



# Kennedy

# GREENED

*A Neighborhood Green Street Project*



Image: Ray Papa

*Presented by:*

Nitsch Engineering • Urban Rain|Design • DC Water • Stacy Levy

Green Infrastructure Challenge –  
Green Infrastructure Streetscape Project

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ASLA Annual Meeting

November 2014





## I. Background: DC Water

# Background:

## The District of Columbia Water and Sewer Authority (DC Water)

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- **Provides**
  - Drinking water distribution for DC
  - Required wastewater collection and treatment
  - Stormwater collection and conveyance
- **Treats wastewater for a population of 2.1 million**
  - District of Columbia
  - Montgomery & Prince George's Counties, MD
  - Fairfax & Loudoun Counties, VA
- **Operates the world's largest Advanced Wastewater Treatment Plant**
  - Average daily capacity, 370 mgd
  - Peak daily capacity, 1 billion+ gallons
- **Serves a regional area of approximately 725 Sq Mi**



**Blue Plains Advanced Wastewater  
Treatment Plant**

# Background:

## DC Clean Rivers Project Overview

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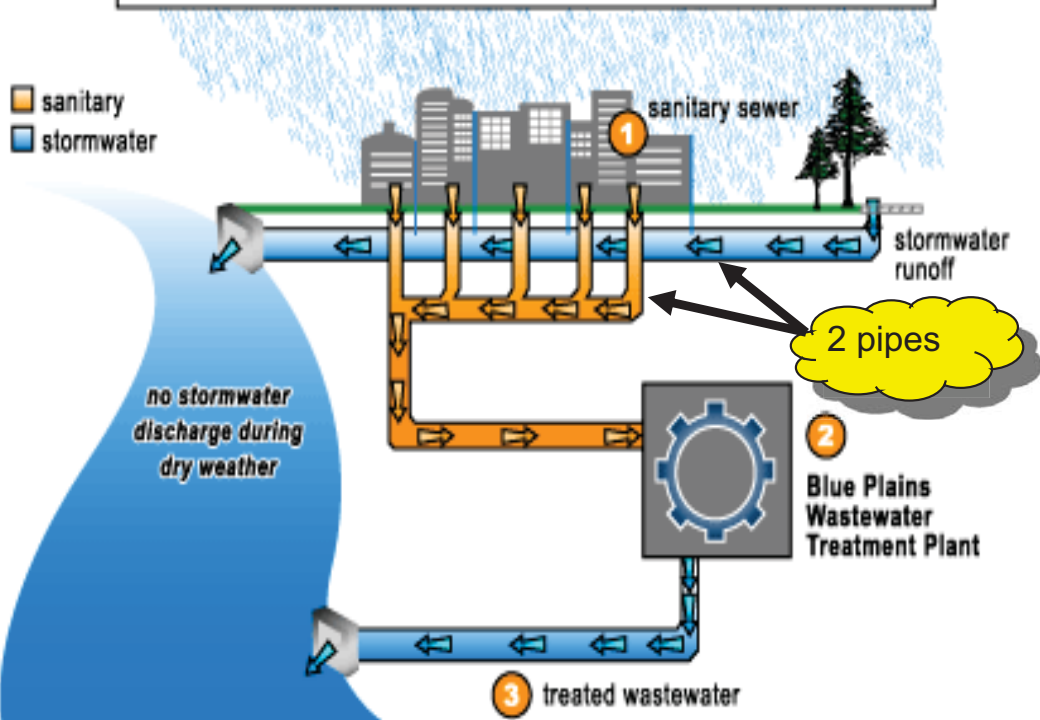
- **Control Combined Sewer overflows to the**
  - Potomac River
  - Anacostia River
  - Rock Creek
- **Relieve flooding in the Northeast Boundary Area**
- **Implemented under a Federal Consent Decree among**
  - US Environmental Protection Agency (US EPA)/  
US Department of Justice (US DOJ)
  - District of Columbia and
  - DC Water



# Background:

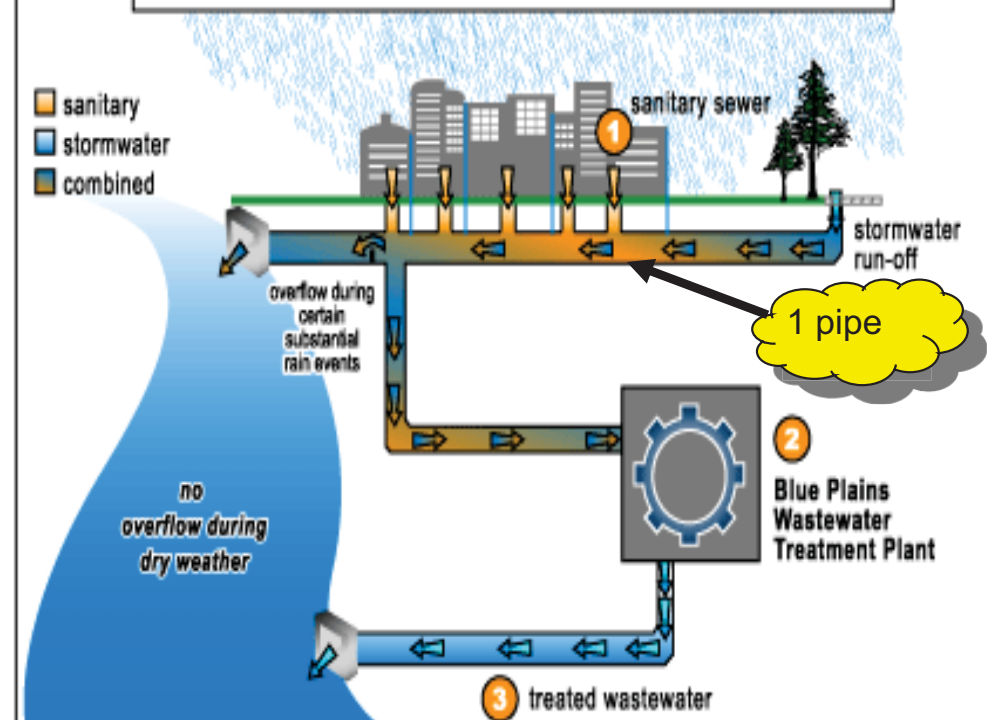
## Separate and Combined Sewer Systems

### SEPARATE SANITARY & STORMWATER SEWER SYSTEMS



100% of suburbs  
67% of D.C.

