

Green Infrastructure: Not Just About the Water



ASLA Green Roof:
Michael Van Valkenburgh

Moderator

Roxanne Blackwell

Director of Federal Government Affairs,
American Society of Landscape Architects

Panelists

Kyle Dreyfuss-Wells

Manager of Watershed Programs,
Northeast Ohio Regional Sewer District

Mark A. Focht, PLA, FASLA

First Deputy Commissioner of Parks and Facilities,
City of Philadelphia, PA

Christopher Wierzbicki, PE

Deputy Director, Road Services Division,
King County Department of Transportation

Stacey Eriksen

Urban Watershed Revitalization Coordinator
USEPA Region 8

Tamara Mittman

Environmental Engineer,
US EPA Office of Wastewater Management



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Green Infrastructure: The Triple Bottom Line



City of Greensburg Main Street Streetscape
BNIM



Nueva School
Andrea Cochran Landscape Architecture



Sonoran Landscape Laboratory
Ten Eyck Landscape Architects, Inc.

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Green Infrastructure

Systems that mimic a natural hydrologic cycle to take stormwater & slow it down, spread it out, & soak it in.

Green Roofs, Planter Boxes, Rain Gardens, Bioswales / Bioretention Cells, Vegetated Swales, Tree Trenches, Ponds, Porous Pavements, Wetlands, Riparian areas, Rainwater Harvesting, etc.

Can be integrated into:

- ✓ Parks, open space, urban forestry
- ✓ Parking lot landscaping requirements
- ✓ Climate adaptation strategies
- ✓ Smart growth / sustainability / resilience strategies
- ✓ Flood restoration



Brooklyn Botanic Garden Visitors Center
HMWhite

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Value of Green Infrastructure

- Stormwater management
- Climate adaptation
- Urban heat island reduction
- Biodiversity
- Air quality improvements
- Clean water
- Healthy soils
- Recreation
- Quality of life



Multi-Variate Study of Stormwater BMPs
BNIM

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Green Infrastructure Resources

Green Infrastructure Case Studies

Overview
Stormwater Case Studies

View all Stormwater
Case Studies by State →

www.asla.org/stormwater



Applebee's Restaurant Support Center
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Green Infrastructure Policy

The Innovative Stormwater Infrastructure Act (H.R. 3449, S.1677)

- Implementation Grants
- Technical Assistance (model codes, BMPs)
- Regional Centers of Excellence



City of Greensburg Main Street Streetscape
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BANKING ON GREEN:

A Look at How Green Infrastructure Can Save Municipalities Money and Provide Economic Benefits Community-wide



- Provides less expensive, and more cost-effective, approaches to managing runoff.

GREEN INFRASTRUCTURE CAN SAVE MUNICIPALITIES MONEY AND PROVIDE ECONOMIC BENEFITS COMMUNITY-WIDE

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- Provides less expensive, and more cost-effective, approaches to managing runoff.
- Increases energy efficiency and reduces energy costs
- Reduces the economic impacts associated with flood events
- Protects public health and reduces illness-related costs

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Green Infrastructure: Not Just About the Water



SW Montgomery Green Street: Connecting the West Hills to the Willamette River
Nevue Ngan Associates



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Kyle Dreyfuss-Wells

Manager of Watershed Programs,
Northeast Ohio Regional Sewer District

Rockefeller Park Strategic Master Plan
Siteworks



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**Northeast Ohio
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355

square miles



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Northeast Ohio Regional Sewer District Responsibility



- \$3 billion in 25 years
- CSO control
- Sewer fees
- Regional flooding and erosion issues
- Impervious surface fee

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Northeast Ohio Regional Sewer District
**Project Clean Lake: The gray and
the green of CSO control**

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What is a Combined Sewer?



Dry Weather Flow
to treatment plant

Additional Conveyance
Capacity Available for
wet-weather

Combined Sewer
Overflow Discharge to
Stream/Lake

What is a Combined Sewer Overflow?



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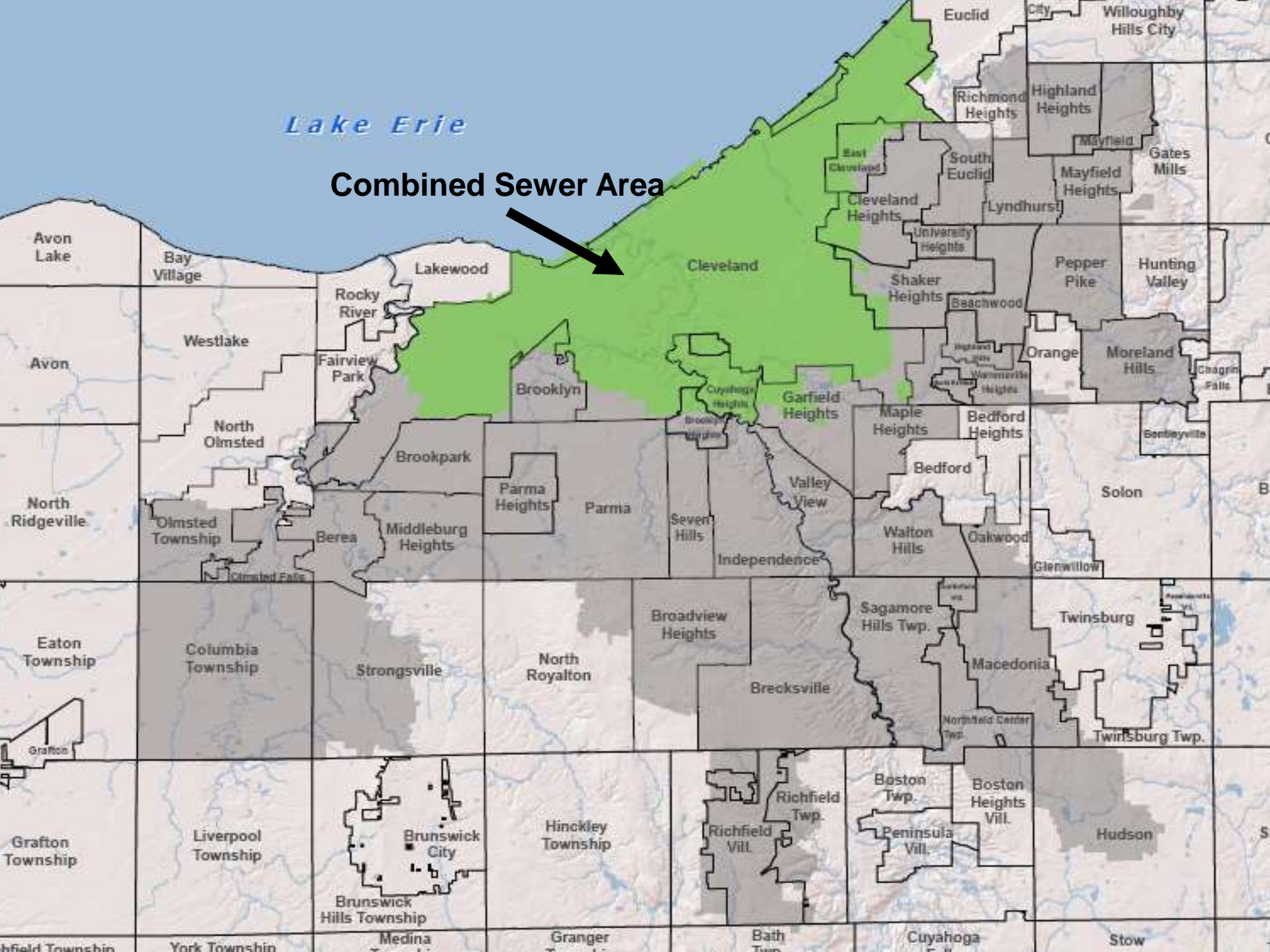
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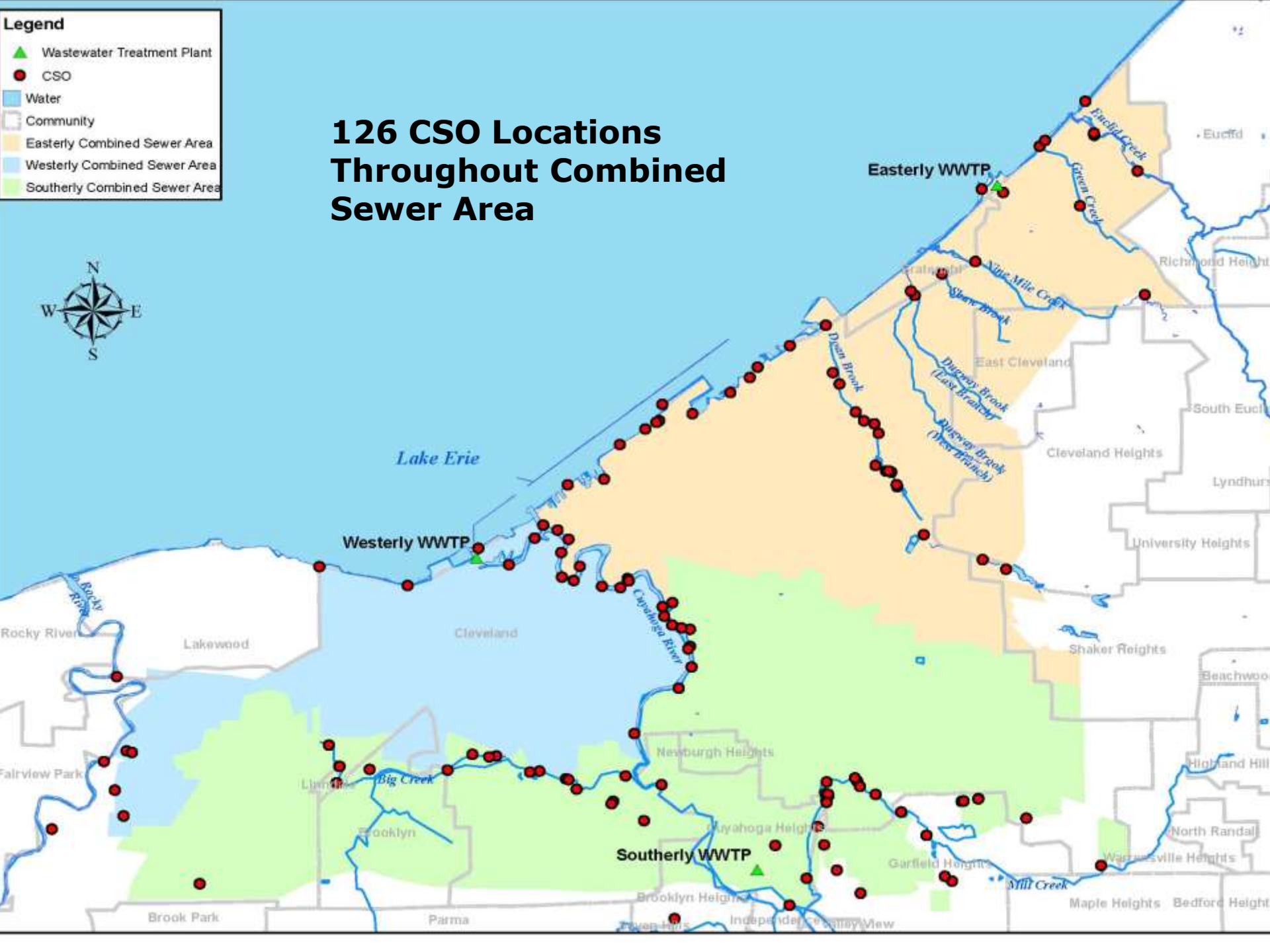
Lake Erie

