

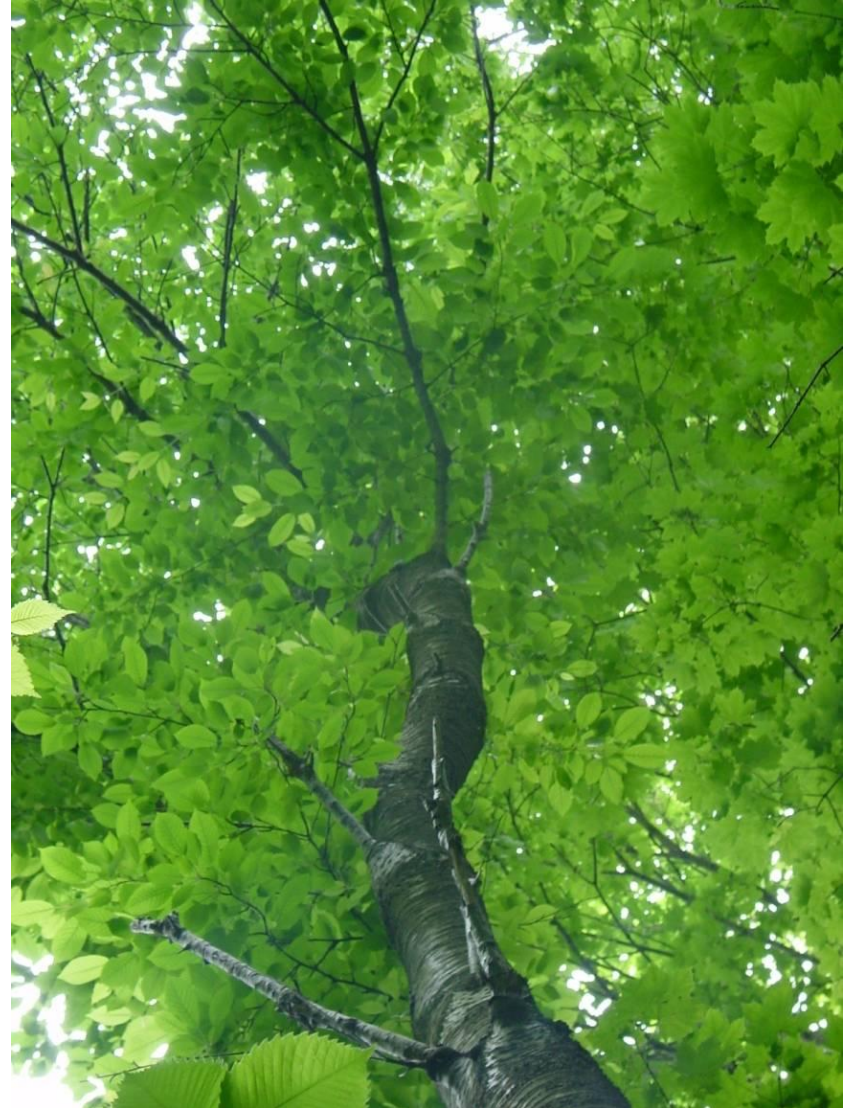


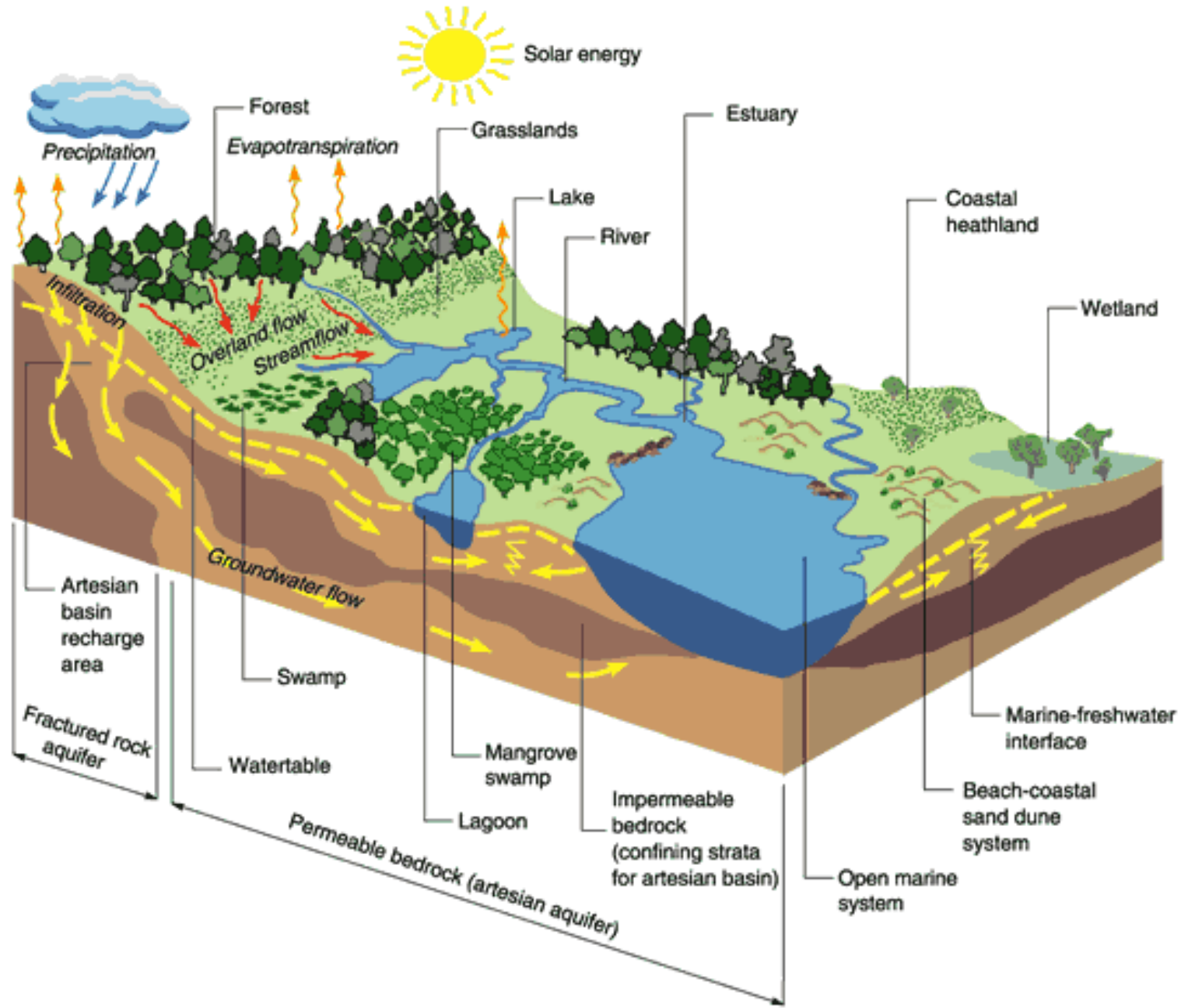
Clean Waterways *in Wilmington:*

Green Infrastructure Planning and Implementation
to Improve Water Quality and Support Public
Space

