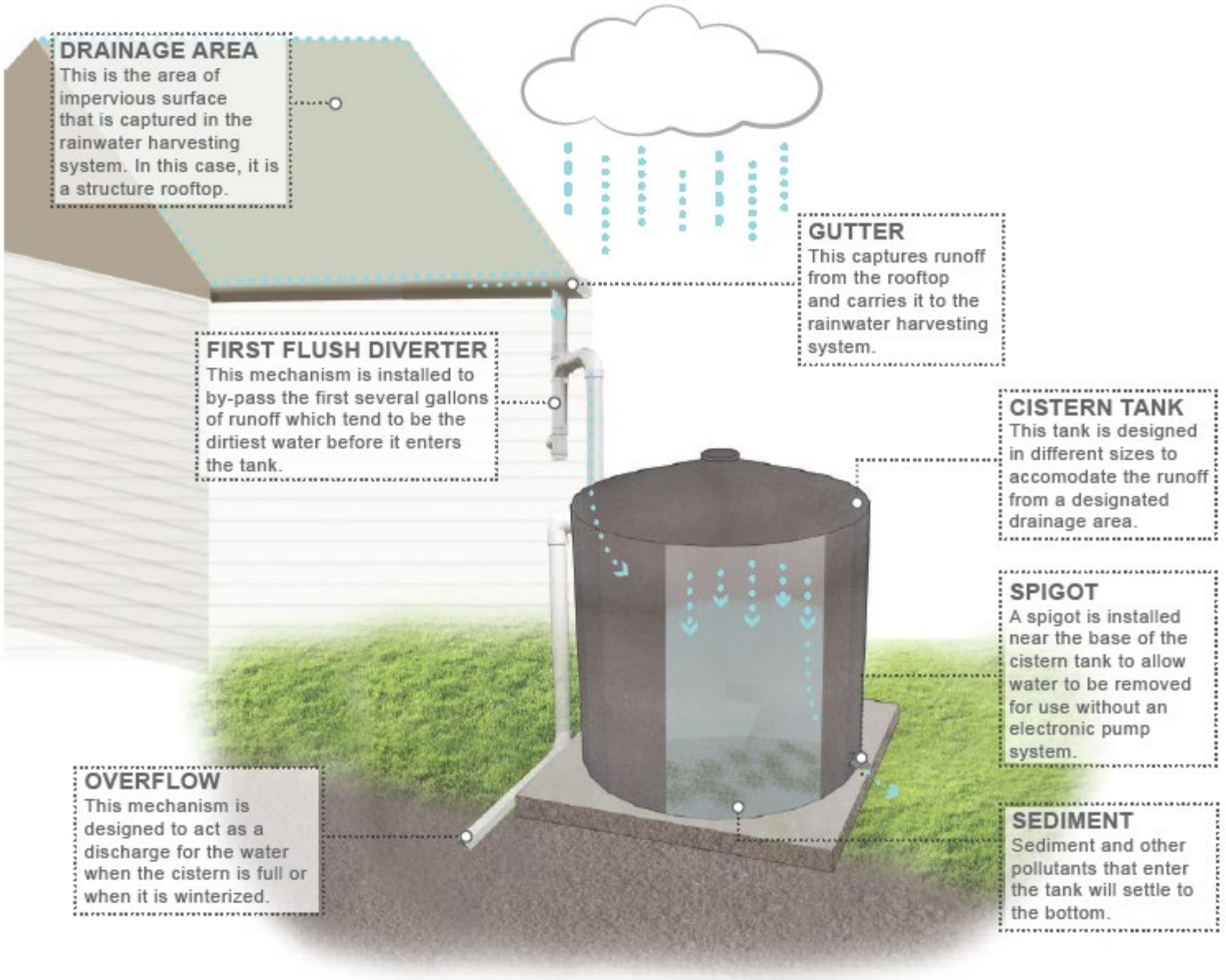
Porous Asphalt


Pervious Concrete


Permeable Pavers


Grass Pavers

Rainwater Harvesting Systems



Rain Barrels

Cisterns

SITE SELECTION

What are good sites?