Combined Sewer Area

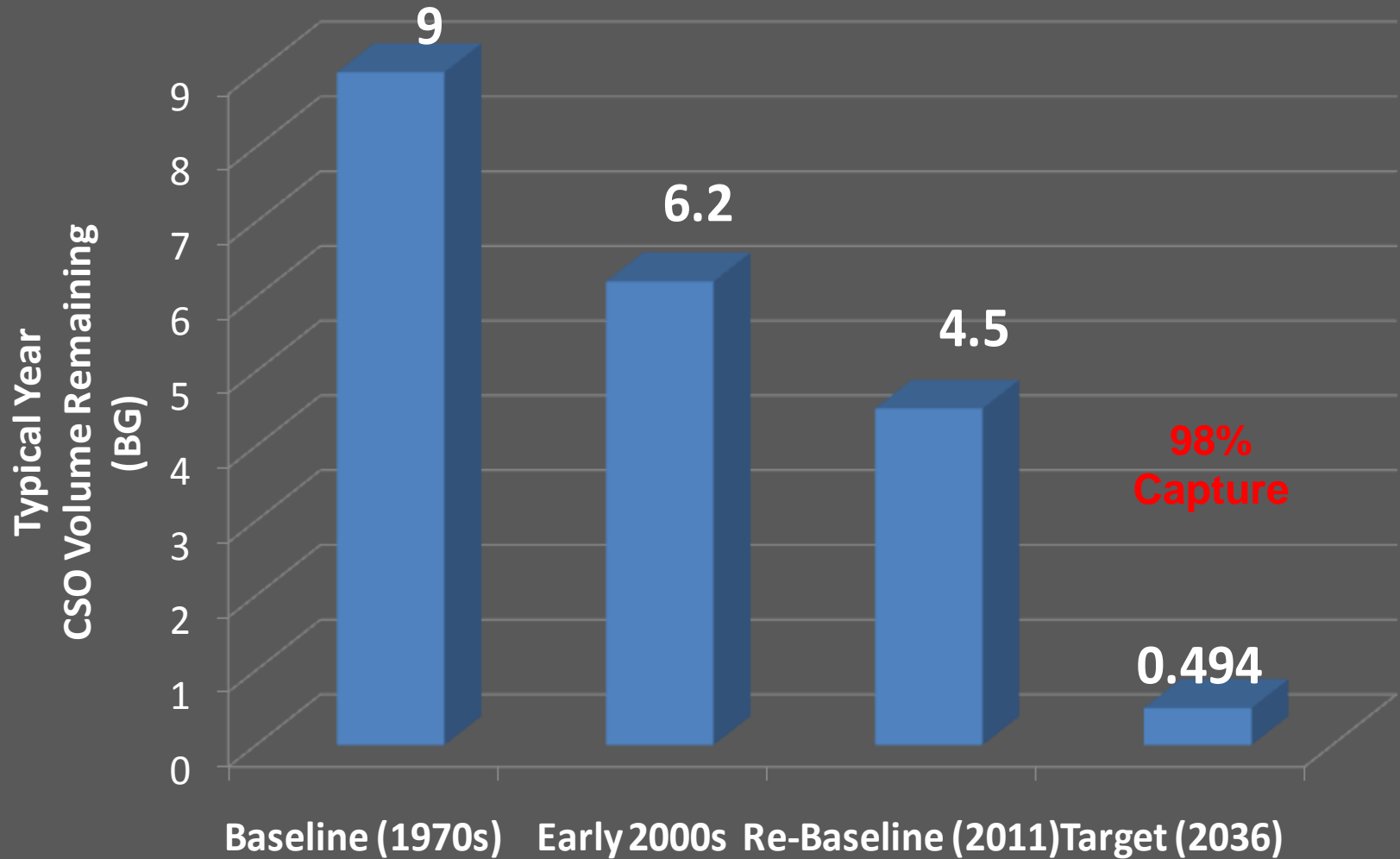


- Legend**
- ▲ Wastewater Treatment Plant
 - CSO
 - Water
 - Community
 - Easterly Combined Sewer Area
 - Westerly Combined Sewer Area
 - Southerly Combined Sewer Area

126 CSO Locations Throughout Combined Sewer Area



EPA Requires CSO Problem Reduced in 25 Yrs



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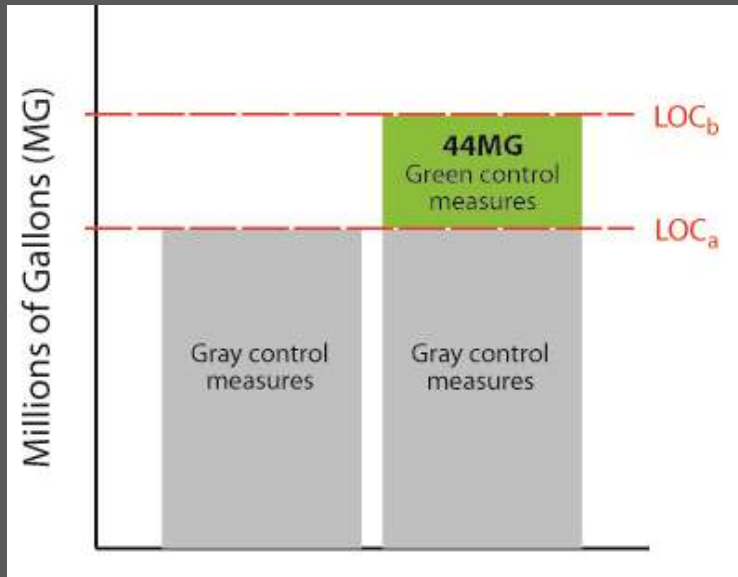


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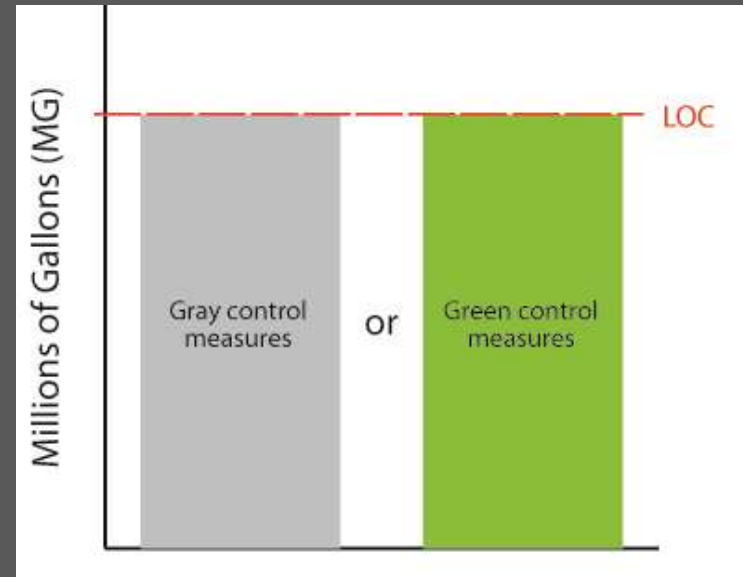


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CSO Consent Decree includes two options for Green Infrastructure



Appendix 3: “Gray plus Green”
(District Green Infrastructure
Plan December 2011)



Appendix 4: “Gray vs. Green”
(Opportunity to “right-size” gray
using green)

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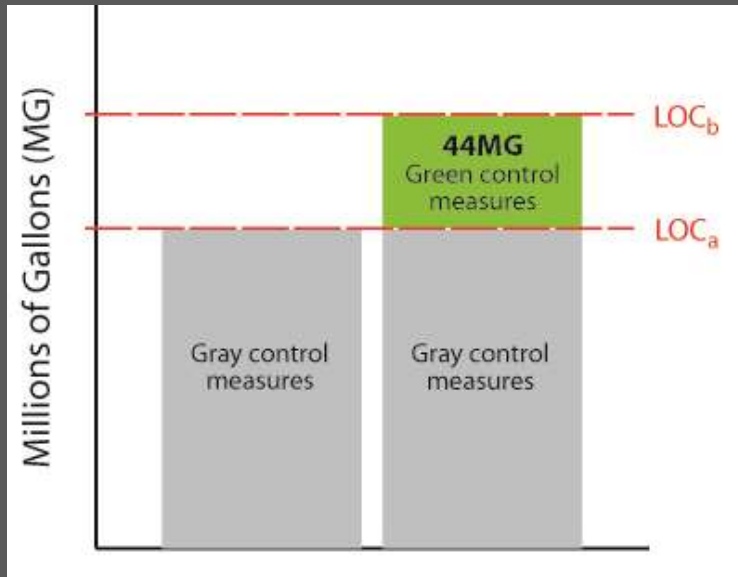


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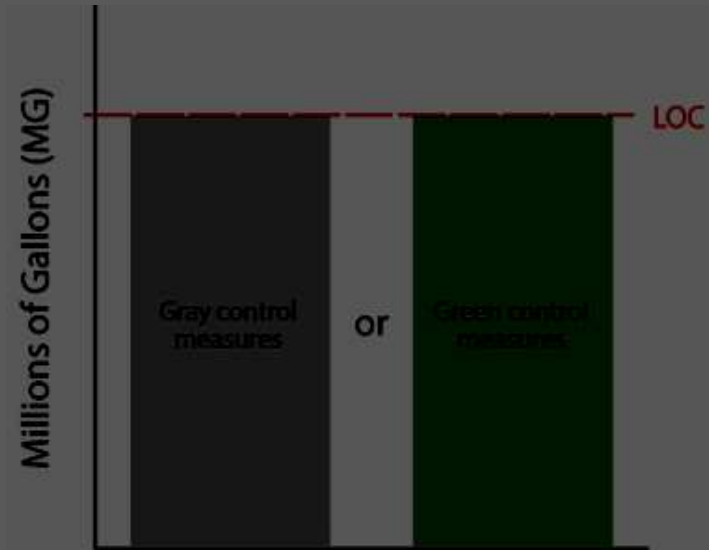


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Appendix 3: “Gray plus Green”
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Appendix 4: “Gray vs. Green”
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Appendix 3 Green Infrastructure

\$42 Million for 44 Million Gallons in 8 Years with Green Infrastructure

NEORSD GREEN INFRASTRUCTURE

Looking across combined sewer area for opportunities to manage stormwater before it enters combined system



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Project Clean Lake

Promoting GI for CSO Control in Cleveland

- Engage City of Cleveland
 - They have the land
 - We have the consent decree
- Work with Community Development Corporations and neighborhoods
- Connect to development activities