Current Programs

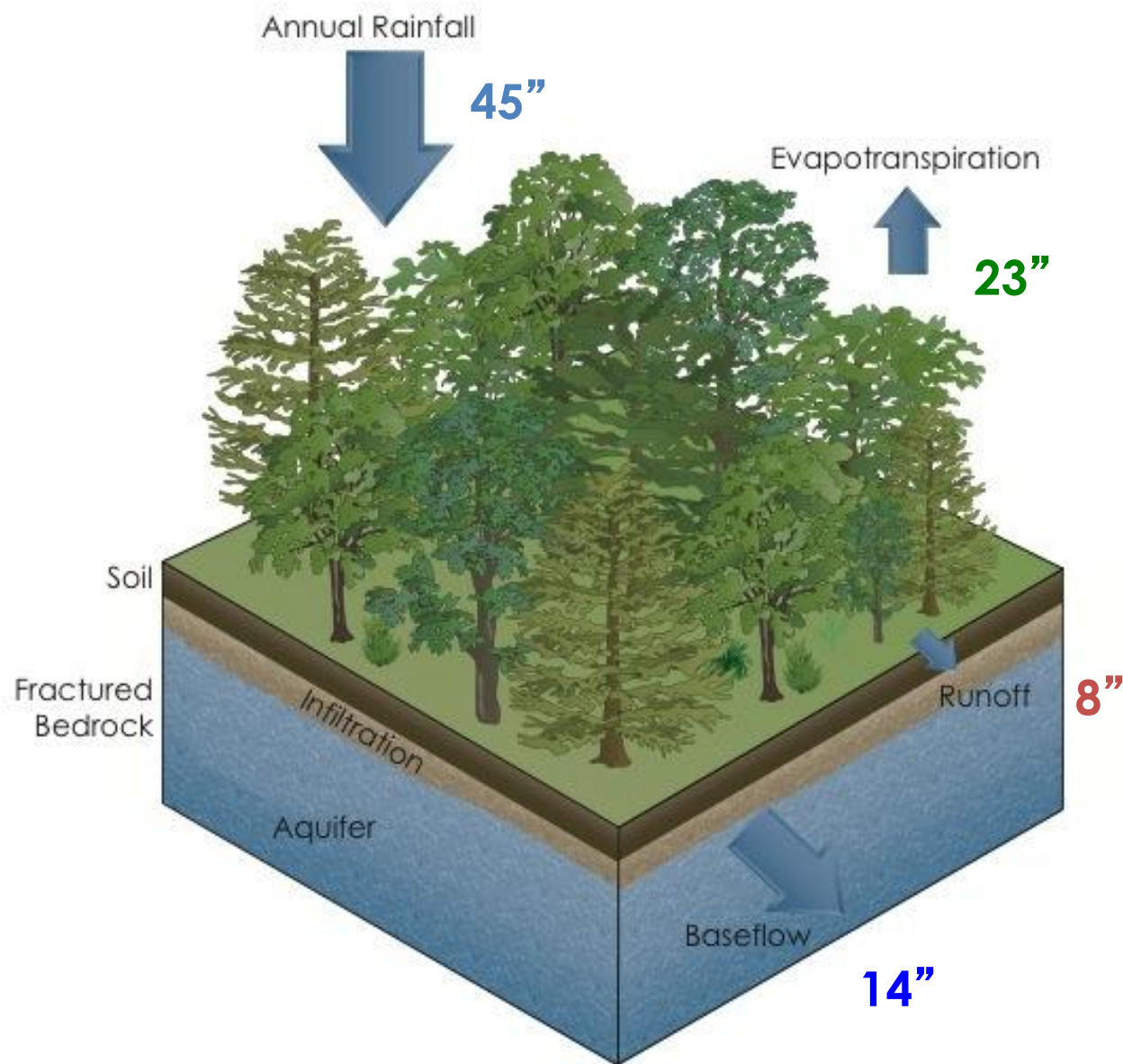
- Stormwater Utility Fee / Credit Program
- **CSO4a Green Infrastructure Plan**
 - 28 potential GI concepts
 - **4 concept designs**
- City Initiatives:
 - **ACME Trolley Square**
 - **Locust Street Tree Trench**
 - Rockford Road Downspout Disconnect Program
 - Urban Forestry Program
 - South Wilmington Wetlands Park
 - Planned Plaza Renovations