### COMBINED SEWER SYSTEMS



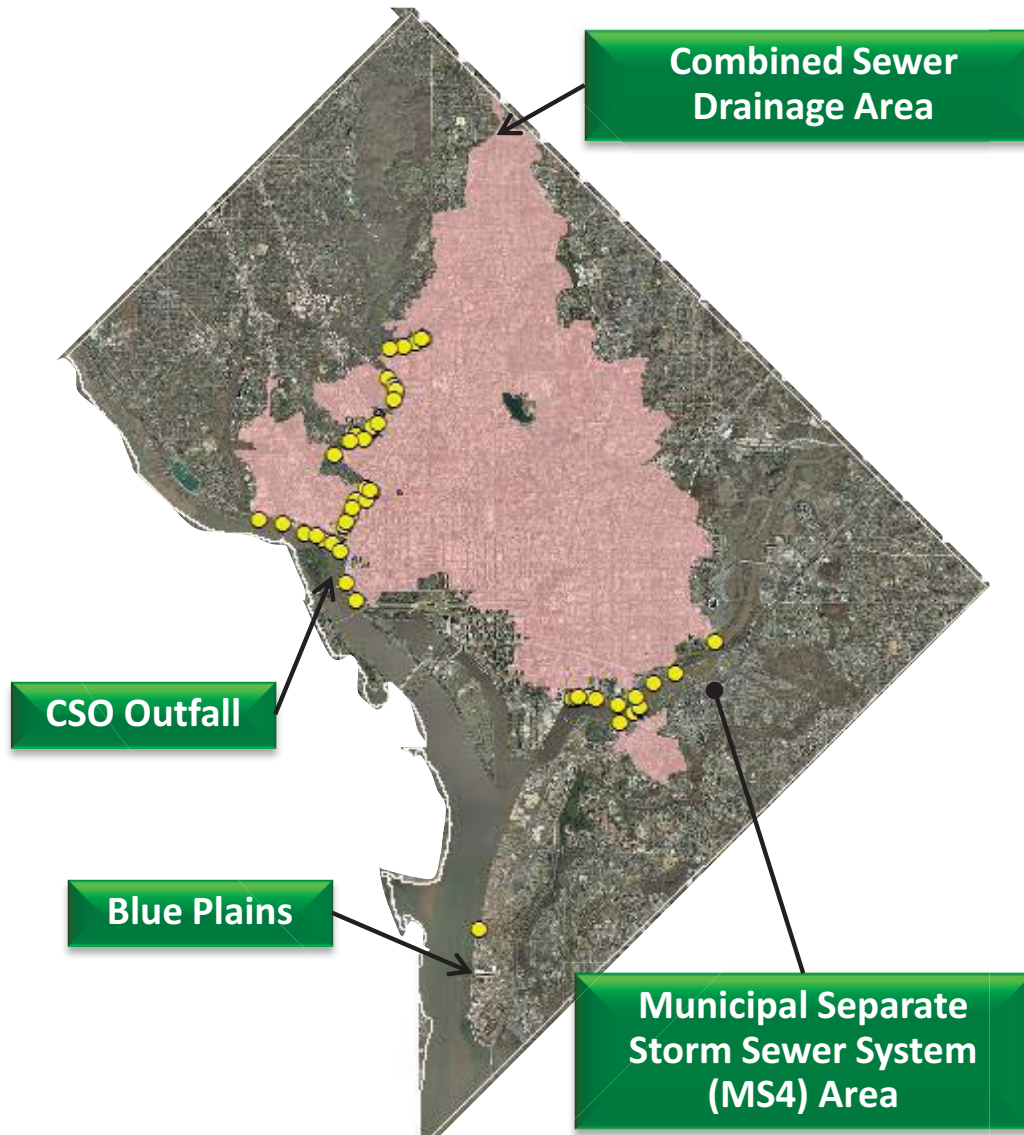
0% of suburbs  
33% of D.C.



# Background:

## Where are Combined Sewers Located?

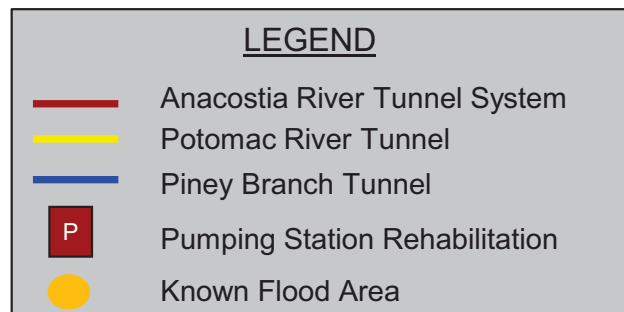
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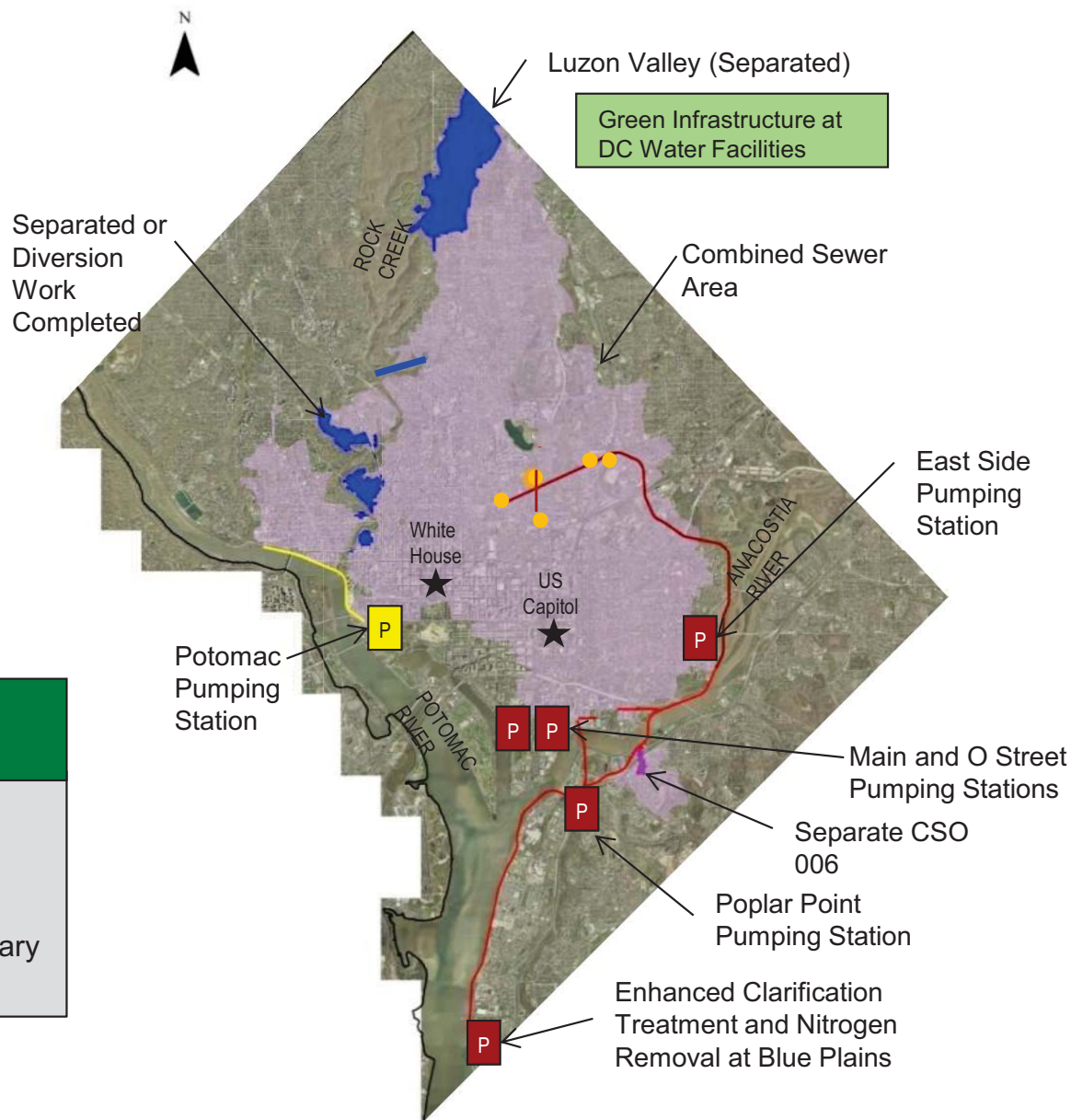
- 1/3 area is combined (12,478 acres)
- 53 CSO outfalls
  - 15 to Anacostia
  - 10 to Potomac
  - 28 to Rock Creek
- Three receiving waters
  - Anacostia River
  - Potomac River
  - Rock Creek