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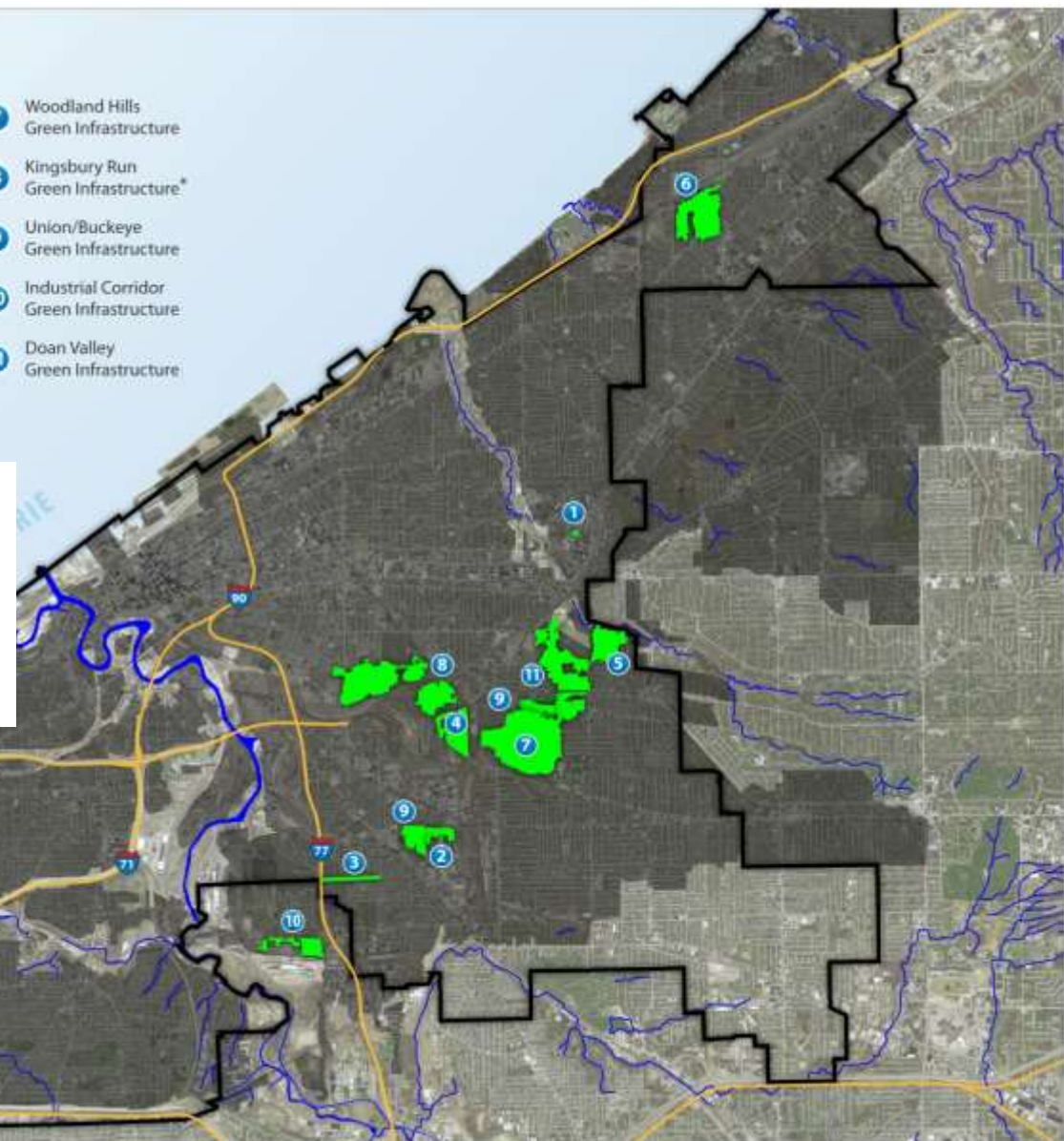


APPENDIX 3 GREEN INFRASTRUCTURE

October 2013

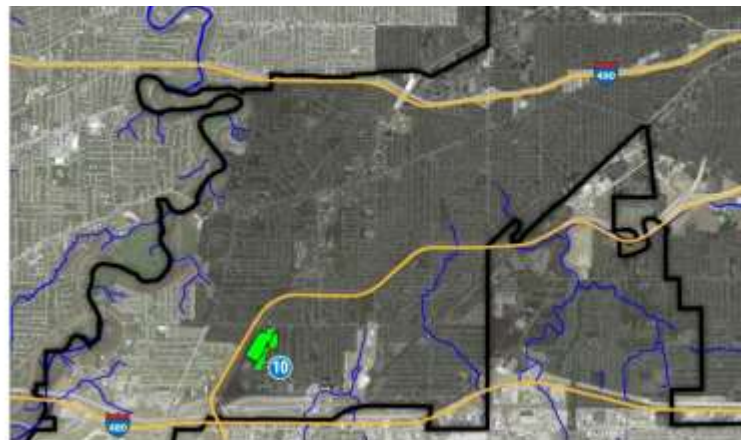
- Interstate
- Existing River/Stream
- Approximate Combined Sewer Service Area
- City of Cleveland Boundary

- | | |
|---|--|
| 1 University Circle Green Infrastructure Demonstration Project | 7 Woodland Hills Green Infrastructure |
| 2 Slavic Village Demonstration Projects | 8 Kingsbury Run Green Infrastructure* |
| 3 Fleet Avenue Green Infrastructure* | 9 Union/Buckeye Green Infrastructure |
| 4 Urban Agriculture | 10 Industrial Corridor Green Infrastructure |
| 5 Fairhill-MLK | 11 Doan Valley Green Infrastructure |
| 6 East 140 th Street Consolidation & Relief Sewer Project | |



Appendix 3 GI Projects:

- ≈46 MG of CSO Control
- ≈\$80 million Capital Cost
- 10 Projects: 2013-2019



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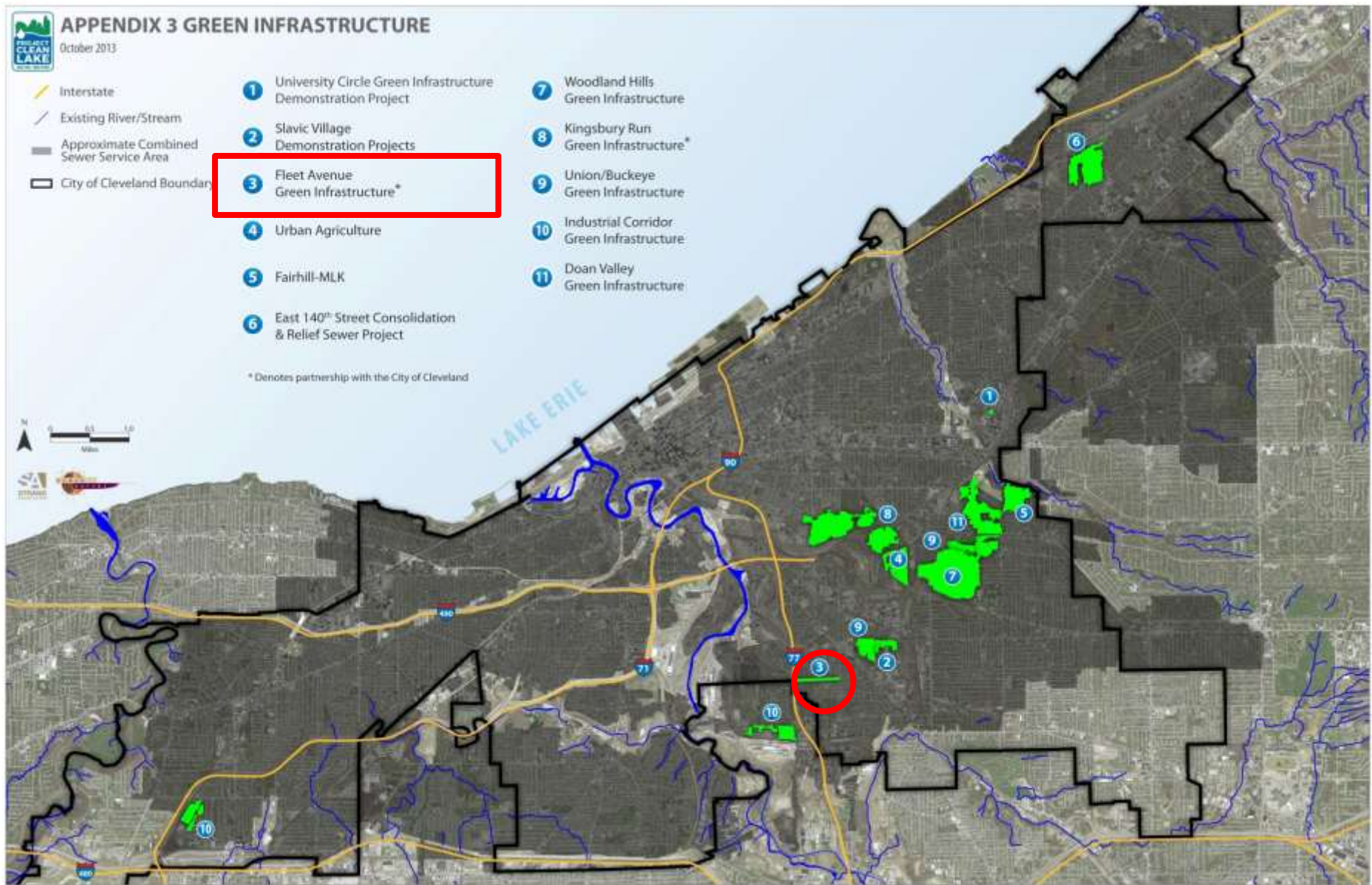
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* Denotes partnership with the City of Cleveland



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Fleet Avenue Green Infrastructure Project



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Fleet Avenue Green Infrastructure Control Measure

Existing Site

- 3 Vacant Parcels
- 0.27 total acres

Integrated with City street reconstruction

Green infrastructure result of neighborhood planning project



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GI Project	Est. Construction Start	Est. Construction Cost	Est. Stormwater Capture (MG)	Est. CSO Reduction (MG)
Fleet Avenue*	Q1 2014	\$1,300,000	9.00	0.90