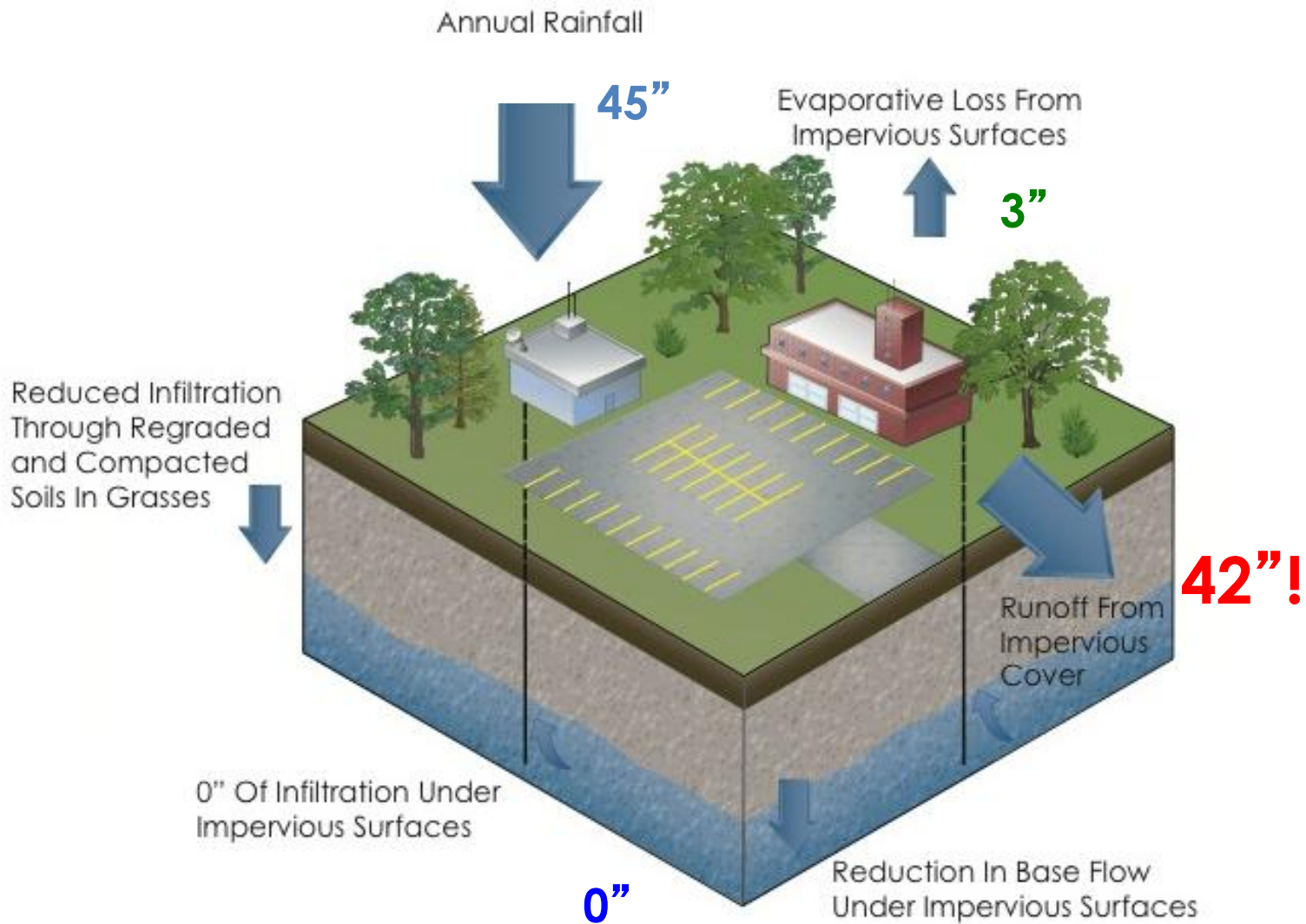


The Hydrologic Cycle

Natural Water Cycle Mid-Atlantic Area



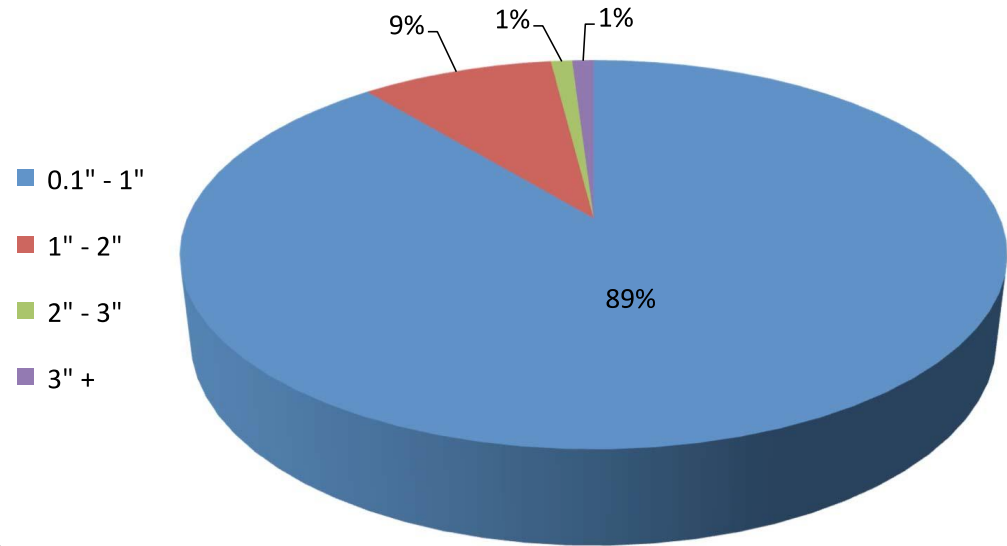
Altered Water Cycle – Impervious Surfaces



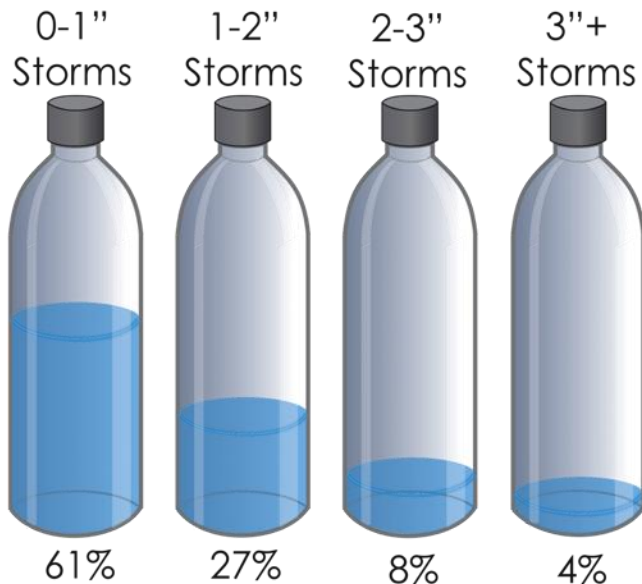
Two important observations:

Frequency: Most of the time, it rains 1 inch or less

Annual Frequency of Storm Events

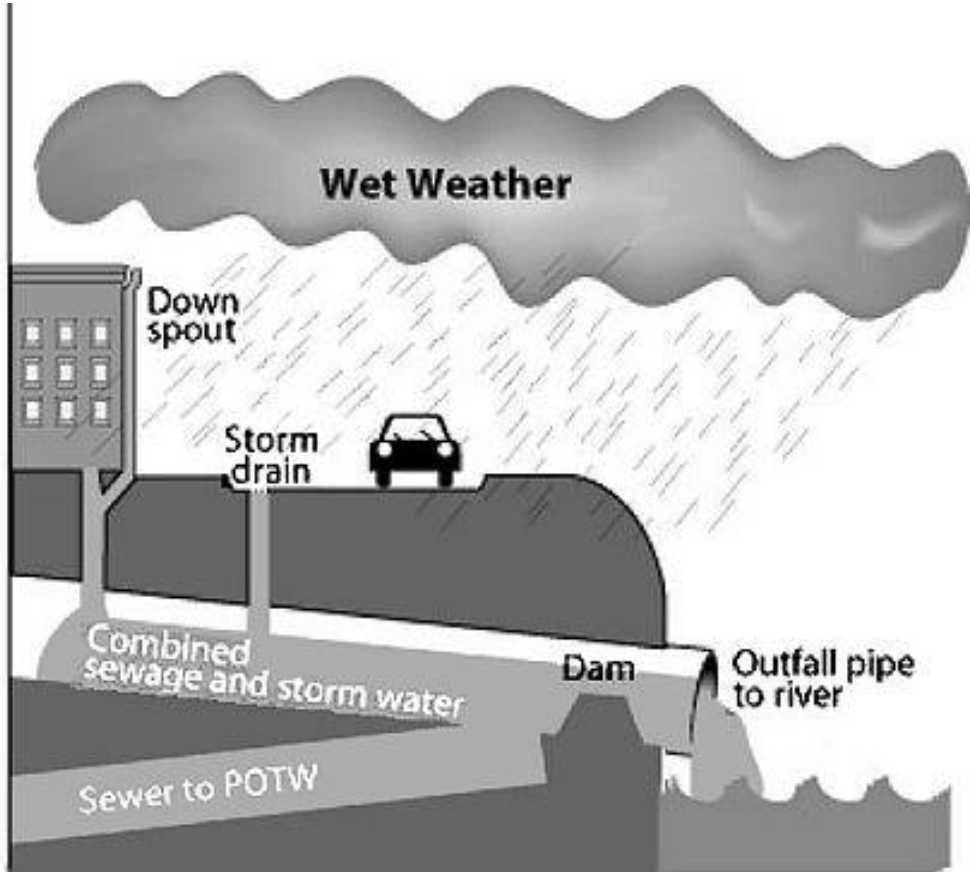
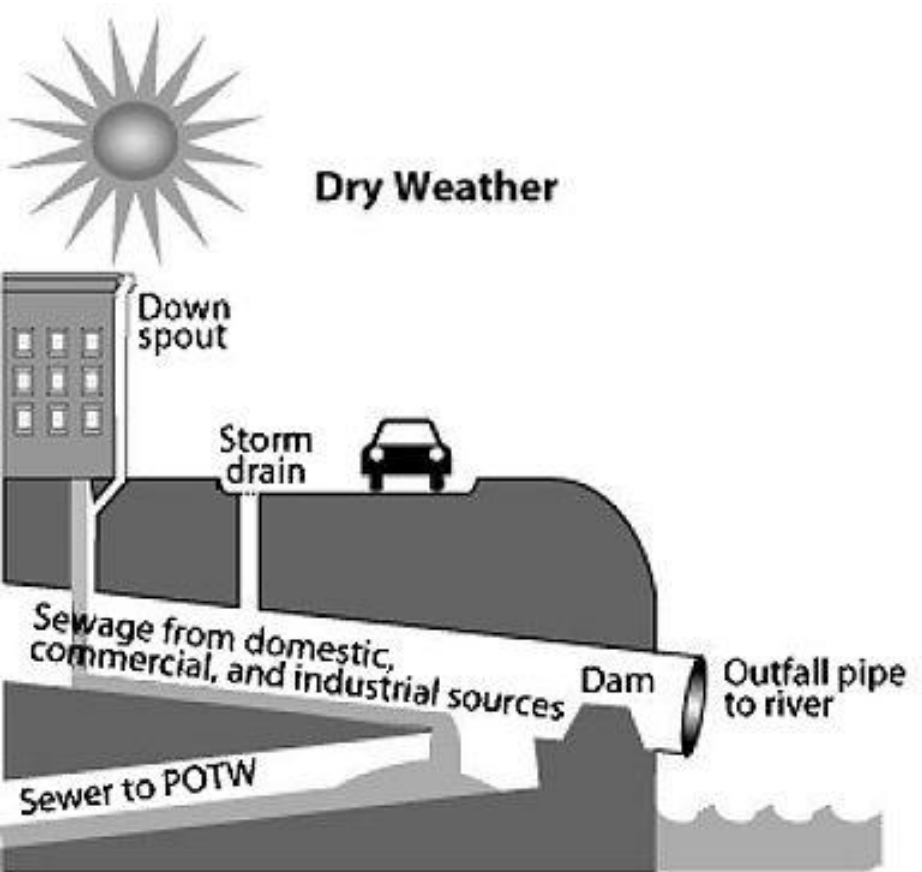