# Background:

## DC Clean Rivers Project and Nitrogen Removal Programs



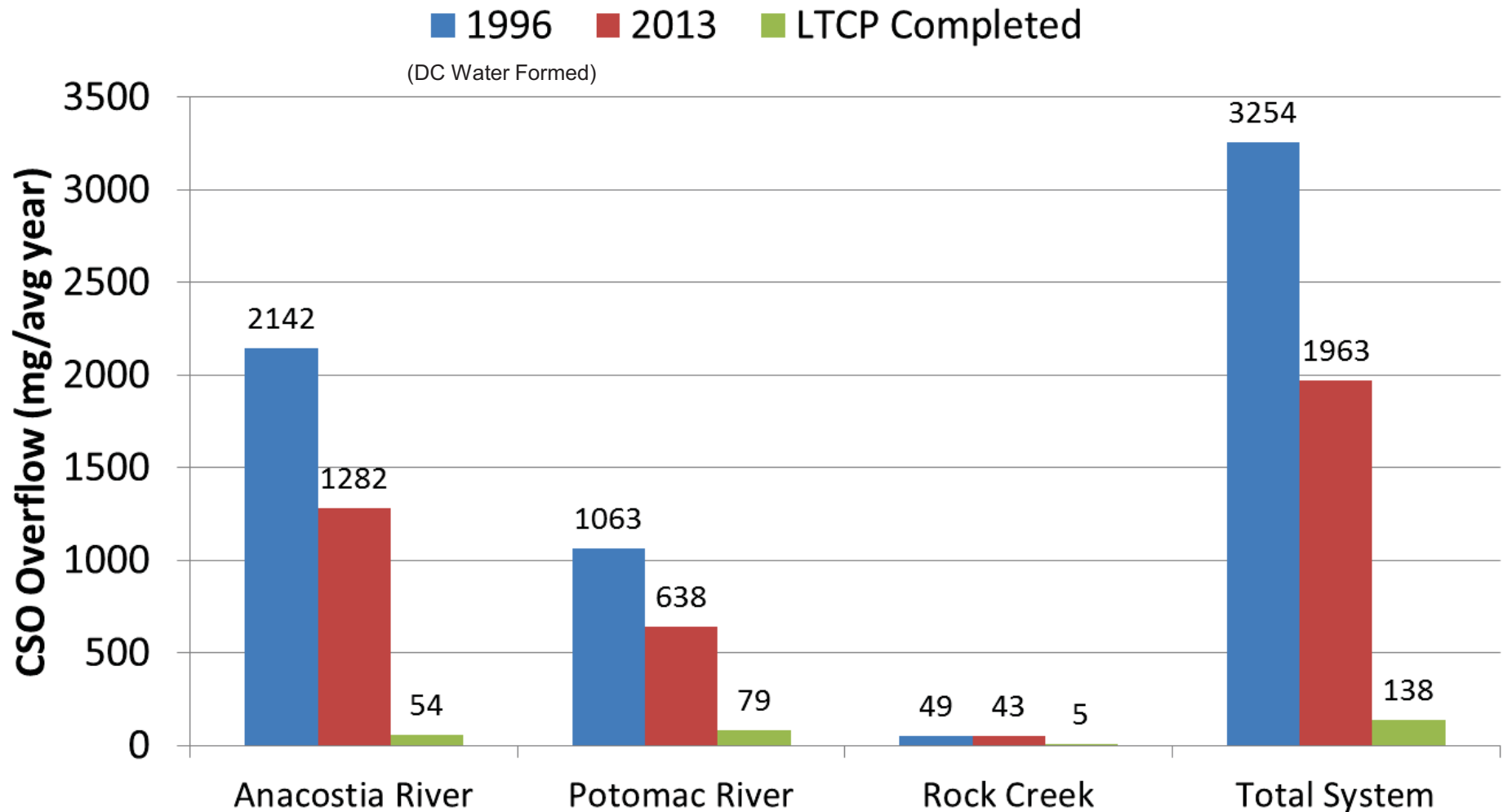
DC CLEAN RIVERS PROJECT AND NITROGEN REMOVAL PROGRAMS
<ul style="list-style-type: none"> <li>• DC Clean Rivers Project: \$2.6 Billion</li> <li>• Nitrogen Removal: \$950 Million</li> <li>• Total &gt; \$ 3.5 Billion</li> <li>• 20 yr implementation (2005 – 2025)</li> <li>• 96% reduction in CSOs &amp; flood relief in Northeast Boundary</li> <li>• Approx 1 million lbs/yr nitrogen reduction predicted</li> </ul>



# Background:

## Progress to Date Controlling CSOs

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# Background:

## DC Water's Approach to CSO Control

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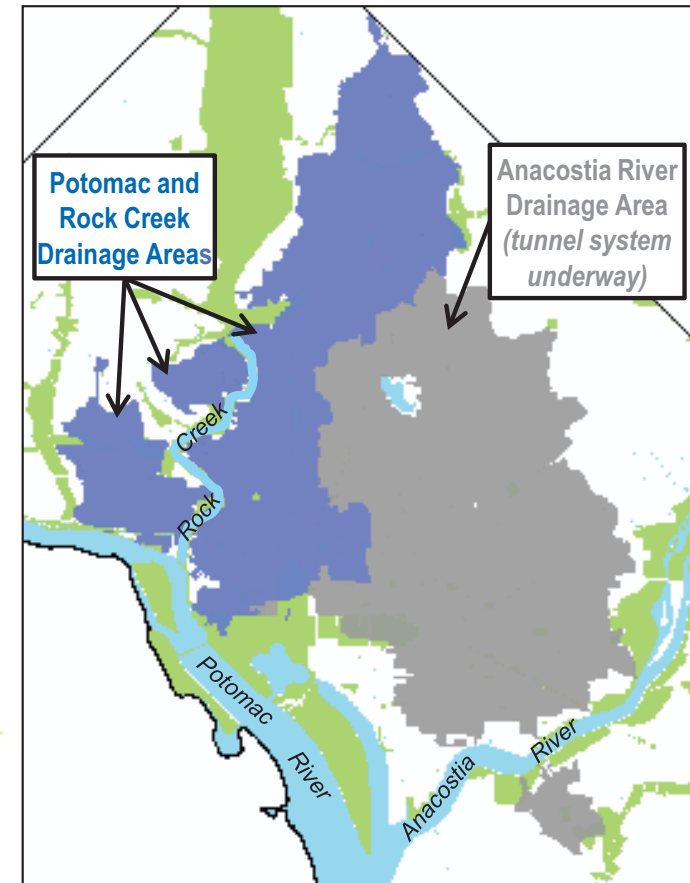


### Anacostia River Projects

- DC Water is implementing tunnels
- Most severely impacted by CSOs
- GI will provide additional control