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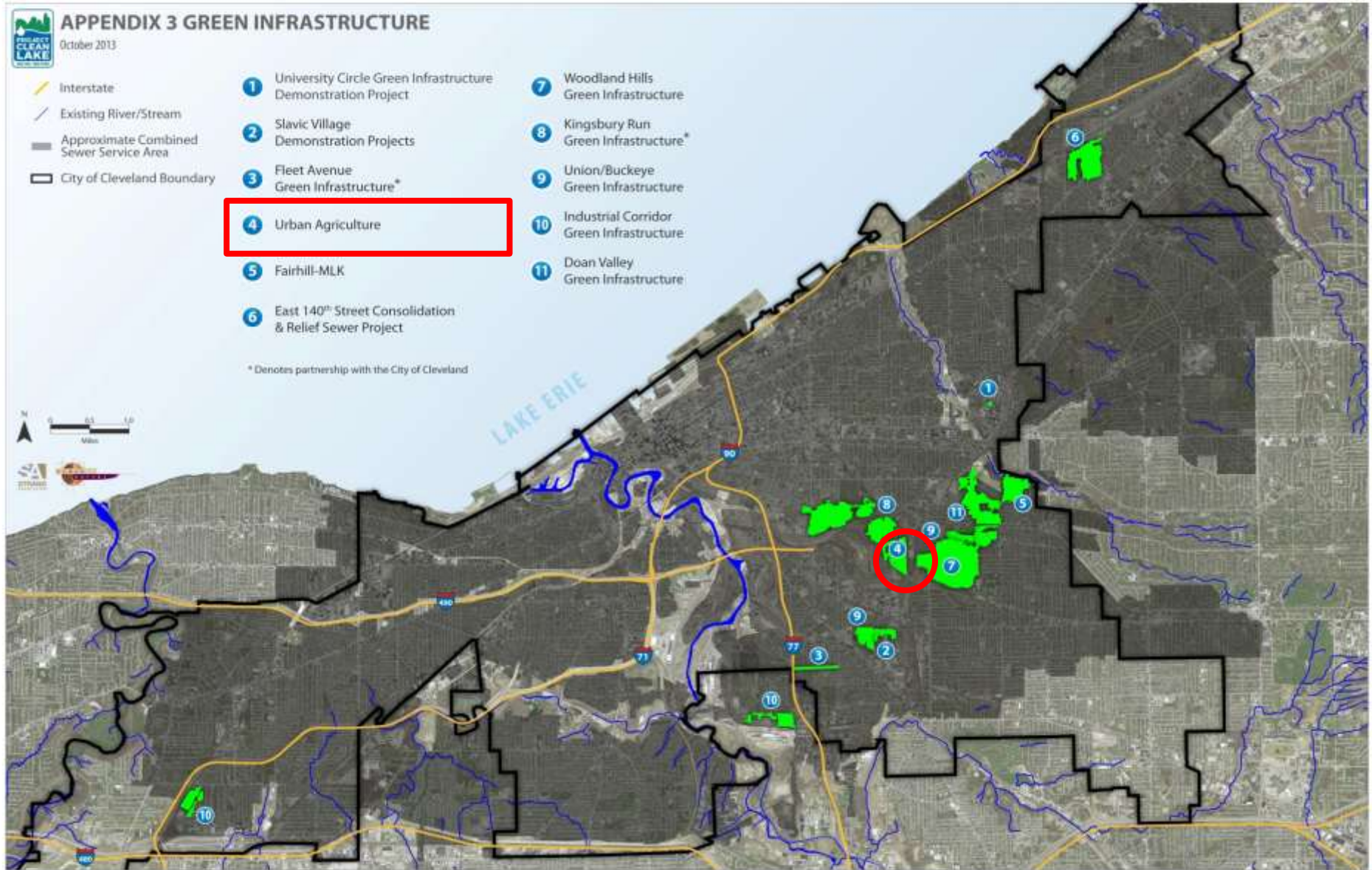
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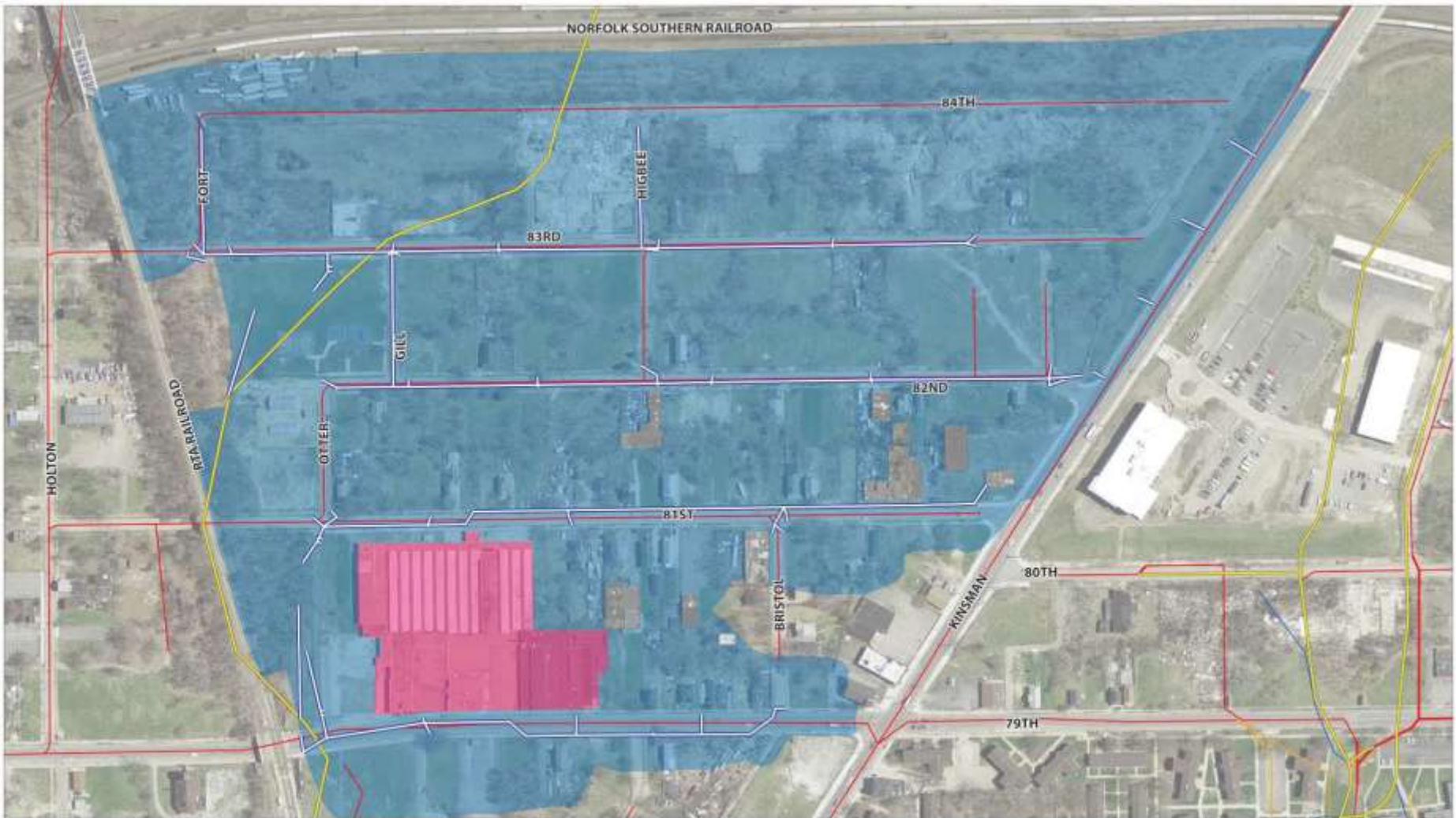


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- Legend**
- Combined Sewer
 - SWO Sewer
 - Drainage Area (Modeled Benefit)
 - Sanitary Sewer
 - Proposed Storm Sewer
 - Drainage Area (Potential Benefit)
 - Storm Sewer

NORTHEAST OHIO REGIONAL SEWER DISTRICT
EARLY ACTION PROJECTS
 URBAN AGRICULTURE EAP
 DRAINAGE AREA



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Urban Agricultural Innovation Zone



Legend

-  SWD Sewer (Kingsbury Run)
-  Proposed Storm Sewer

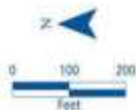


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NORTHEAST OHIO REGIONAL SEWER DISTRICT
EARLY ACTION PROJECTS
**URBAN AGRICULTURE EAP
 CONCEPT**



DATA SOURCES: HEREAS



Urban Agricultural Innovation Zone – Existing Conditions



East 82nd Street / Glade Avenue

Urban Agricultural Innovation Zone – Existing Conditions



04/19/2012 11:51

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Rid-All Green Partners – Urban Agricultural Innovation Zone



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URBAN AGRICULTURE INNOVATION ZONE
GATEWAY FEATURE
CONCEPT RENDERING



EXISTING CONDITIONS



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URBAN AGRICULTURE INNOVATION ZONE
EAST BIORETENTION BASIN
CONCEPT RENDERING



EXISTING CONDITIONS



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GI Project	Est. Construction Start	Est. Construction Cost	Est. Stormwater Capture (MG)	Est. CSO Reduction (MG)
Urban Agriculture	Q2 2014	\$5,607,126	9.50	1.80

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Assessment of Benefits



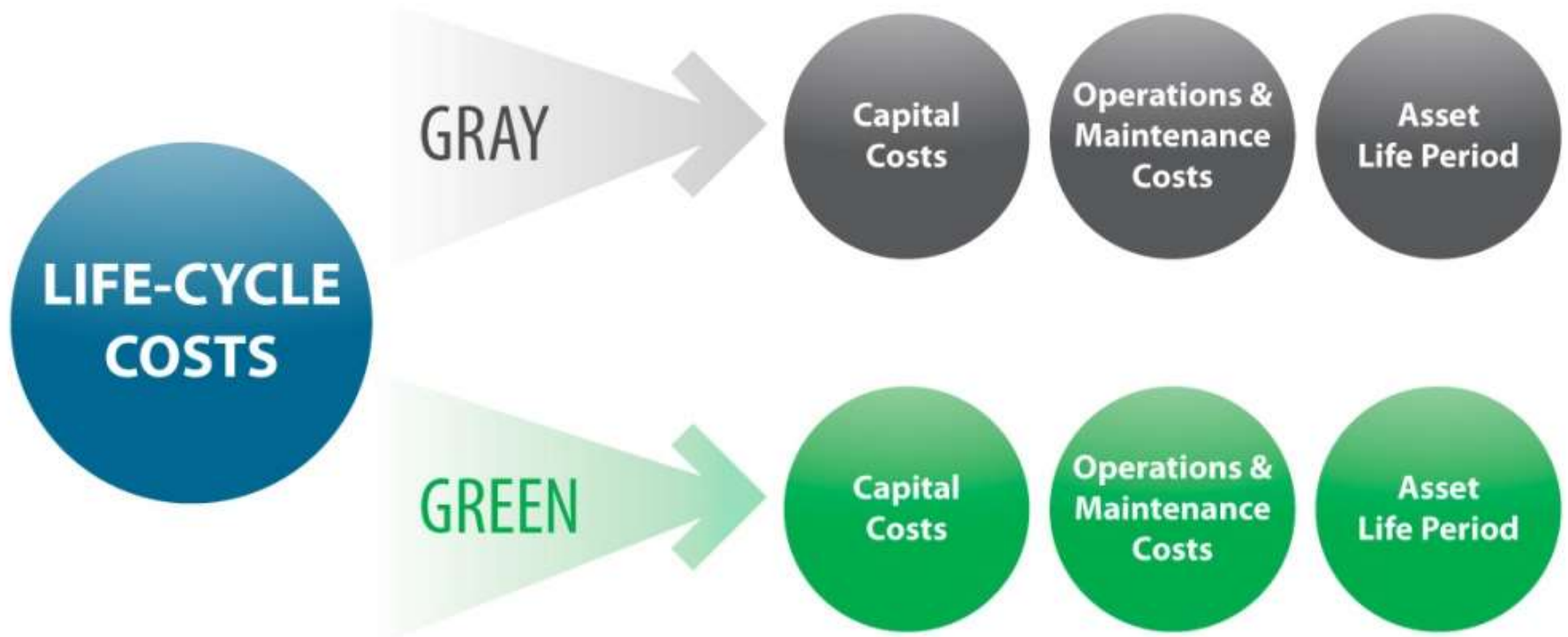
*Construction Costs only
(does not include O&M)