Annual Percentages of Volume from Storms



Volume: 96% of the annual rainfall volume of 45 inches is from storms 3 inches or less

Areas with Combined Sewers



Low Impact Development (LID) or “Green Infrastructure” (GI)



“Allow natural infiltration to occur as close as possible to the original area of rainfall. By engineering terrain, vegetation, and soil features to perform this function, costly conveyance systems can be avoided and the landscape can retain more of its natural hydrologic function.”

National Association of Home Builders

Landscapes informed by Nature

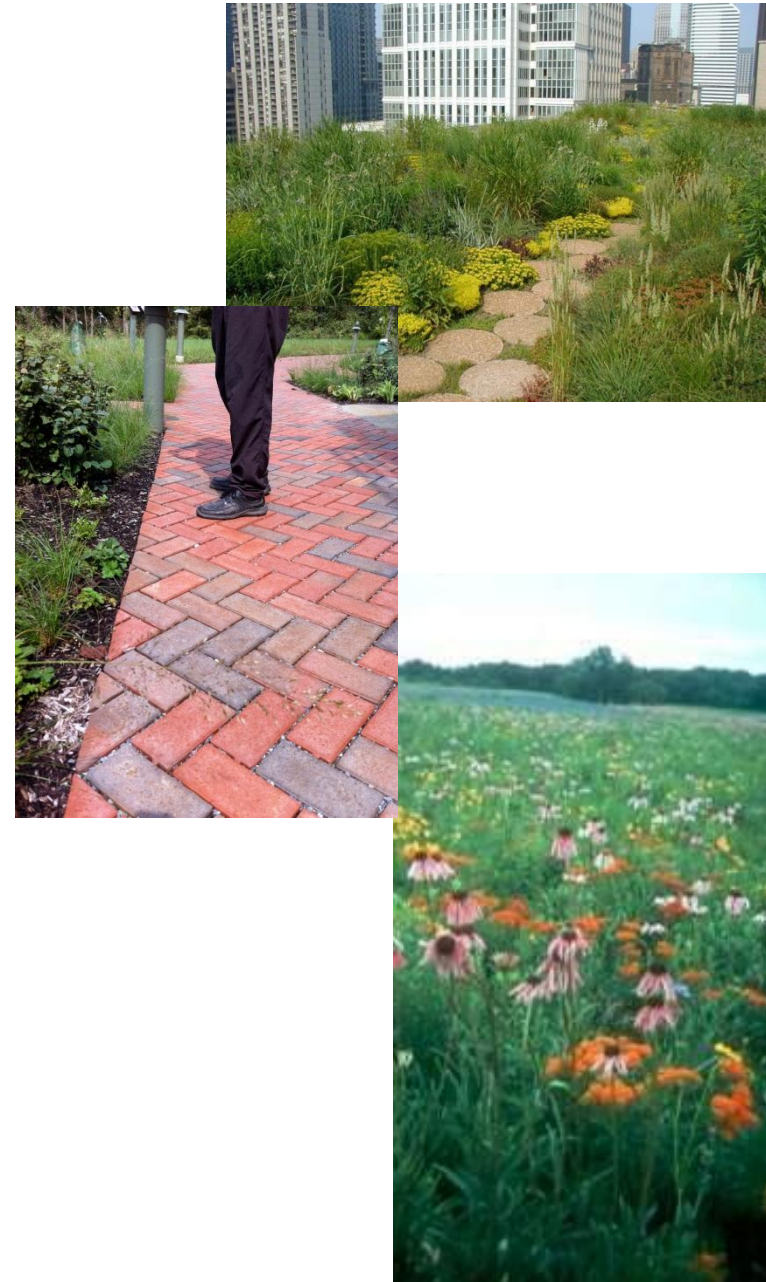
BMPs or Green Infrastructure Technologies

Structural

- Porous Pavement
- Rain Gardens / Bioretention
- Infiltration Systems
- Cisterns and Re-use
- Green Roofs

Restorative or “Non-Structural”

- Lawn to Meadow
- Soil and Landscape Restoration
- Tree Planting / Reforestation
- Riparian Buffers
- Disconnect Impervious



Wilmington CSO4A Green Infrastructure Plan

- 28% of overflows in the city
- Plan to manage first 1.5 inches of runoff from 30 acres of impervious surface