- Sites with impervious surfaces that are directly connected
- Sites with a lawn area that can be converted to accept stormwater runoff
- Sites with highly visibility – good educational opportunities
- Sites in impaired watersheds
- Sites on municipal owned land/public land
- Sites that provide partnership opportunities

WE LOOK HERE FIRST:

- ✓Schools
- ✓Places of Worship
- ✓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

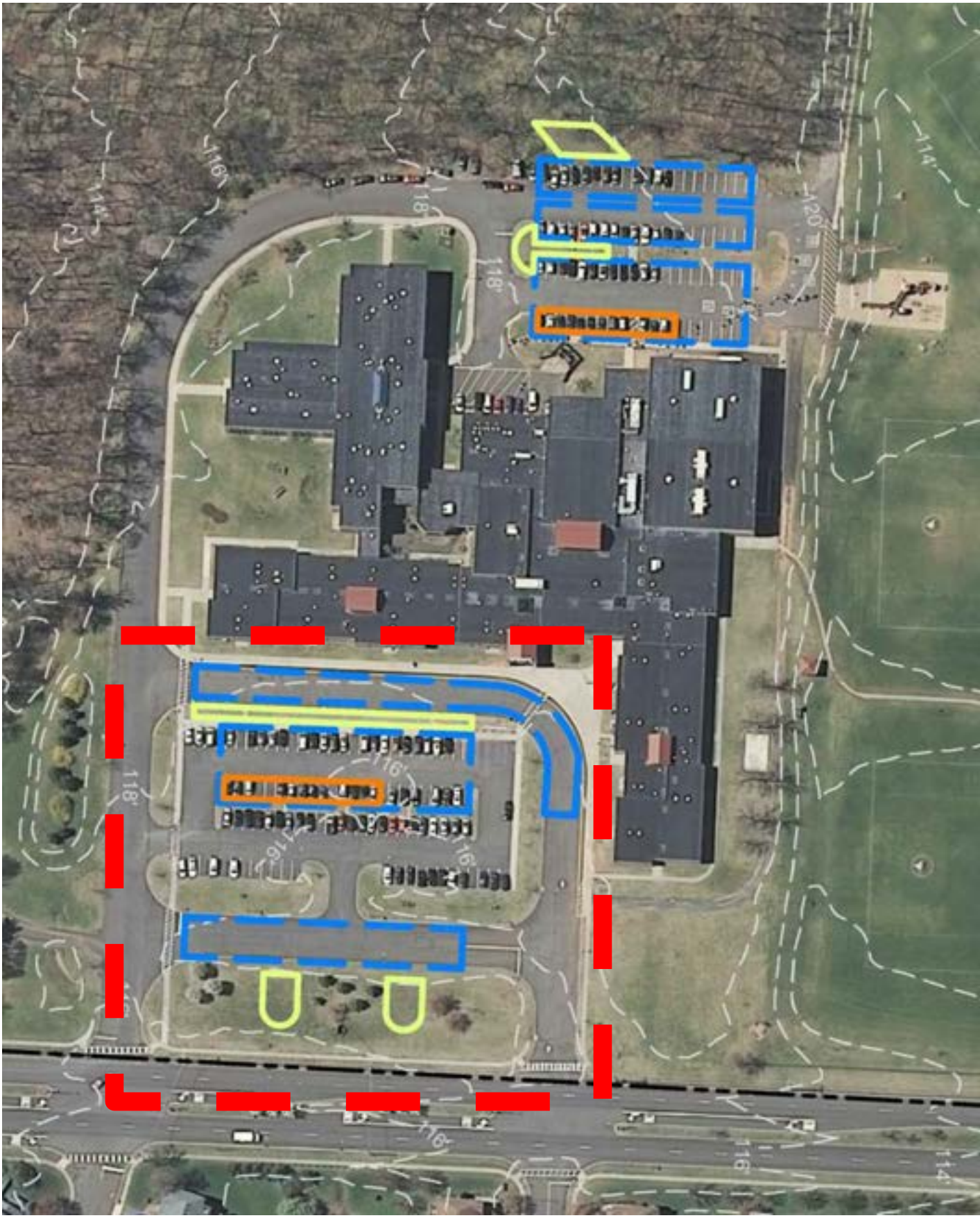
Google or Bing Maps

- Go to Google Maps
- Type in address
- Aerial or birds eye view
- “Snip It” (MS Windows Accessory)
- Insert into PowerPoint
- “Crop It”

Auten Road School in Hillsborough, NJ
281 Auten Rd, Hillsborough Township, NJ 08844


116'
118'
120'


120'
118'


116'
118'
120'
114'
116'
118'
116'
116'
116'
118'
114'