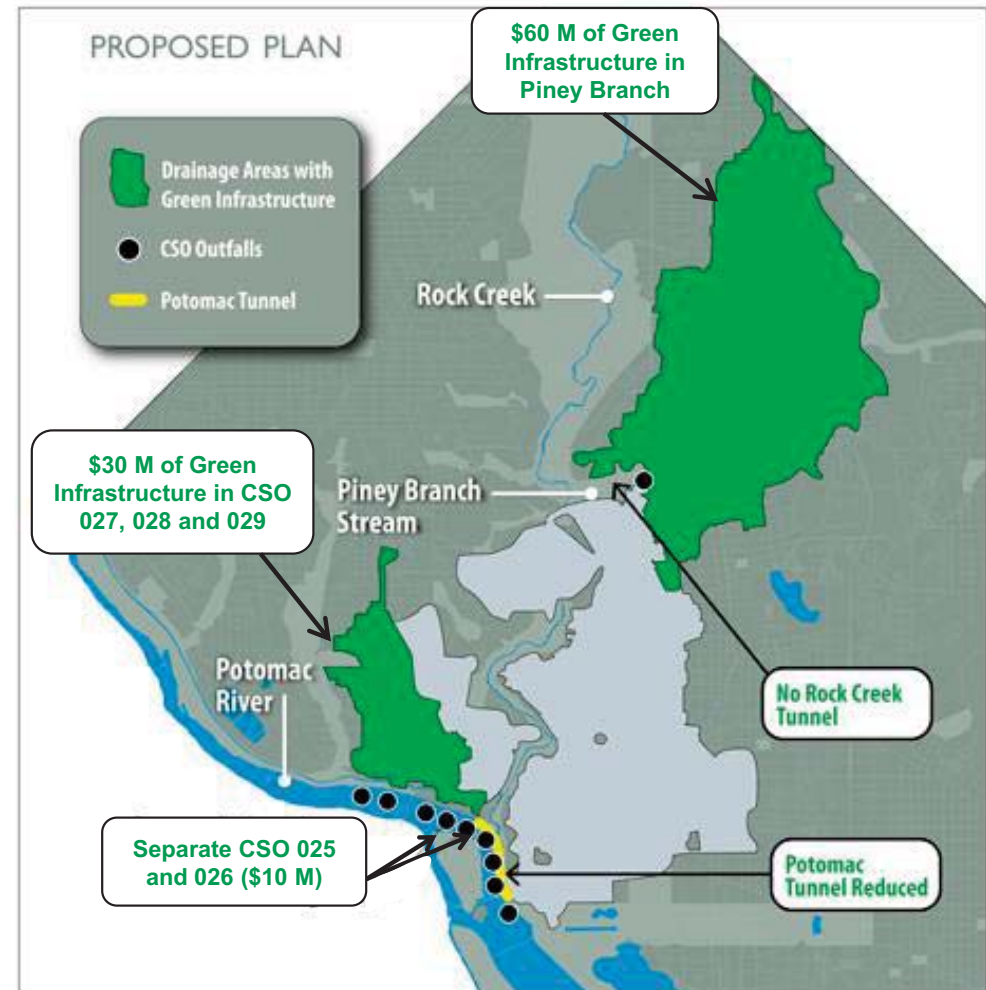
### Potomac & Rock Creek Projects

- There is time to consider new approaches



# Background:

## Proposed GI Plan for Potomac and Rock Creek



# Background: GI Challenge Overview

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- Partnership Agreement (December 10, 2012)
  - 3 party agreement - DC Water, EPA and the District
  - Identified GI as a solution to control CSOs in the District of Columbia
  - Included the *Green Infrastructure Challenge* as a vehicle for advancing innovative GI practices

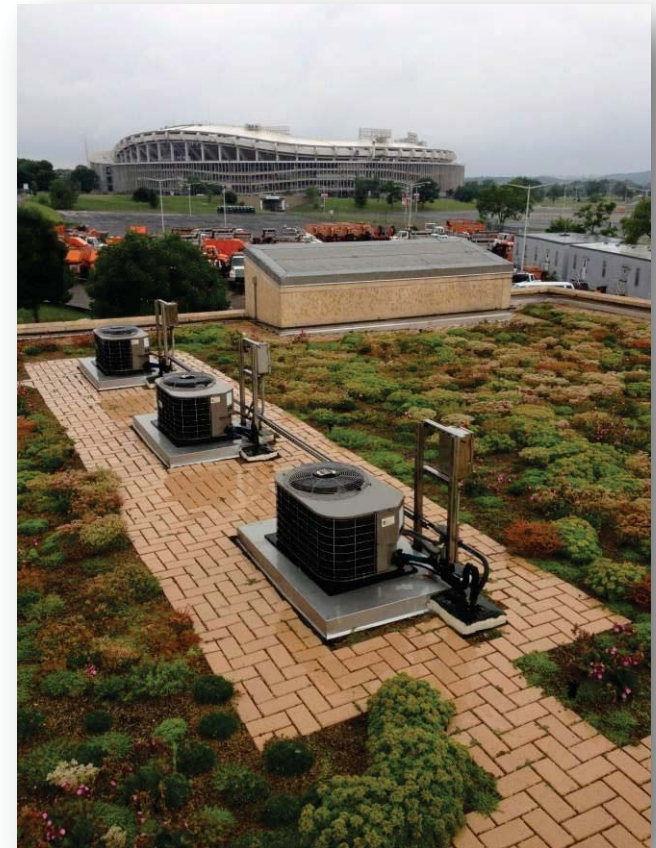




# Background: GI Challenge Goals

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- Advancing innovative technologies and strategies
- Capturing stormwater runoff volume
- Demonstrating cost effective solutions
- Proposing practical and implementable solutions that can be constructed
- Retrofitting the urban environment



# Background:

## GI Challenge Evaluation Criteria

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- **Innovation:** focus on Programmatic/New Technologies
- **Performance:** focus on Capture Volume and Cost Effectiveness
- **Practicality:** focus on O&M and Constructability
- **Triple Bottom Line:** focus on Community Enhancement and Local Job Creation