Wilmington CSO4A Green Infrastructure Plan

1. Understanding the Sewershed

- Historical Context
- Soils
- Land Use
- Impervious Surface Analysis

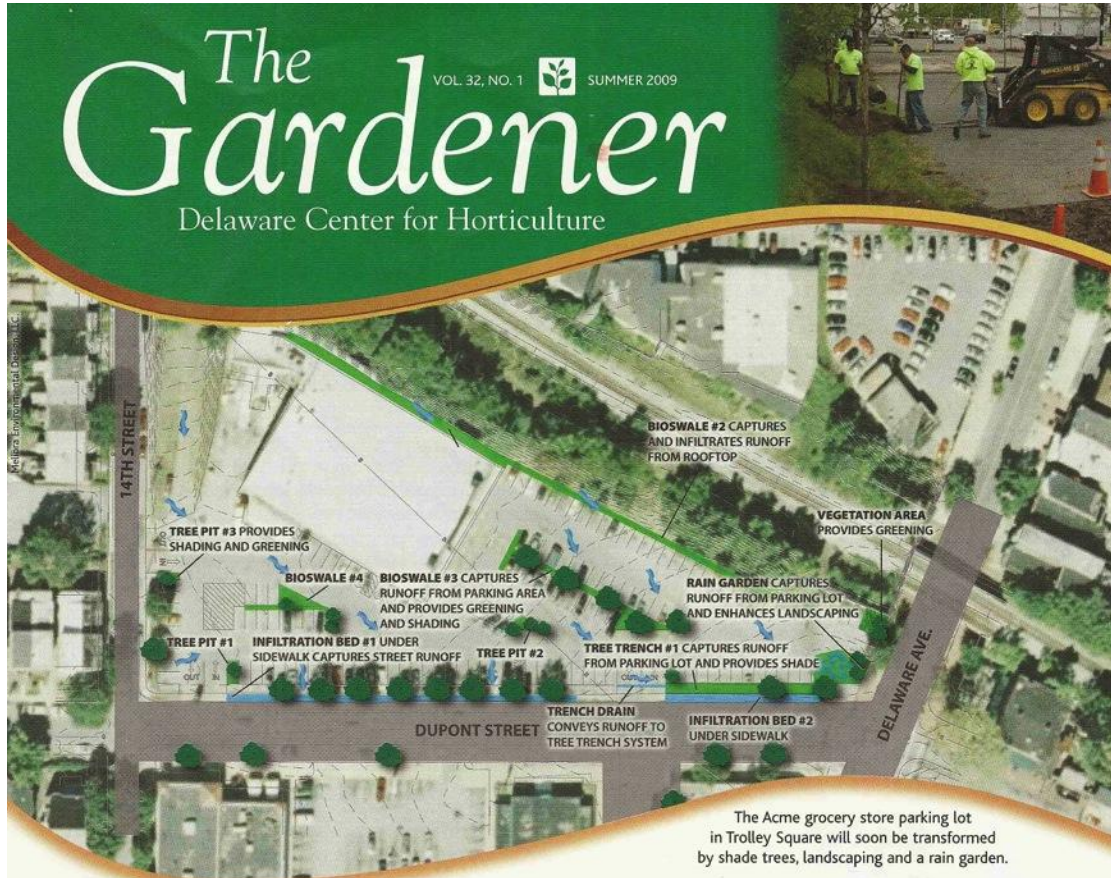
<hr/>		
<i>Sewershed (in acres)</i>	<i>322.67</i>	
Landcover Type	AC	% of DA
Roof	68.25	21.15%
Road/Driveway	54.34	16.84%
Parking Lot	31.44	9.74%
Sidewalk (6' wide)	18.02	5.59%
Playground	0.87	0.27%
Pool	0.69	0.22%
TOTAL IMPERVIOUS COVER	173.62	54%

Wilmington CSO4A Green Infrastructure Plan

2. Identify locations that “capture” a significant drainage area
3. Field verification



Acme Parking Lot: Urban Grocery Store in Wilmington



The Acme grocery store parking lot in Trolley Square will soon be transformed by shade trees, landscaping and a rain garden.

Hot in the City

New plantings capture stormwater and reduce summer heat

Anyone who has walked across a paved road on a bright summer afternoon knows that black asphalt radiates shimmering heat. And in the search for parking, one of life's small pleasures is finding a space with some shade.

What's blooming in this issue...

Rare Plant Auction report | page 2

Go Ask Alice | page 3

Bioretention between existing parking





Making use of “wasted”
spaces between parking





Curb cuts to Bioretention

Tree Trenches along the street



Rain Garden

Benches by Bus Stop

Signage

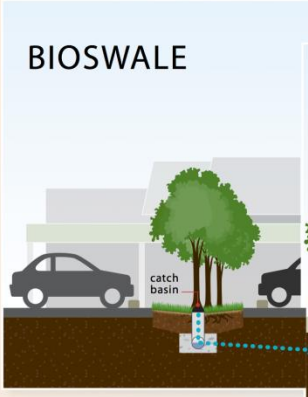
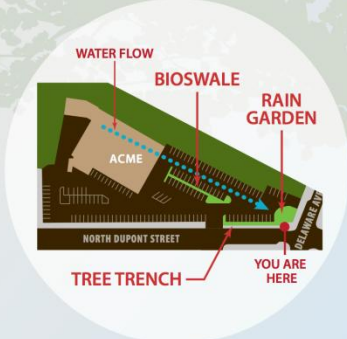


Education (while you shop)

Landscaping for Rainwater Management

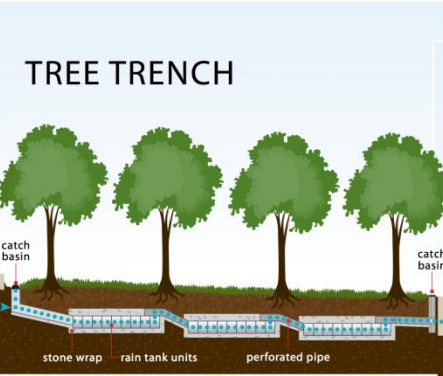
A special system to reduce the water in our storm drains is hidden in this parking lot. Can you see it?

When Trolley Square was first built, pipes were installed under the street to carry both rainwater and sewage out to the Brandywine River. Small streams were also buried in pipes and redirected through the same plumbing as the rain and sewage. For instance, a stream called Rattlesnake Run is flowing under your feet. Today the pipes are routed through a treatment plant, but in heavy rains, the combined system is overwhelmed and polluted water still dumps directly into the river. In this parking lot, trees and a series of underground holding tanks are filtering, absorbing and slowing down the rainwater before it enters our storm drains.



BIOSWALE

How a bioswale works
Large shade trees, shrubs and grasses capture rain flowing down the parking lot. Roots of these plants filter and absorb the first phase of water. A small catch basin at the low end gathers overflow.



TREE TRENCH

More than a row of trees...
Buried under a row of large shade trees along Dupont Street are three stepped storage tanks. They are connected to the bioswale overflow by a pipe under the parking lot. The storage tanks are open at the bottom, allowing rain to slowly soak back into the soil and water the trees.



RAIN GARDEN

What is a rain garden?
This rain garden collects water from two directions: the extra water flowing down the parking lot plus overflow from the storage tanks in the tree trench. If this low area fills up during heavy rain, it eventually enters the storm pipes. An assortment of shrubs, grasses and flowering plants has been specially selected to tolerate a wide range of water conditions — from completely dry to temporarily submerged.