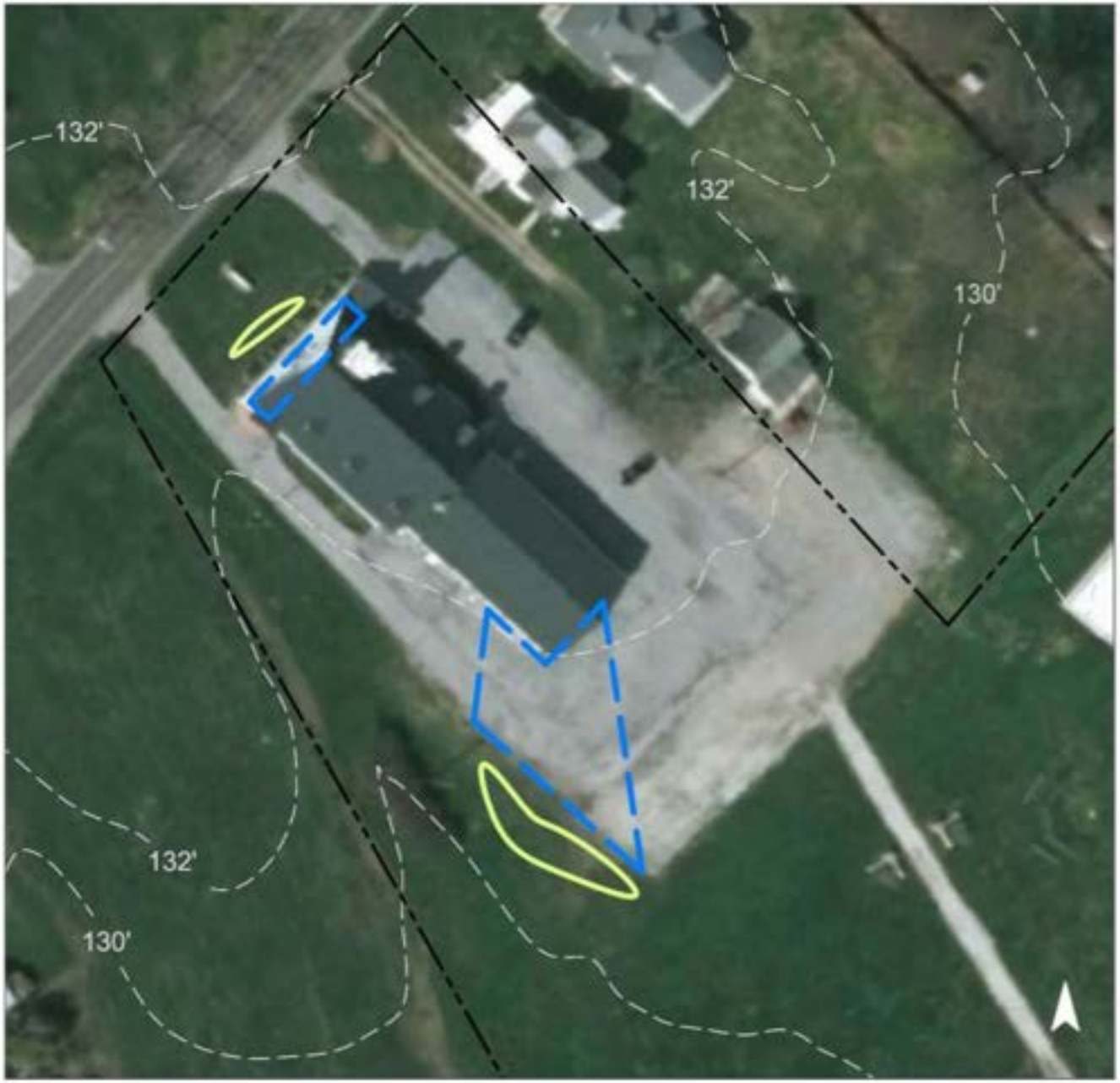
"Protecting Public Health and the Environment"

RUTGERS
New Jersey Agricultural
Experiment Station

"Protecting Public Health and the Environment"

RUTGERS
New Jersey Agricultural
Experiment Station

GREEN INFRASTRUCTURE RECOMMENDATIONS



Pittsgrove Baptist Church

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

0 30' 60'

CURRENT CONDITION

CONCEPT DESIGN

Site Visits

What are we looking for during our site visit?

1. What are sources of stormwater and where does it flow?
2. What is the direction and relative slope of the site?
3. Where are impervious surfaces on the site?
4. What is the condition of the paved areas?
5. Are impervious surfaces directly connected?
6. Are there opportunities to disconnect?
7. Are there stormwater catch basins?
9. Is there evidence of ponding water on the site?
10. Where are the utilities on the site?
11. Are there pedestrian safety issues?