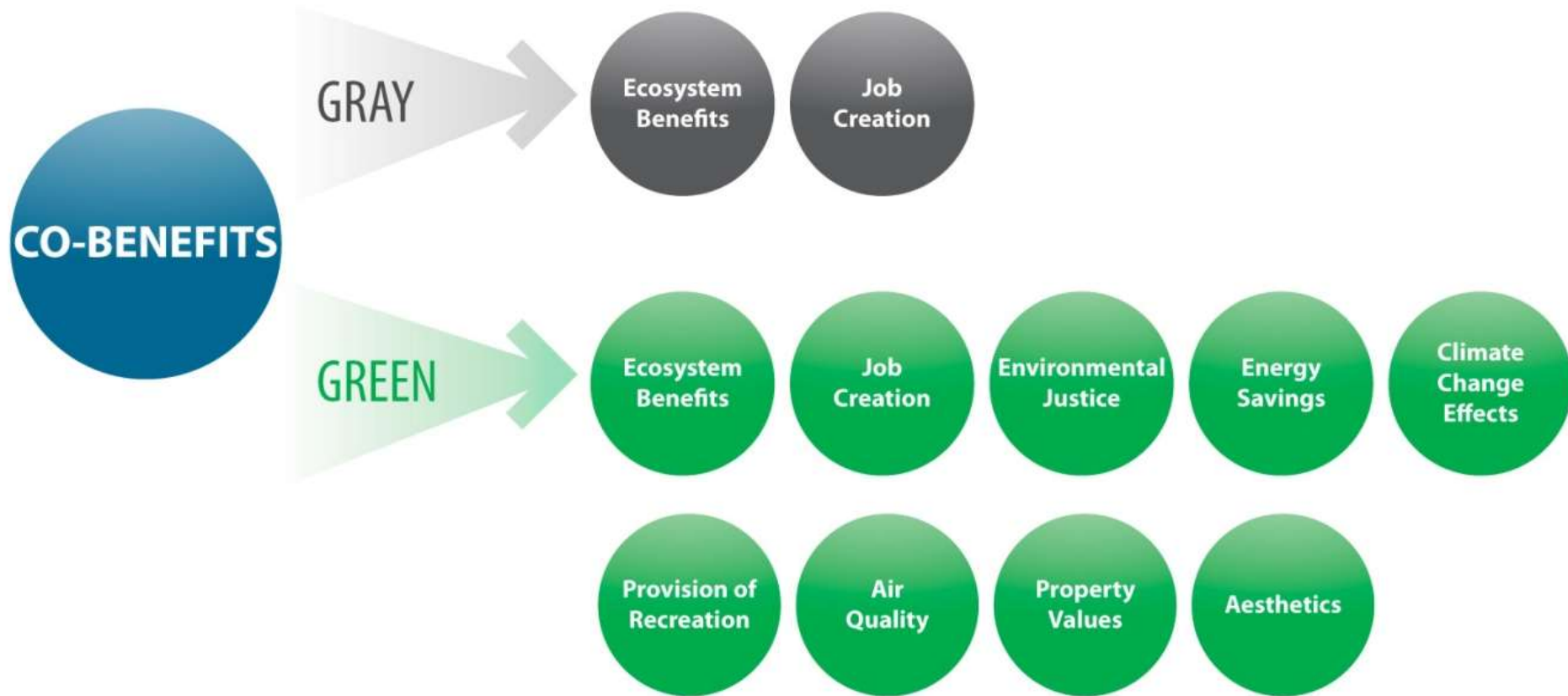
Your Sewer District Keeping our Great Lake great.

 #neorsdPCL

Assessment of Benefits



Assessment of Benefits



NEORSD Green Infrastructure for CSO Control

Summary

- Project Clean Lake's commitment to Green Infrastructure – Appendix 3 and Appendix 4
- \$82 million committed to capture 46MG
 - Construction costs average \$1.79/gallon
- Replace gray infrastructure with green
 - Actively searching for options
- Volume control
 - Stormwater capture \neq CSO reduction

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For more information

Kyle Dreyfuss-Wells

Manager of Watershed Programs

neorsd.org or at 216.881.6600

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Follow us! twitter.com/neorsd



 Northeast Ohio
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See More Green Infrastructure Around Cleveland

neorsd.blogspot.com/2014/01/green-78-green-infrastructure-projects.html

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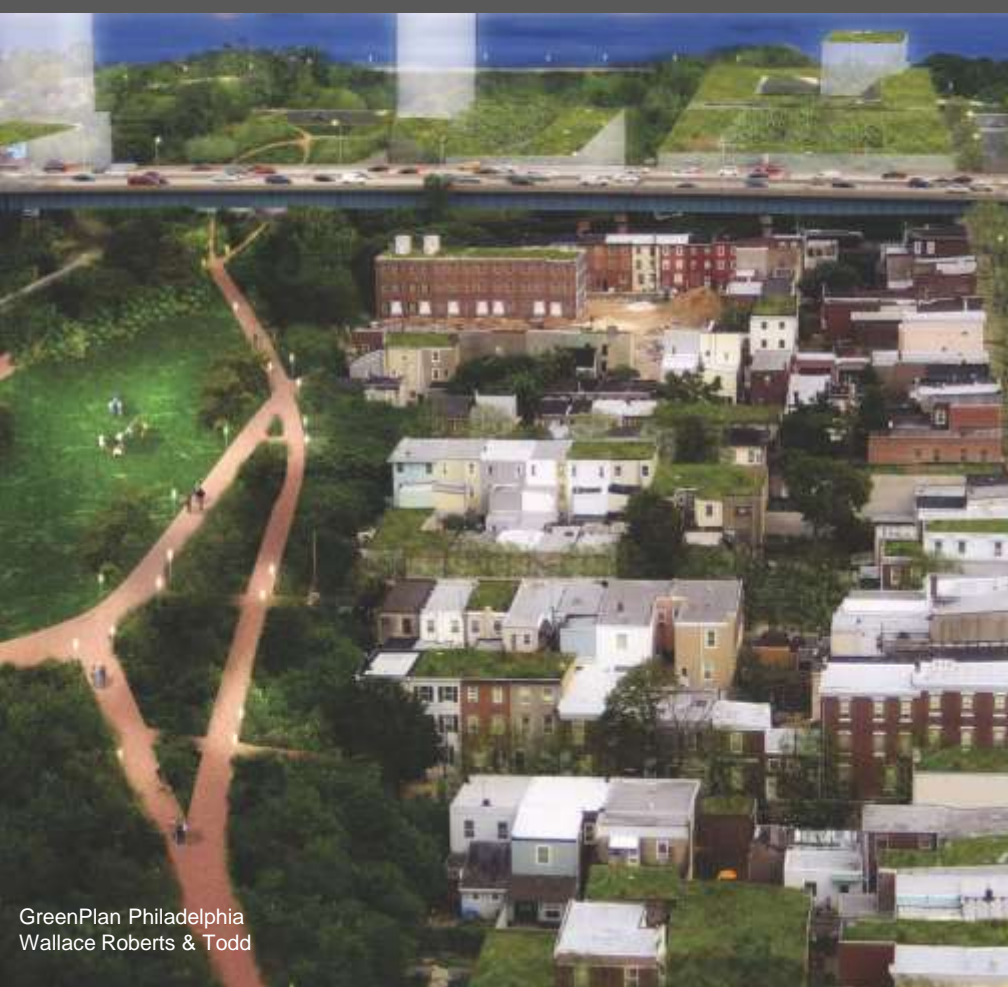


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Mark A. Focht, PLA, FASLA
First Deputy Commissioner of Parks and Facilities,
City of Philadelphia, PA

GreenPlan Philadelphia
Wallace Roberts & Todd



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A map of Philadelphia showing the city's street grid and the Schuylkill River. Overlaid on the map are various green infrastructure elements, including green spaces, parks, and waterways, highlighted in shades of green and yellow. The text is centered over the map.

GREEN CITY, CLEAN WATERS

Green Infrastructure - The Philadelphia Story

Mark A. Focht, PLA, FASLA

First Deputy Commissioner, Philadelphia Parks & Recreation

President, American Society of Landscape Architects

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Philadelphia, PA

Land Area:
135 sq. mi.

Annual Rainfall:
42 inches

Population:
1,526,000 (2010)

Median Income:
\$37,090 (USD, 2008)

Persons Below Poverty Level:
23.8% (2008)