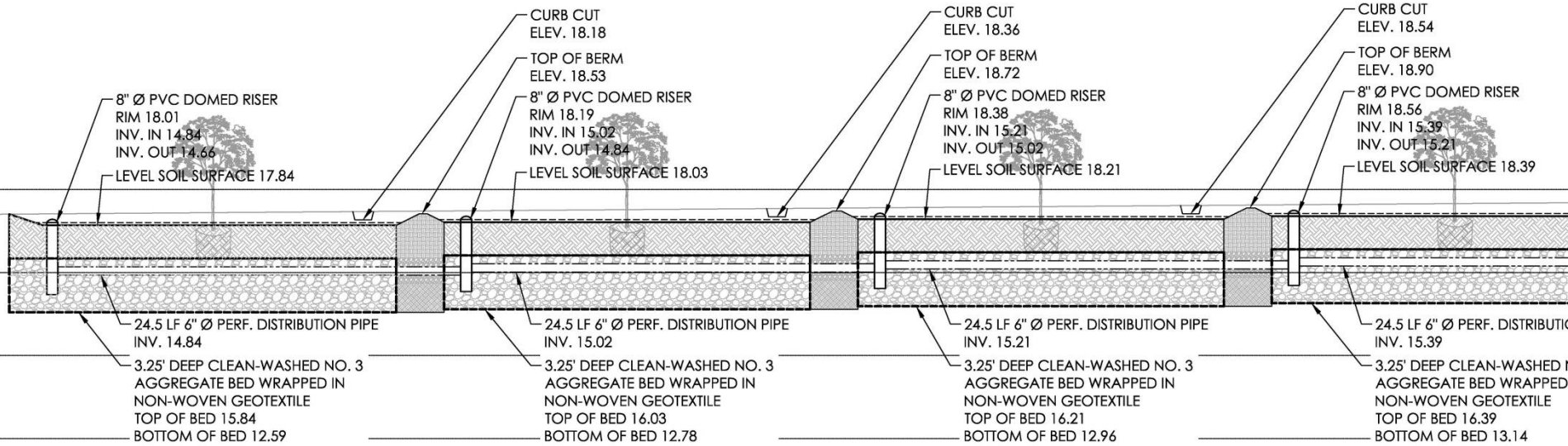
Locust Street Tree Trench - Before



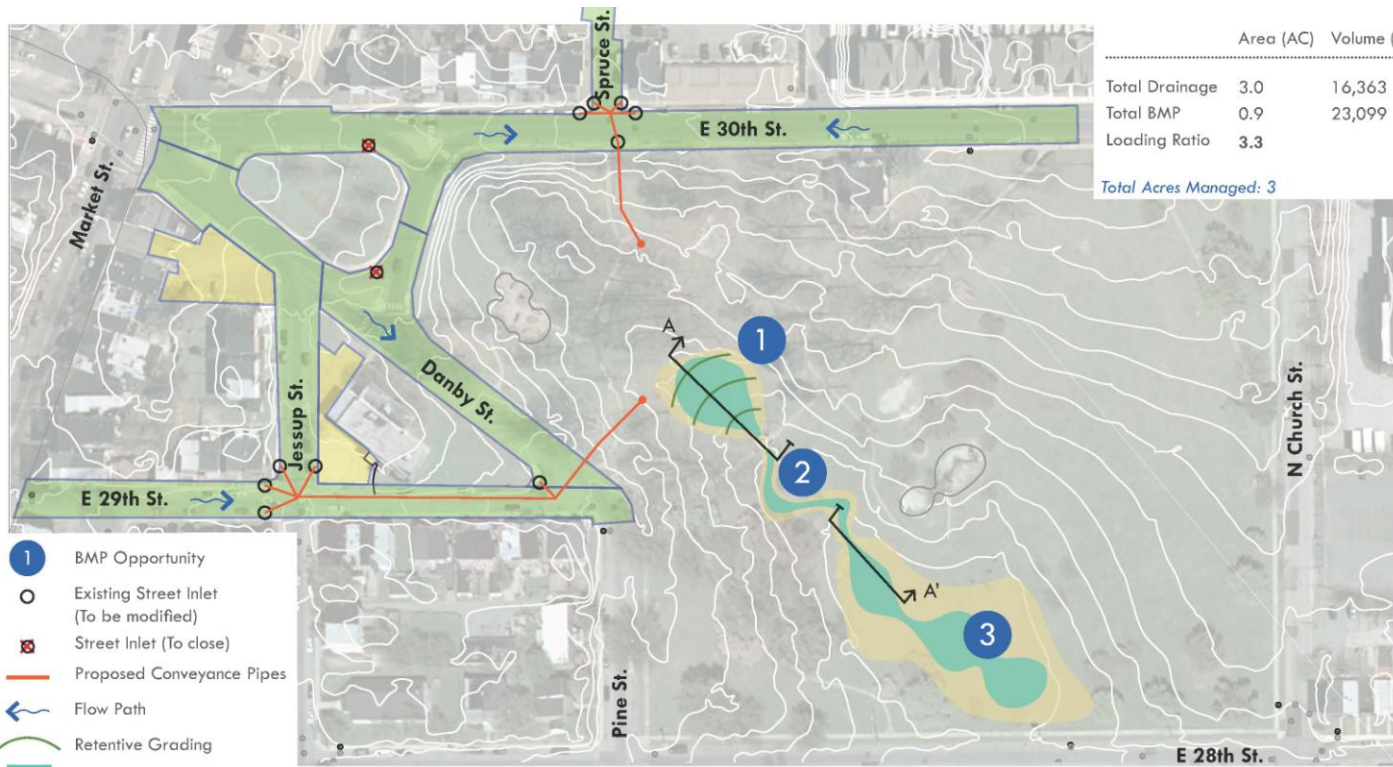
Locust Street Tree Trench - After



Locust Street Tree Trench



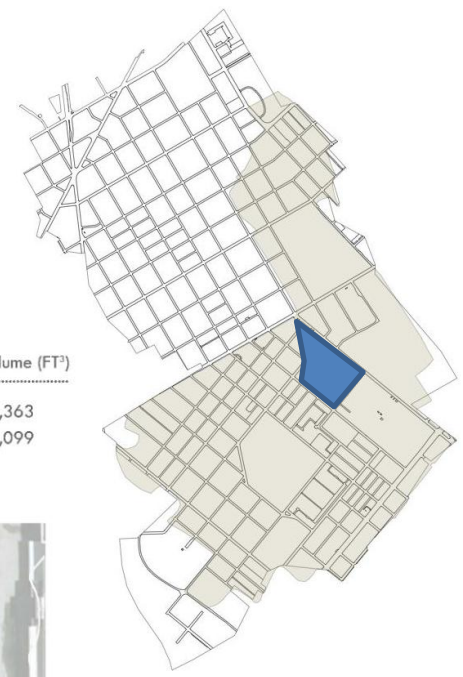
CSO 4a Concept - Prices Run



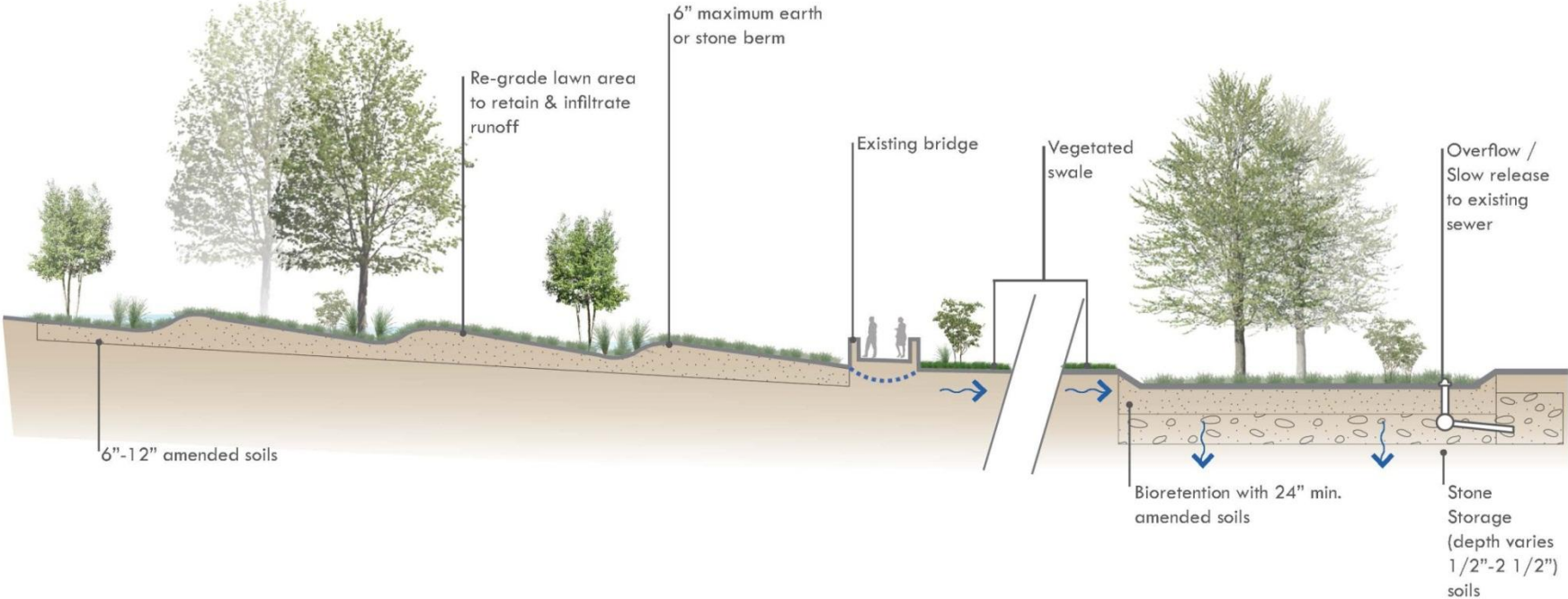
	Area (AC)	Volume (FT ³)
Total Drainage	3.0	16,363
Total BMP	0.9	23,099
Loading Ratio	3.3	
Total Acres Managed: 3		