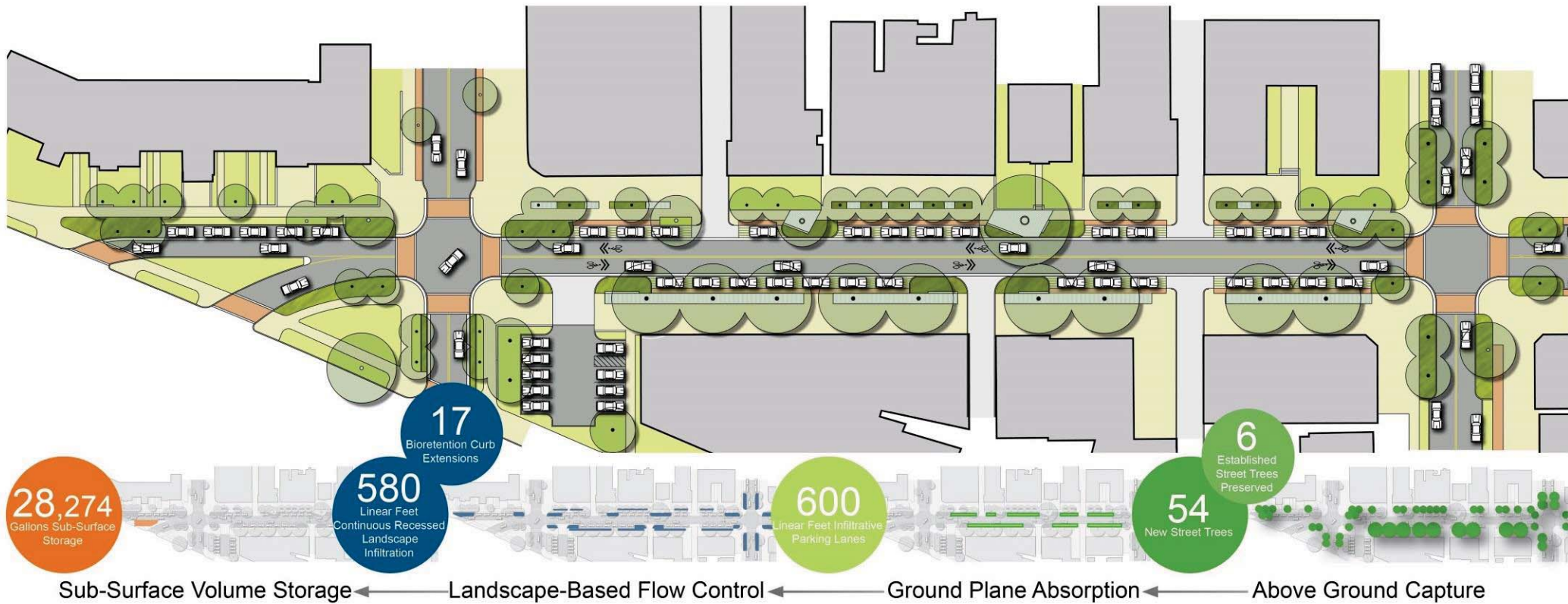




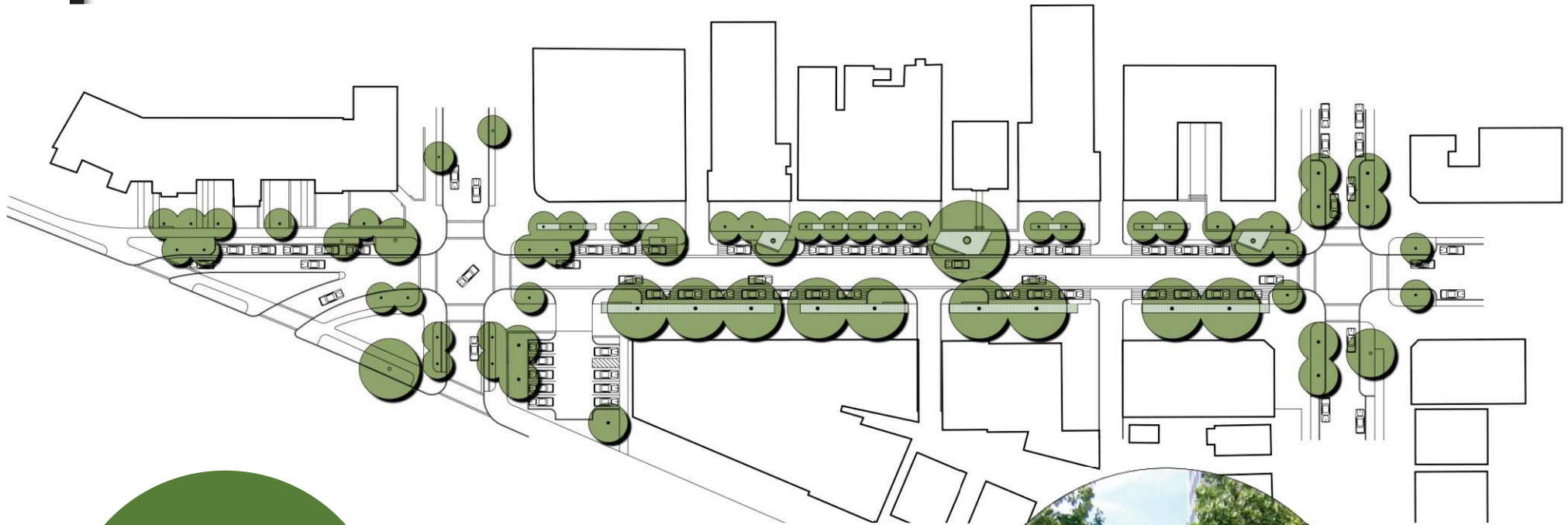
## II. Performance



# High Performance Stormwater Management



# 1 Maximize Rainfall Capture (Vertical)

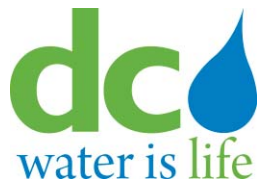


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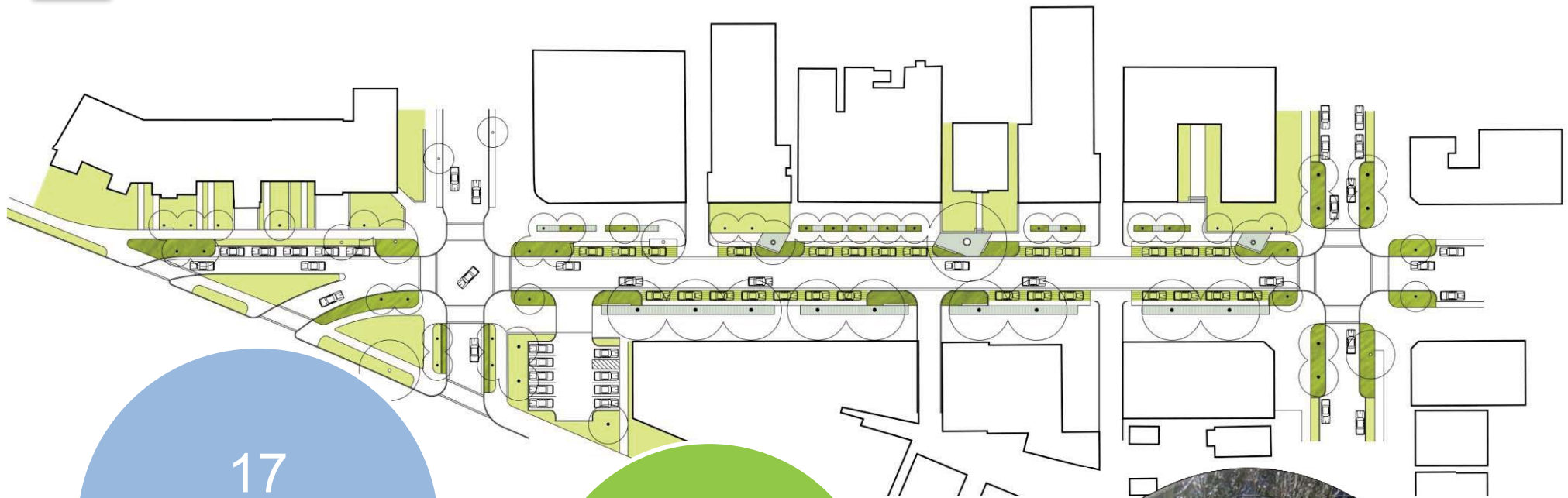
Existing  
Trees  
Preserved