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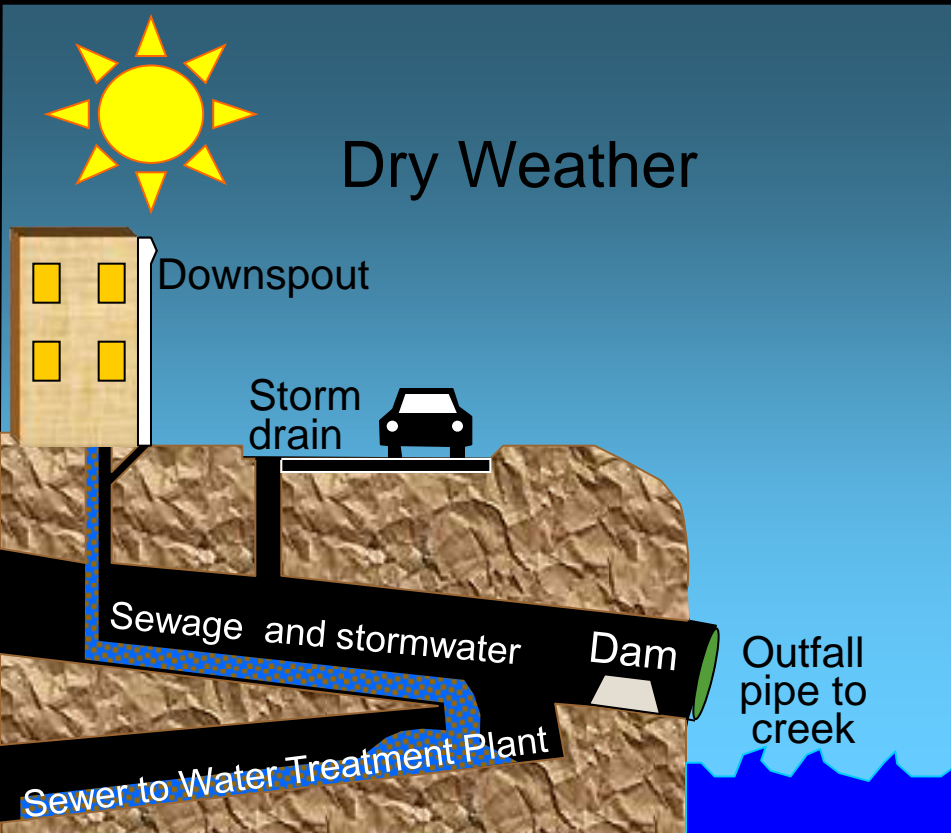
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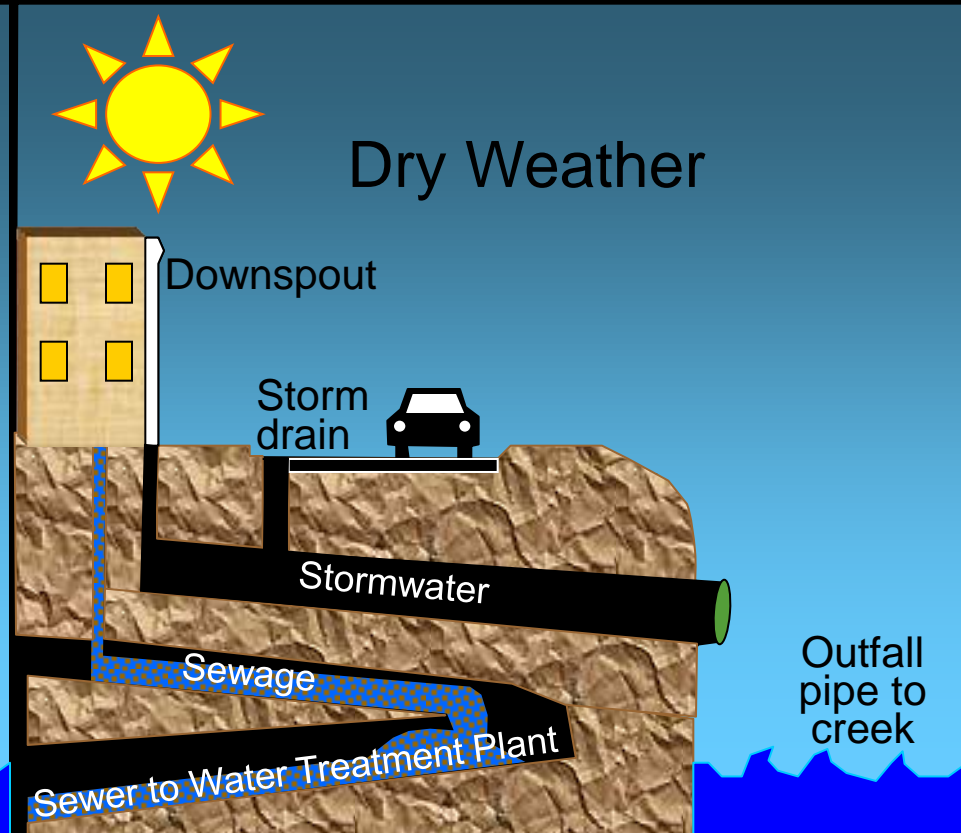
TYPES OF SEWERS IN PHILADELPHIA

Combined Sewer



60% of Philadelphia

Separate Sewer



40% of Philadelphia

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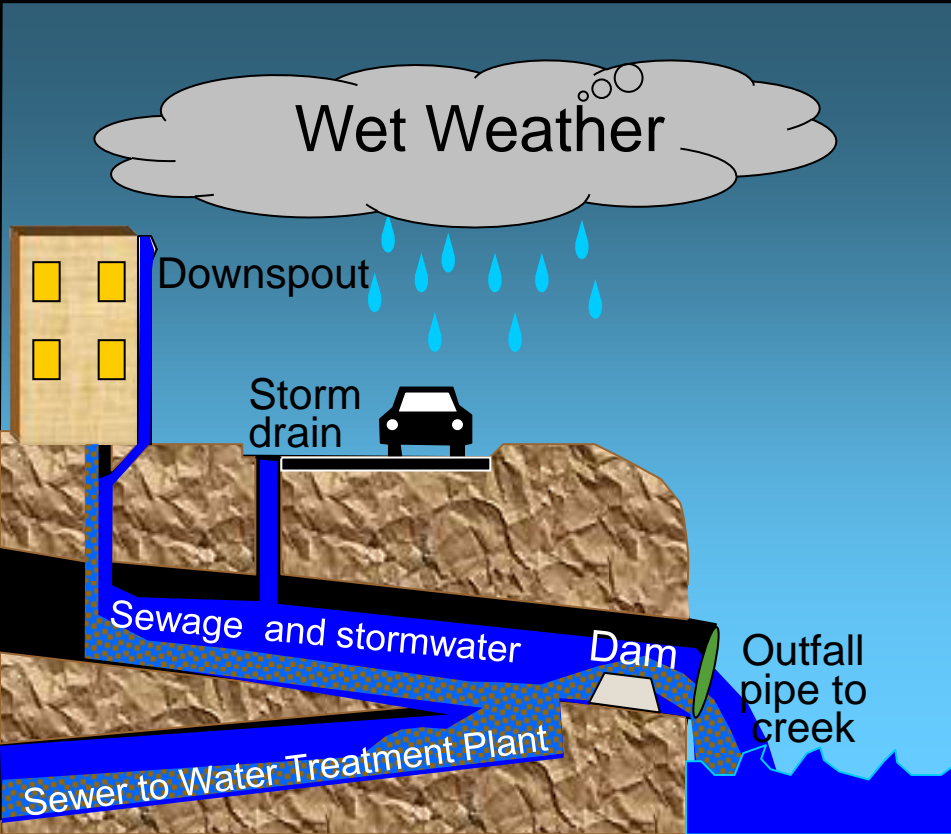
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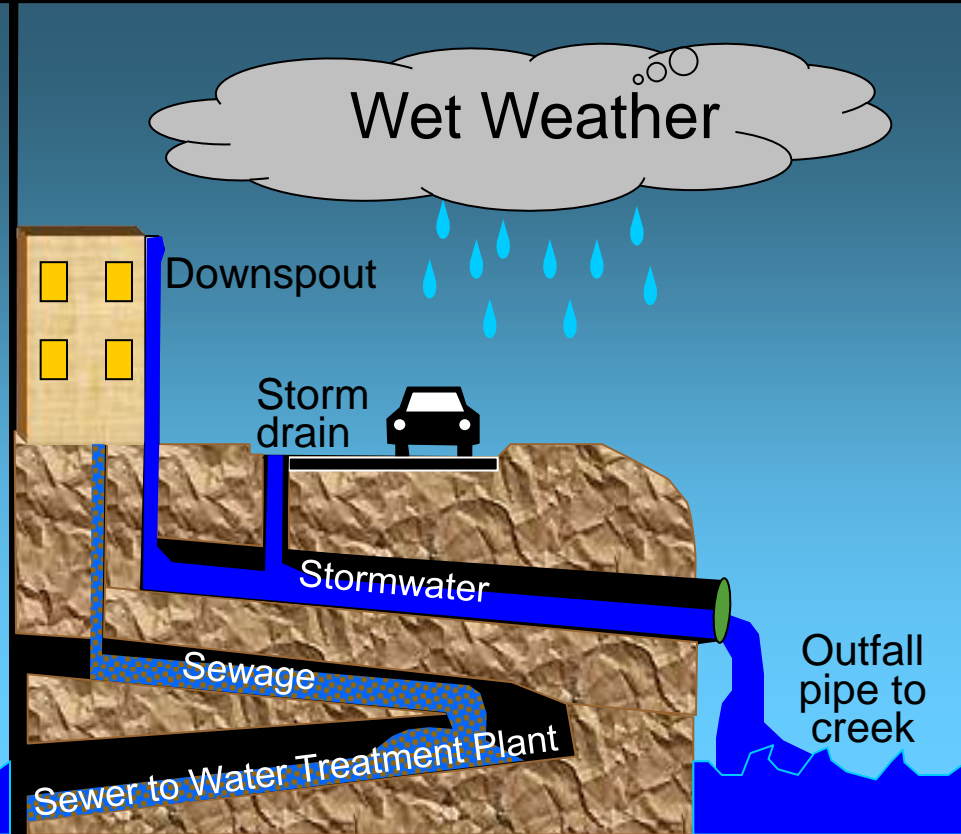
TYPES OF SEWERS IN PHILADELPHIA

Combined Sewer



60% of Philadelphia

Separate Sewer



40% of Philadelphia

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Choosing the Right Investment with Limited Funding



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TRIPLE BOTTOM LINE BENEFITS

Economic/Environmental/Social



Economic Benefits

- Property Values
- Job Creation
- City Competitiveness



Environmental Benefits

- Fishable, Swimmable
- Habitat Enhancement
- Air Quality
- Energy Savings
- Carbon Footprint



Social Benefits

- Recreation
- Aesthetics
- Public Health
- Equity

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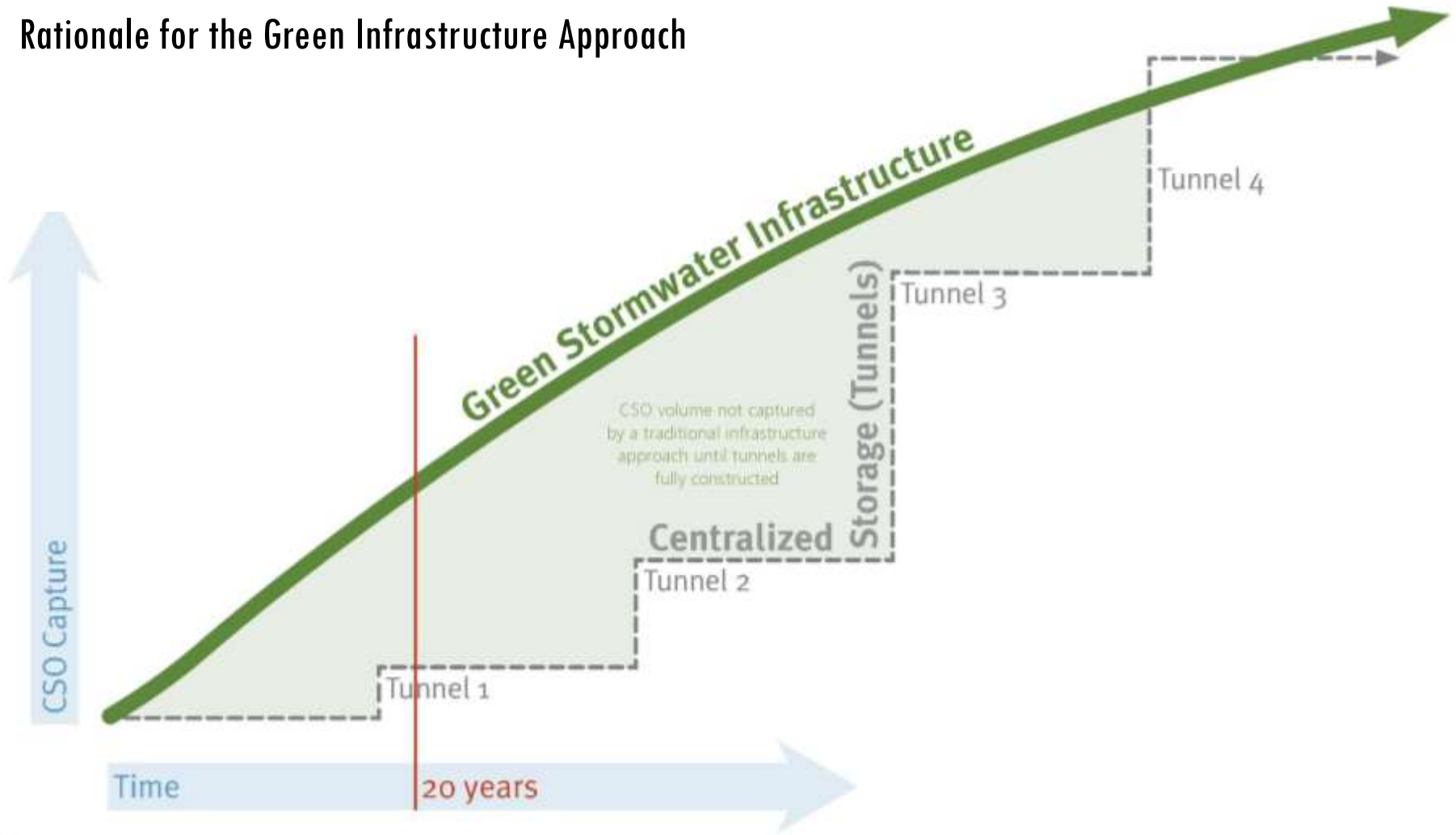
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AN UNCONVENTIONAL PATH