- 1 BMP Opportunity
- Existing Street Inlet (To be modified)
- ⊗ Street Inlet (To close)
- Proposed Conveyance Pipes
- ↩ Flow Path
- Retentive Grading
- Bioretention Area/ Amended Soils
- Planting Extent
- Drainage Area (Public)
- Drainage Area (Private)

Scale: 1" = 120'
 Feet



CSO 4a Concept - Prices Run



CSO 4a Concept - Speakman Place



#	Drainage Area (AC)	BMP Area (SF)
1	2.0	1 14,406
2	2.4	2 28,990
3	1.6	
4	0.7	

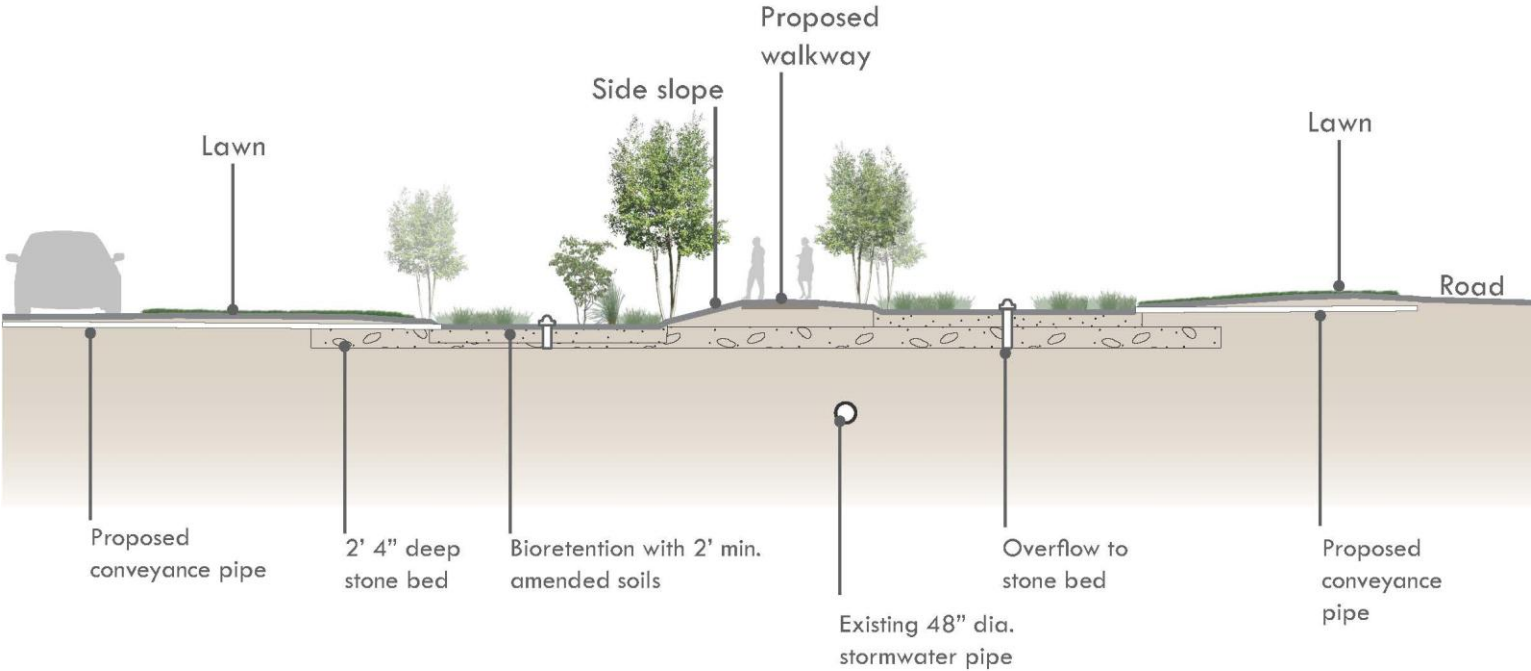
Total Acres Managed: 6.7

- Existing Street Inlet (To be modified)
- ⊗ Street Inlet (To close)
- Proposed Conveyance Pipes
- ↪ Flow Path
- Bioretention Area
- ⋮ Subsurface Infiltration Bed
- Drainage Area (Public)
- ➡ Proposed Walkway