54

New Street  
Trees



# 2 Ground Surface Absorption & Retention



17  
Bioretention  
Curb  
Extensions

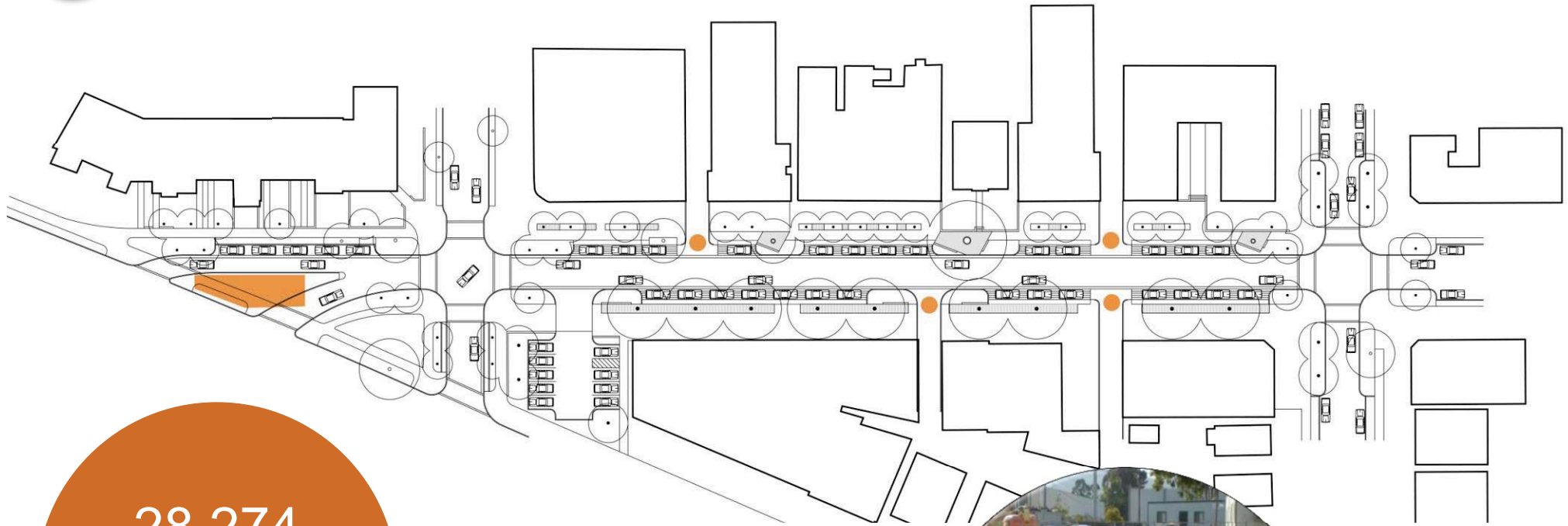
600  
Linear Feet  
Infiltrative  
Parking Lanes

580  
Linear Feet  
Continuous  
Recessed  
Landscape  
Infiltration





# 3 Sub-Surface Storage and Infiltration

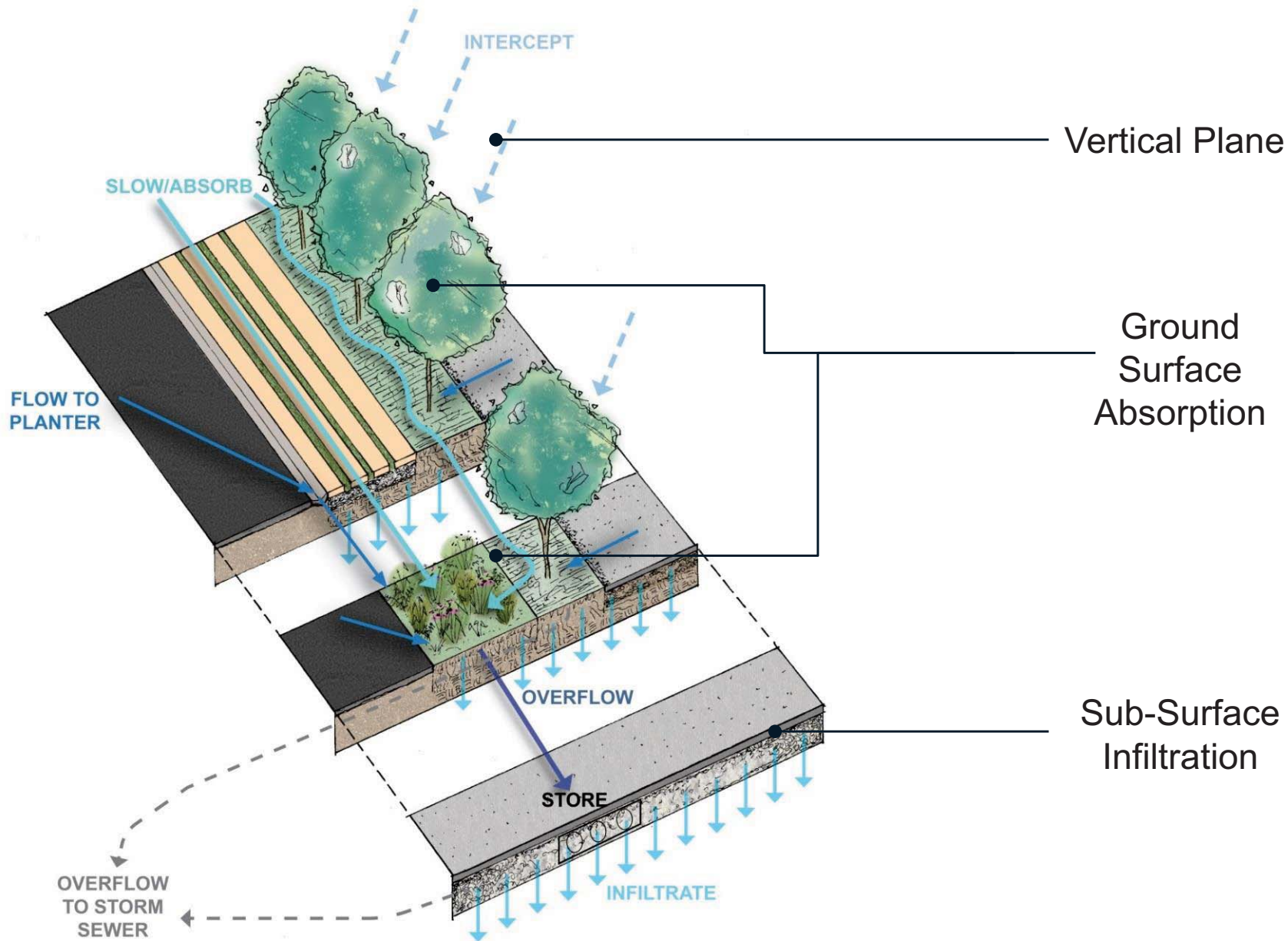


28,274  
Gallons Sub-  
Surface  
Storage

4  
Dry Wells

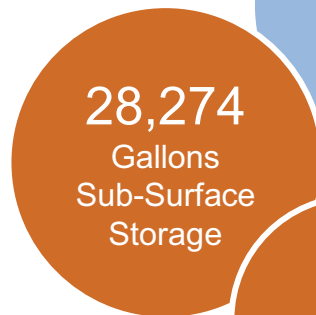
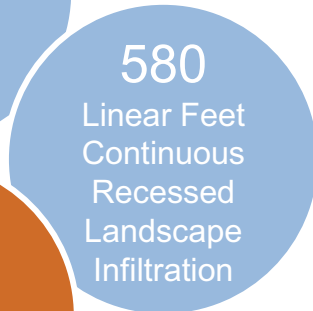
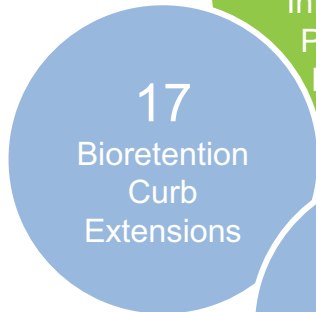