Other Questions

- Do the soils infiltrate?
- Who own the property? Will they be open to installing stormwater management measures?
- Are there potential partners to help with the project?
- Do we need permits for altering this site with stormwater best management practices?
- Does the building have a basement?
- Can we lose parking spaces?
- Who will maintain the green infrastructure practices?
- Is the project a high priority?

THINGS YOU SHOULD BRING ON A SITE VISIT

Aerial photo

Pencil

Tape measure and/or measuring wheel

Camera

Green Infrastructure Manual: http://water.rutgers.edu/GreenInfrastructureGuidanceManual.html

Green Infrastructure CHECKLIST:

http://water.rutgers.edu/GreenInfrastructureGuidanceManual.html

Also found on pages132-135 in the Manual

RUTGERS

Green Infrastructure
Site Assessment Checklist

GENERAL INFORMATION	Site ID:
Name person(s) completing assessment:	Date:
Location Address and Cross Streets:	Neighborhood:
Name of Nearest Waterway:	Property Owner / Tax Parcel ID/Street Segment:
Contact Information:	

SITE DESCRIPTION
Description of site and relative visibility to the public (public or private property, lot size, current use, streetscape, etc):

OBSERVATIONS	NOTES/REMARKS
1) What is the source of stormwater runoff and where does it flow (on map or aerial photo indicate water flow direction and existing storm drains)? Is there a noticeable source or deposit of sediment?	
2) What is the direction and relative slope of the site and/or street? (indicate on map or aerial photo)	
3) Where on the site are impervious areas and estimate area in square feet (i.e. rooftops, parking lots, sidewalks)? For streetscapes, what is the building setback and/or sidewalk width?	
4) Do paved areas appear to be in poor condition (cracks, settling, vegetation growth, etc.) or do they appear newly paved or reconstructed?	
5) Does stormwater runoff from impervious areas flow directly to the sewer system (such as roof runoff directed into a storm drain)?	
6) Are there opportunities to redirect and disconnect runoff (downspouts, grassed areas, tree pits, curb extensions)?	
7) How many stormwater catch basins are visible? Note location on maps and general condition, i.e. clogged, functioning, shallow (< 3 ft), or deep (>3 ft)?	
8) Is there evidence of ponding water at the site or flooding in streets or intersections? (indicate reason; i.e. due to clogged drains, high water table, etc.)	
9) Are there mature trees/vegetation at the site? What types of plants would be appropriate at the site (sun or shade tolerant, height or site line restrictions)?	
10) Where are utilities on the site or in the right of way that could conflict with construction (sewer pipes, utility poles, water, gas, etc.)?	
11) Does pedestrian safety need to be addressed? Will parking or bus stops be impacted by construction?	

RUTGERS

Green Infrastructure
Site Assessment Checklist

Choose suggested BMPs or indicate other. Include site photos and a description of recommended BMP location.

RAIN GARDENS	YES	NO	COMMENTS
1) Are there visible, exterior downspouts on any buildings?			
2) Are there unpaved areas suitable for landscaping?			
3) Is the site subject to ponding or flooding?			
RAIN WATER HARVESTING	**YES**	**NO**	**COMMENTS**
1) Are there nearby buildings with visible exterior downspouts?			
2) Is there a community garden nearby or other use for collected rainwater?			
TREE PITS, TRENCHES, AND STREETSCAPE STRATEGIES	**YES**	**NO**	**COMMENTS**
1) Does stormwater flow across sidewalks or along the curb?			
2) Are there existing trees, landscaping or tree pits near the street?			
2) Can water be directed from the street/curb into adjacent areas?			
POROUS PAVEMENT	**YES**	**NO**	**COMMENTS**
1) Are there large areas of pavement on the site and are any paved areas not heavily used (i.e. fire lane, overflow)?			
2) Are existing impervious areas in poor condition and in need of replacement?			
CURB EXTENSIONS AND STORMWATER PLANTERS	**YES**	**NO**	**COMMENTS**
1) Is this a heavily used pedestrian crossing? Are there pedestrian crosswalks that would be safer if shortened?			
2) Is the intersection or street at a location where stormwater can be collected before it enters a storm drain?			
OTHER STRATEGIES	**YES**	**NO**	**COMMENTS**

RUTGERS
New Jersey Agricultural Experiment Station

Christopher C. Obropta, Ph.D., P.E.
E-mail: obropta@envsci.rutgers.edu

www.water.rutgers.edu