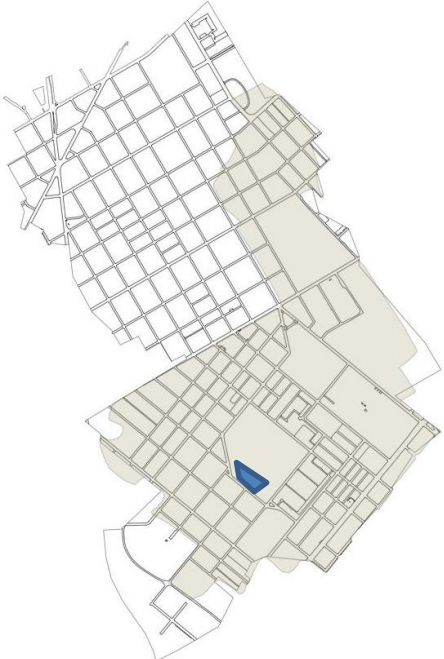
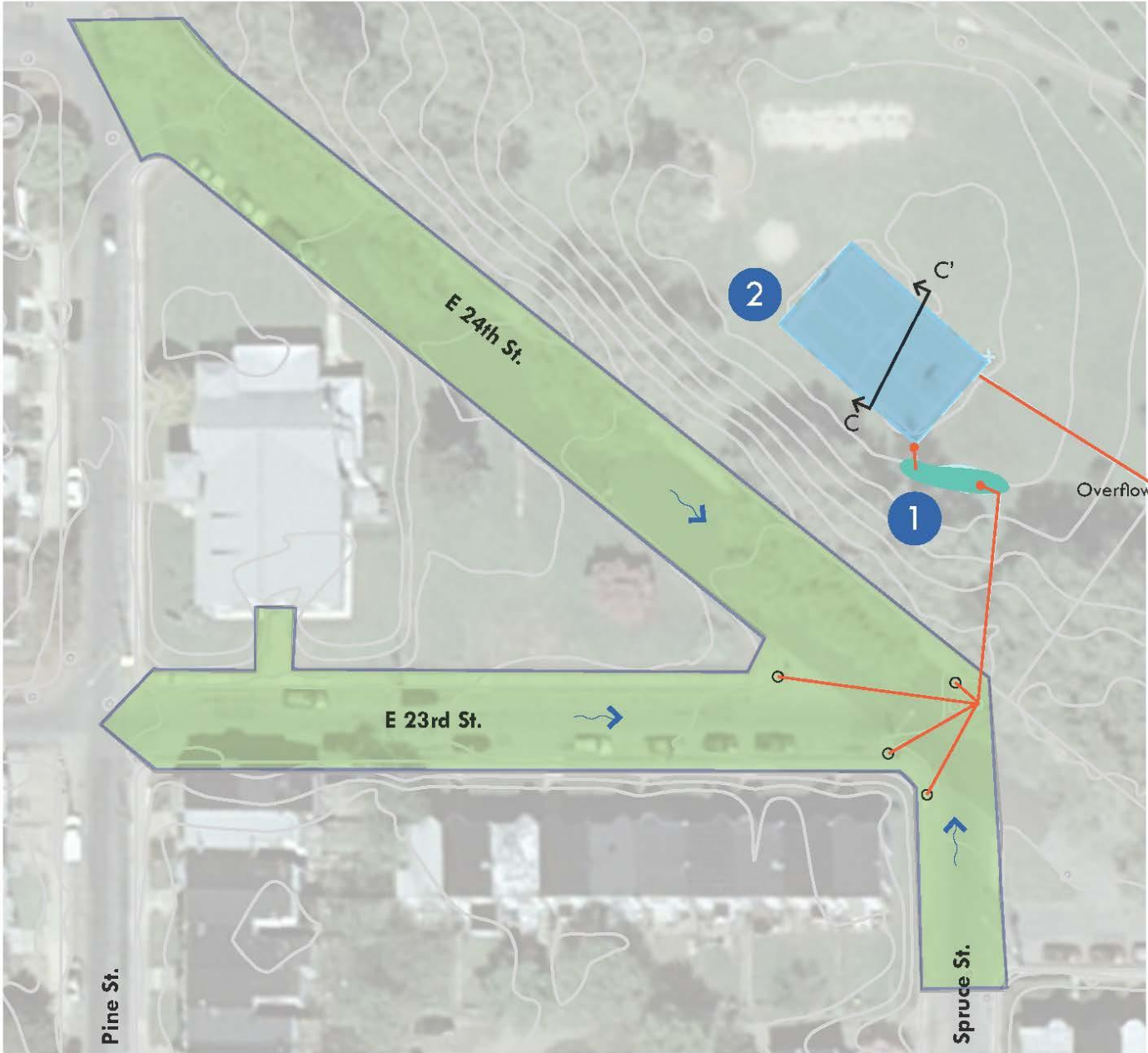
Scale: 1" = 180'
 Feet



CSO 4a Concept - Speakman Place



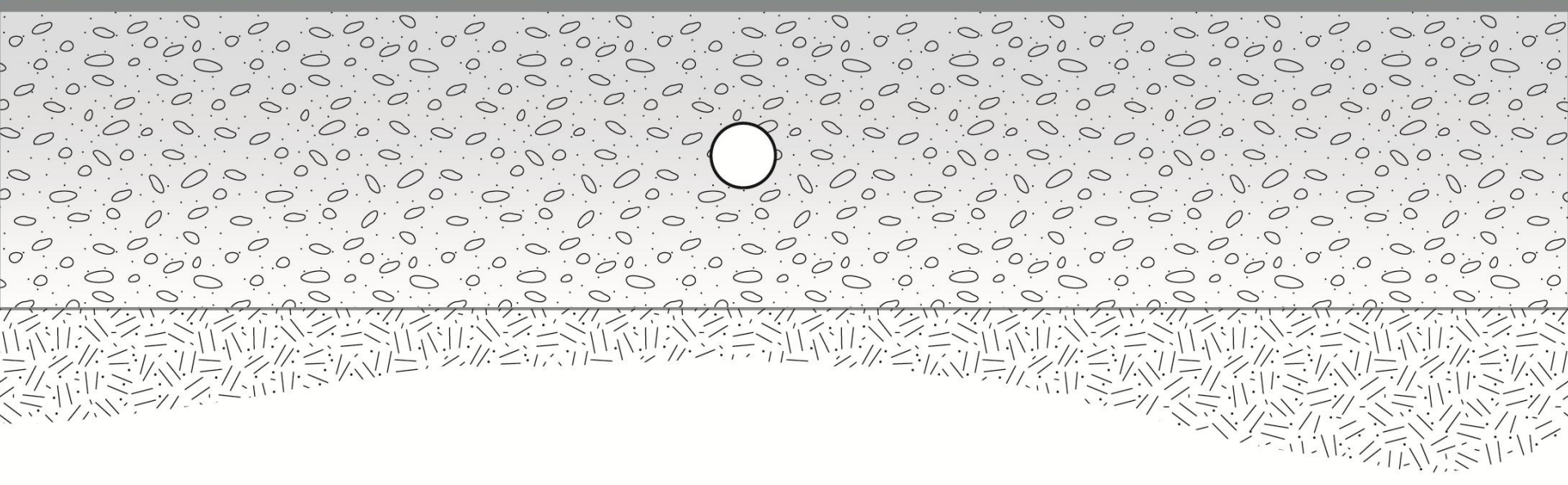
Basketball Court/ Playground



CSO 4a Concept - Basketball Court - Before



CSO 4a Concept - Basketball Court - After



CSO 4a Concept - Vandever Street



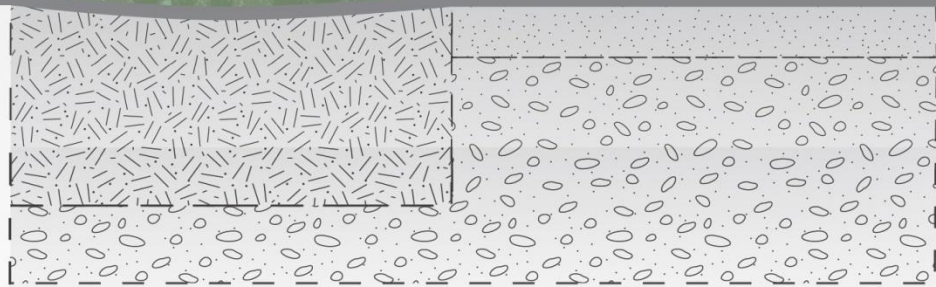
#	Drainage Area (AC)	BMP Area (SF)
1	0.3	1,960
2	0.2	1,000
3	0.4	1,200
4	0.1	
Total Acres Managed:		0.9

1	BMP Opportunity		Proposed Conveyance Pipes		Subsurface Infiltration Bed		Drainage Area (Private)
	Street Inlet (Existing)		Sheet Flow		Porous/Standard Concrete		New Inlet
	Downspout		Lawn with trees		Drainage Area (Public)		

Scale: 1" = 80'

 Feet

CSO 4a Concept - Vandever Street



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