# An Integrated Treatment Train



# High Performance Stormwater Management

## Metrics



**1.2" Rainfall Event** Retained  
For **2.78 Impervious Acres**

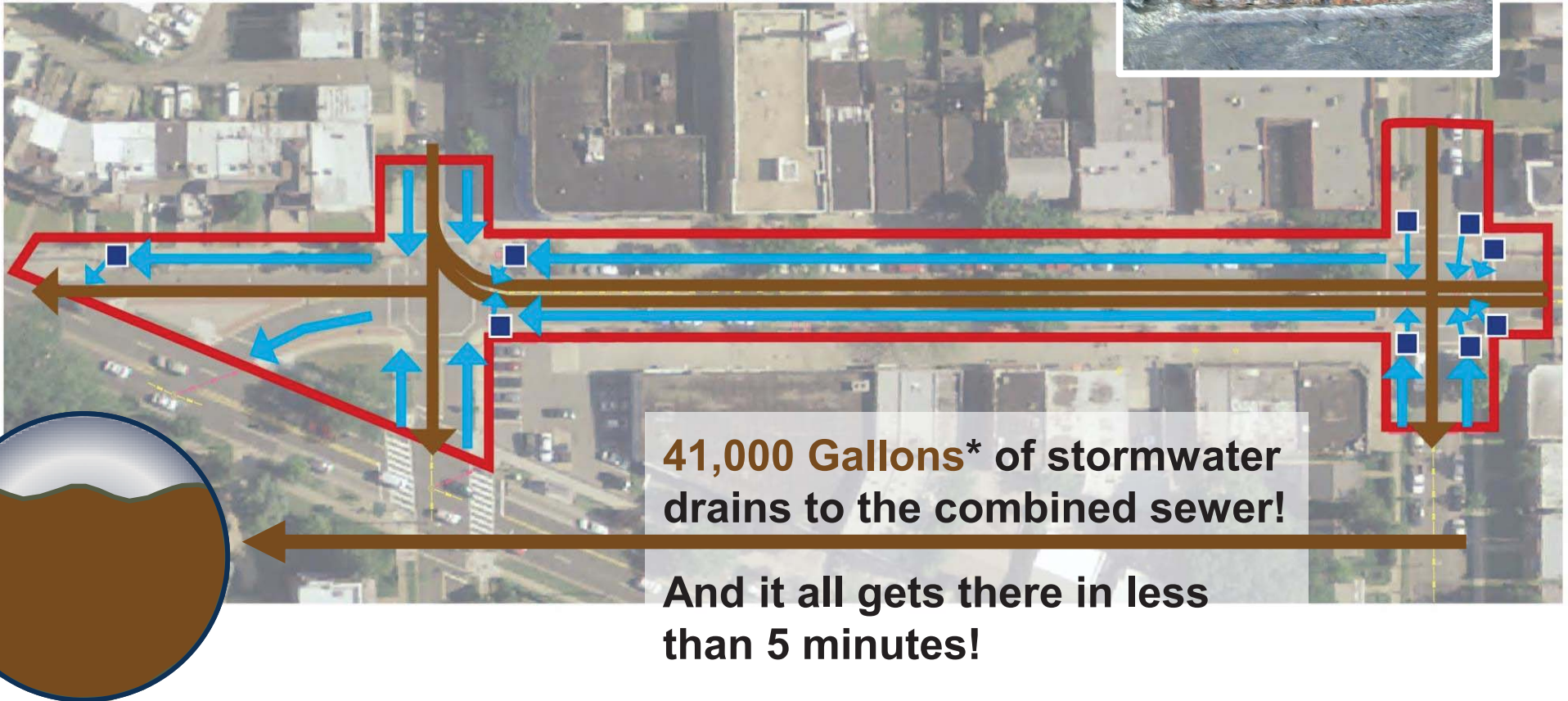
**81,661 Gallons**  
Stormwater Retained

**5 Acres** Impervious Surface Treated  
and Detained through at least 1 GI  
Strategy

**15,000 Square Feet**  
Impervious Surface Reduction



# When it rains 1.2-inches today...



**41,000 Gallons\*** of stormwater drains to the combined sewer!

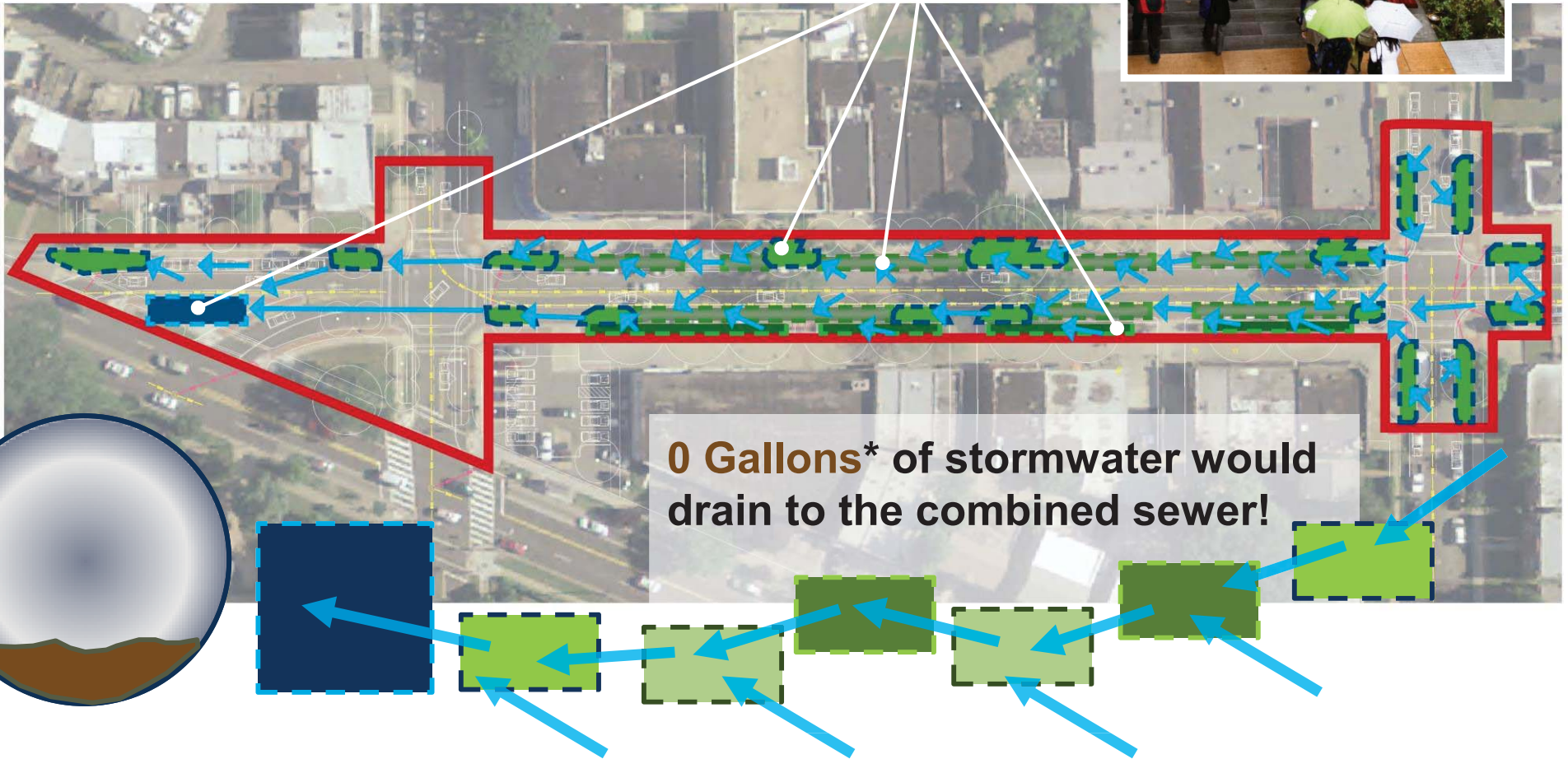
**And it all gets there in less than 5 minutes!**