Rationale for the Green Infrastructure Approach



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GREEN CITY, CLEAN WATERS

- Maintain and upgrade the infrastructure network
- Advance City-wide Sustainability Programs
- Improve public health / quality of life
 - greening our neighborhoods,
- Transform river and stream corridors
 - restoring our waterfronts,
 - improving our outdoor recreation spaces, and
- Preserve and restore aquatic habitat
- Maximize return on every dollar spent

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April 10, 2012: The U.S. EPA and the City of Philadelphia joined in a partnership to advance green infrastructure for urban wet weather pollution control. This partnership demonstrates EPA's strong support for sustainable storm water management yielding multiple benefits for community livability and other urban environment improvements.

"[Philadelphia] has earned a place as a national and global leader on sustainable innovation and clean water protection."

Lisa Jackson, EPA Administrator



June 1, 2011

25-year Program

June 1, 2036

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GREEN CITY, CLEAN WATERS

Green Stormwater Infrastructure

\$800 million

Wet Weather Treatment Plant Upgrades

\$200 million

Adaptive Management

\$200 million



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WHAT IS A “GREENED ACRE”?

Rationale for the Green Infrastructure Approach

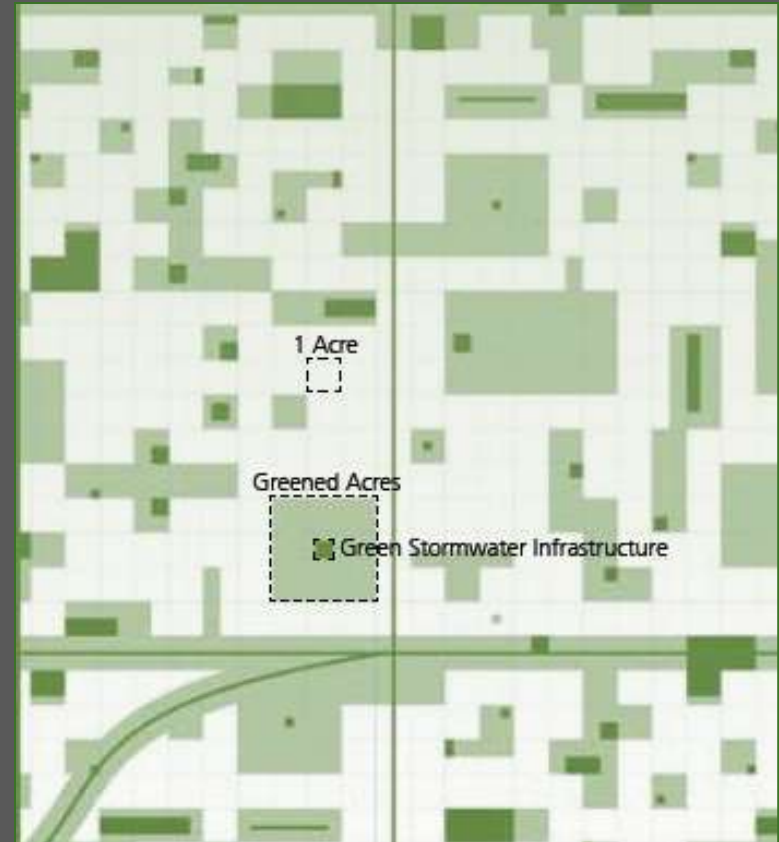
Greened Acre (GA) =
one acre-inch = 27,158 gallons

- One Greened Acre is equivalent to 1 inch of managed stormwater from 1 acre of impervious drainage area, or 27,158 gallons of stormwater.

$$GA = IC * Wd$$

Impervious
cover

Water
Depth



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GREEN STORMWATER GOALS

Year	Greened Acres	Square Miles	% Impervious cover removed
5	750	1	3%
10	2,100	3	8%
15	3,800	6	14%
20	6,400	10	23%
25	9,600	15	34%



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7th and Washington



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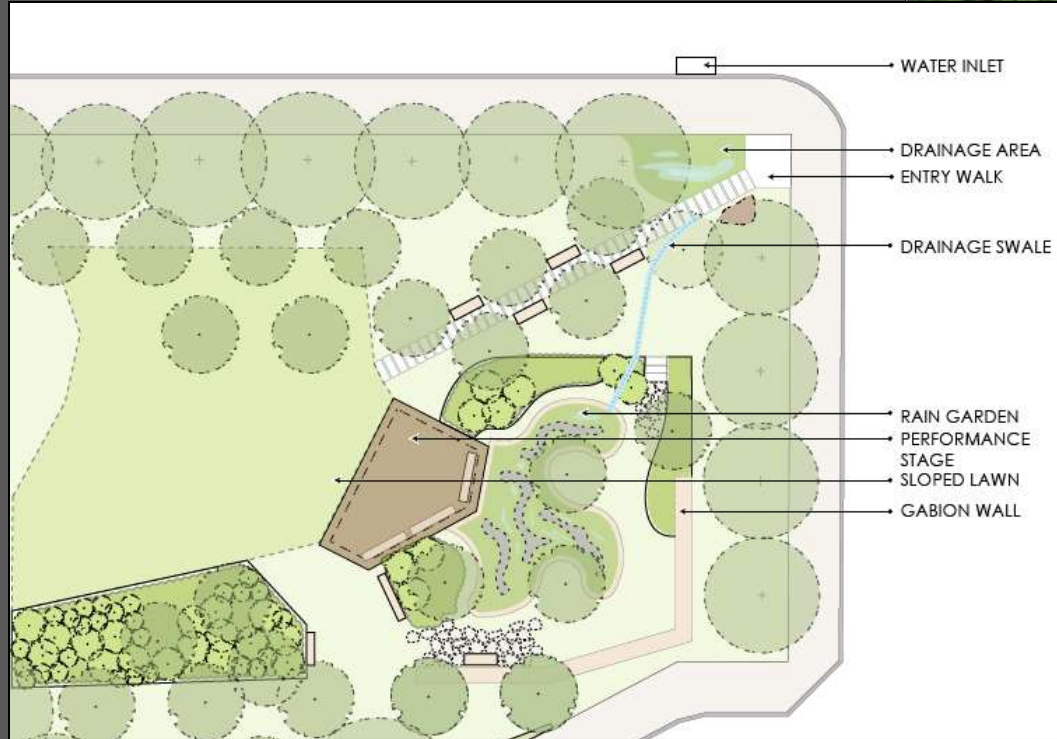


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Green Public Open Space



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Green Public Facilities Columbus Square



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Green Public Facilities Herron Playground

PERVIOUS SAFETY SURFACE

POUROUS COURT SURFACE

RAINGARDEN



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Green Schools



Greenfield Elementary Center City



Wissahickon Charter East Falls



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Green Homes Pilot Project



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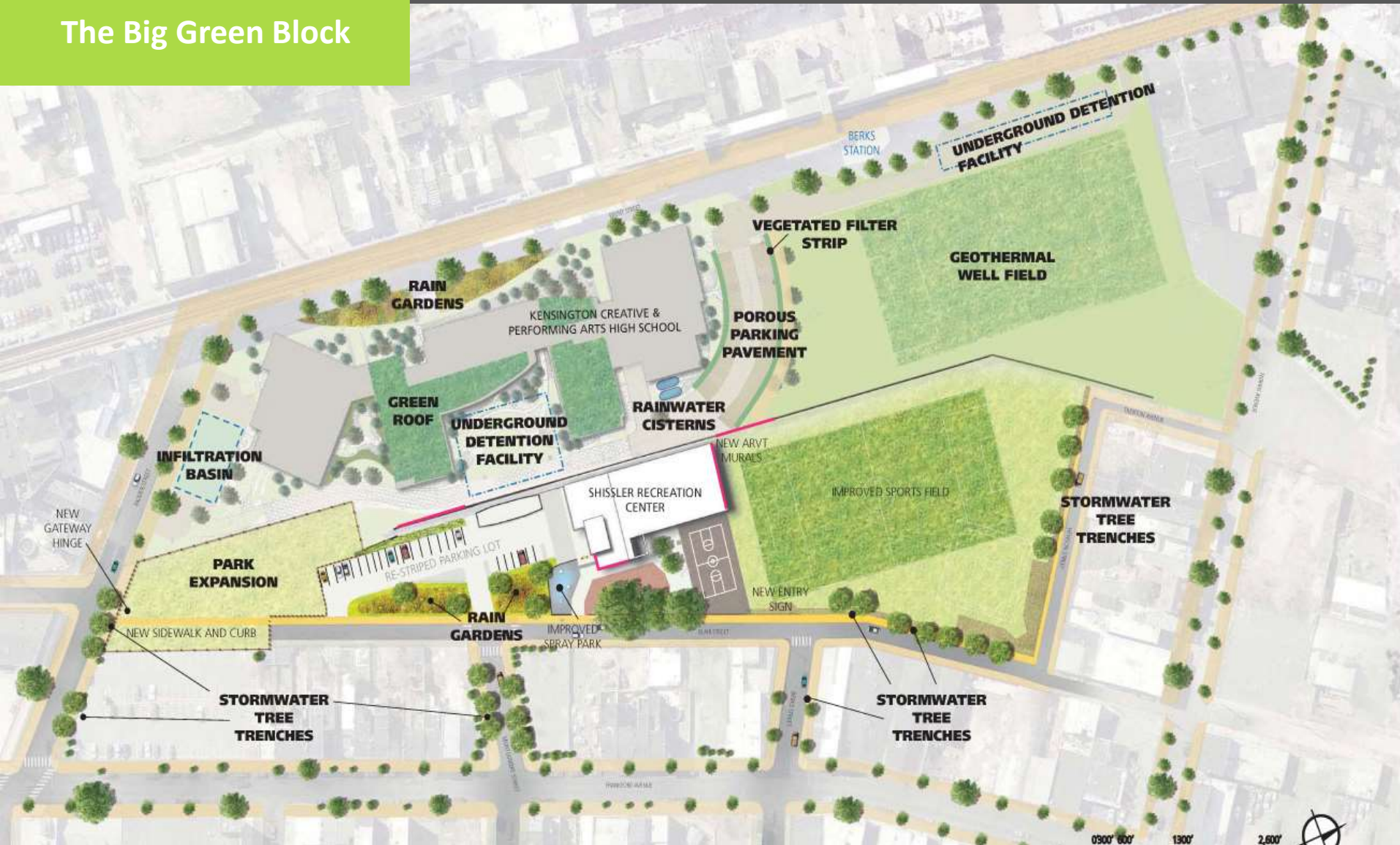


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The Big Green Block



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The Big Green Block
New Kensington H.S.