\*Runoff Volume generated from project site boundary (1.5 acres)

# When it rains 1.2-inches tomorrow

81,000 Gallons of Storage Provided by GI strategies



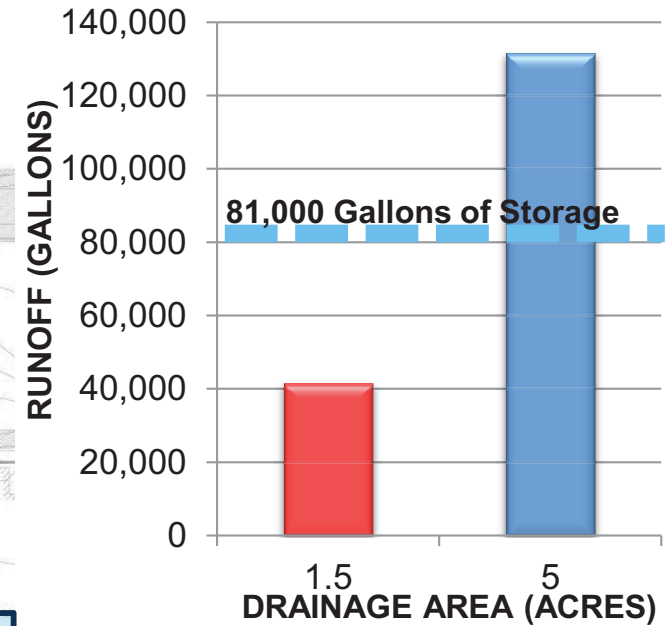
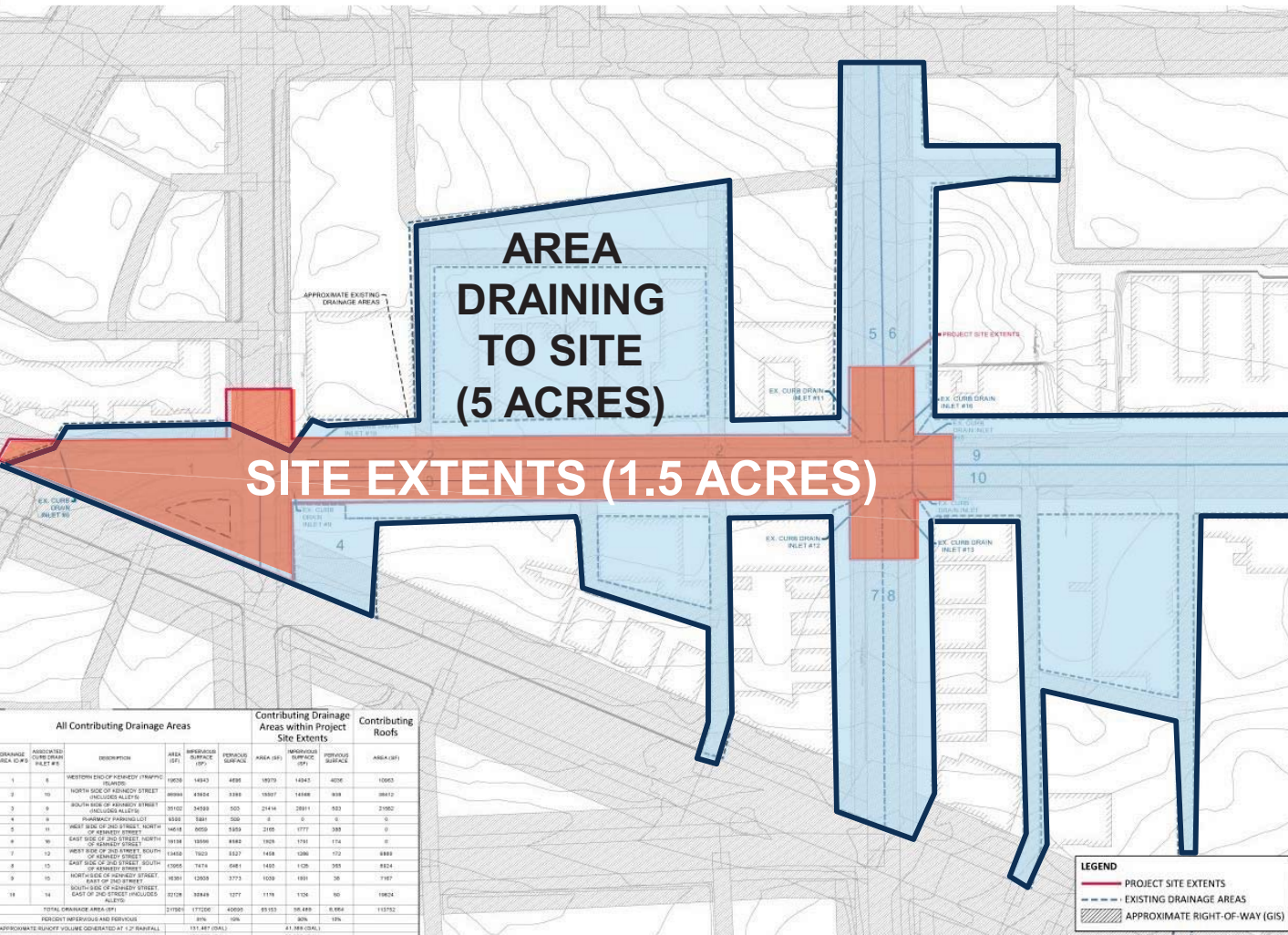
Travel time extends to 20 minutes  
PLUS 10+ hours in storage!

\*Runoff Volume generated from  
project site boundary (1.5 acres)





# Beyond the Project Boundary



**RUNOFF VOLUME FOR 1.2" RAINFALL DEPTH**

**KENNEDY GREENED PROVIDES 81,000 GALLONS OF STORAGE CAPACITY WHICH CAN STORE 1.2-INCHES OF RAINFALL OVER 2.78 IMPERVIOUS ACRES**