Photo by Paul Rider

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The Big Green Block Shissler Rec Center



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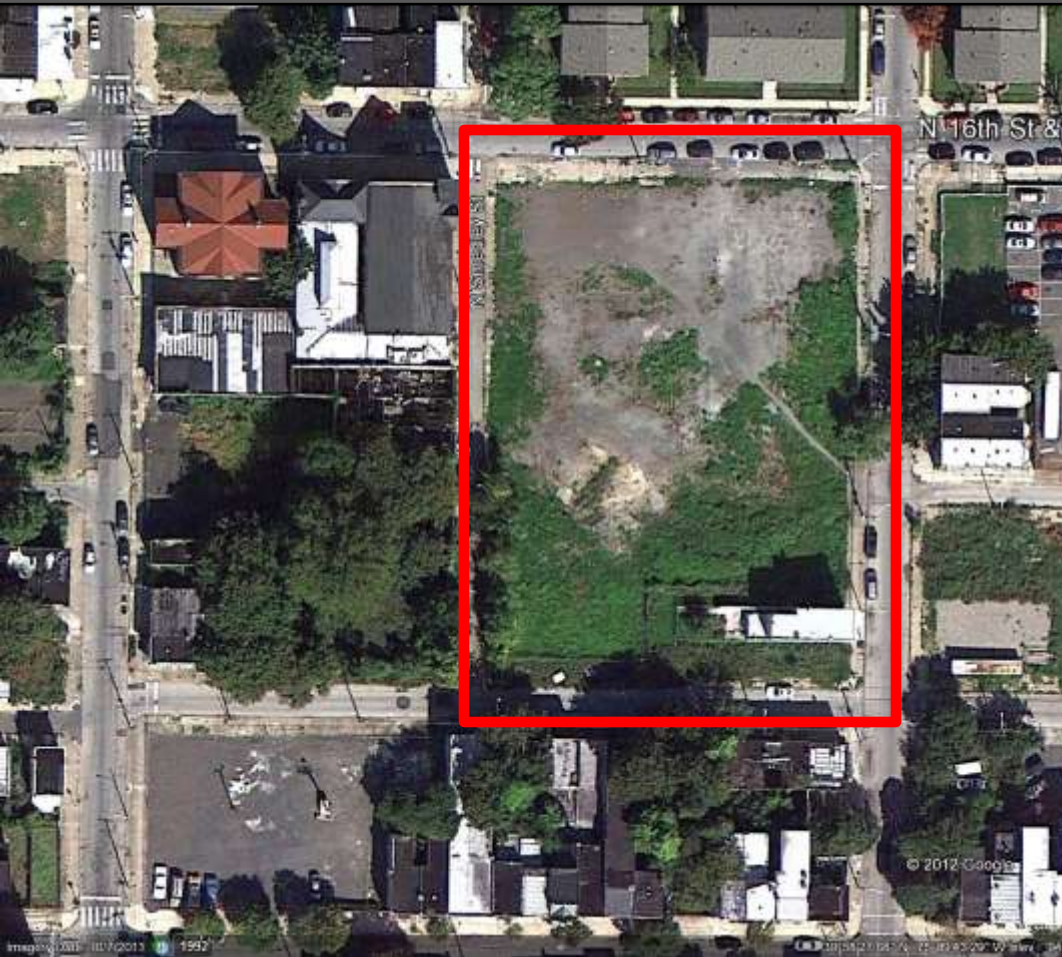


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Green Homes / Green Public Open Space Ingersoll Homes & Park



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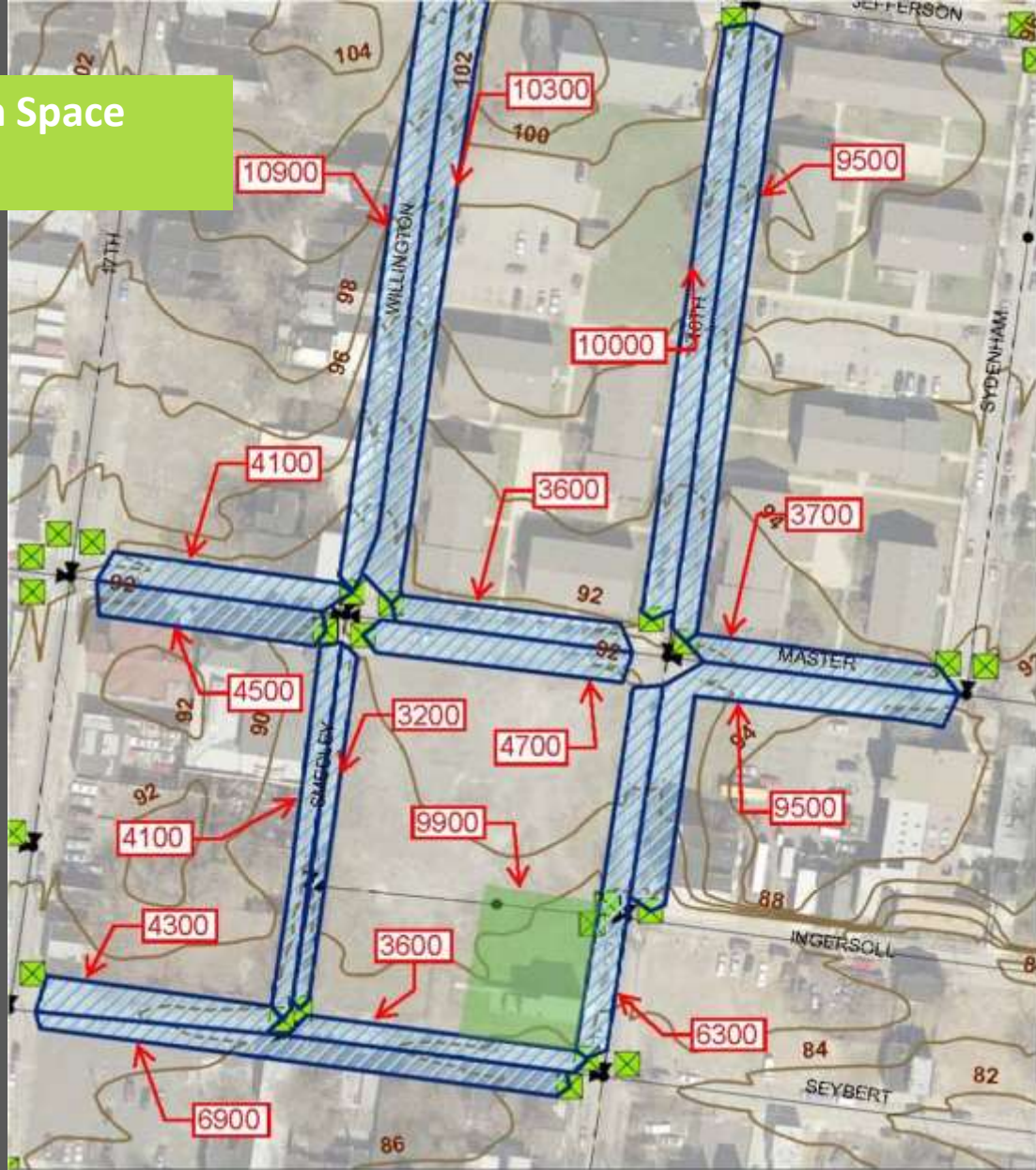
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Green Homes / Green Public Open Space Ingersoll Homes & Park

Can achieve approximately **two 'Greened Acres'** by re-directing surface and sub-surface drainage to Ingersoll Park.



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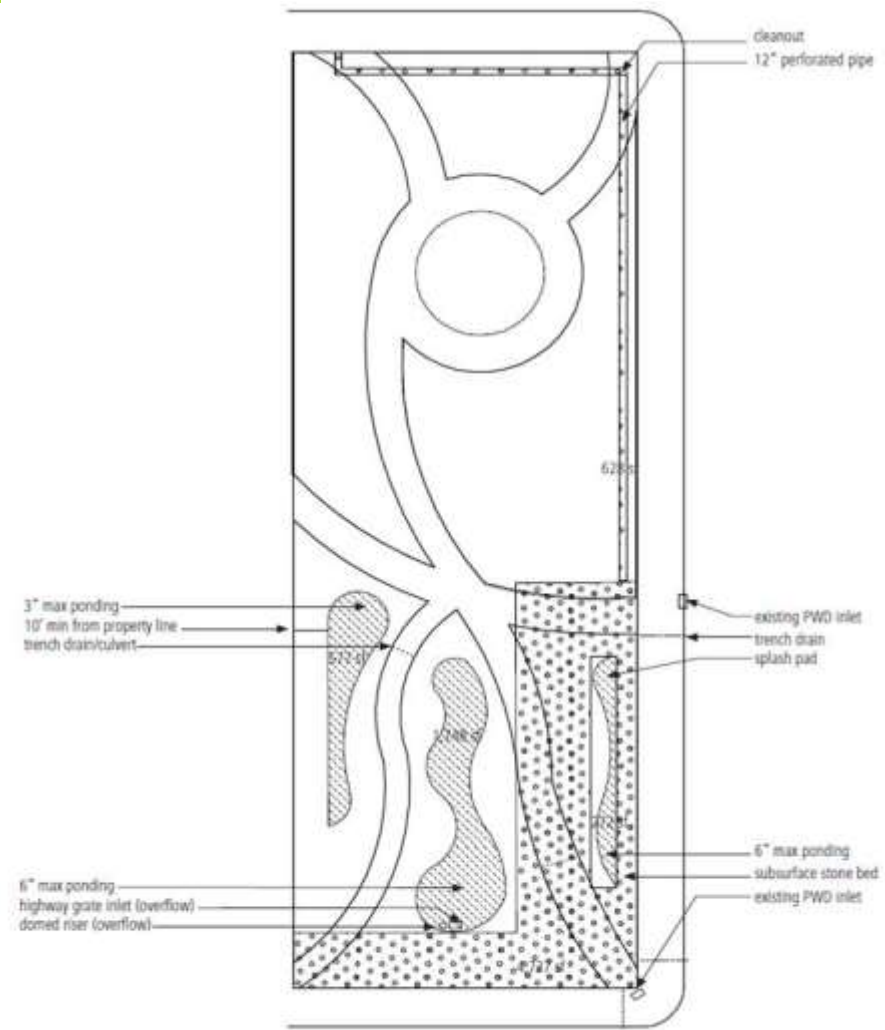
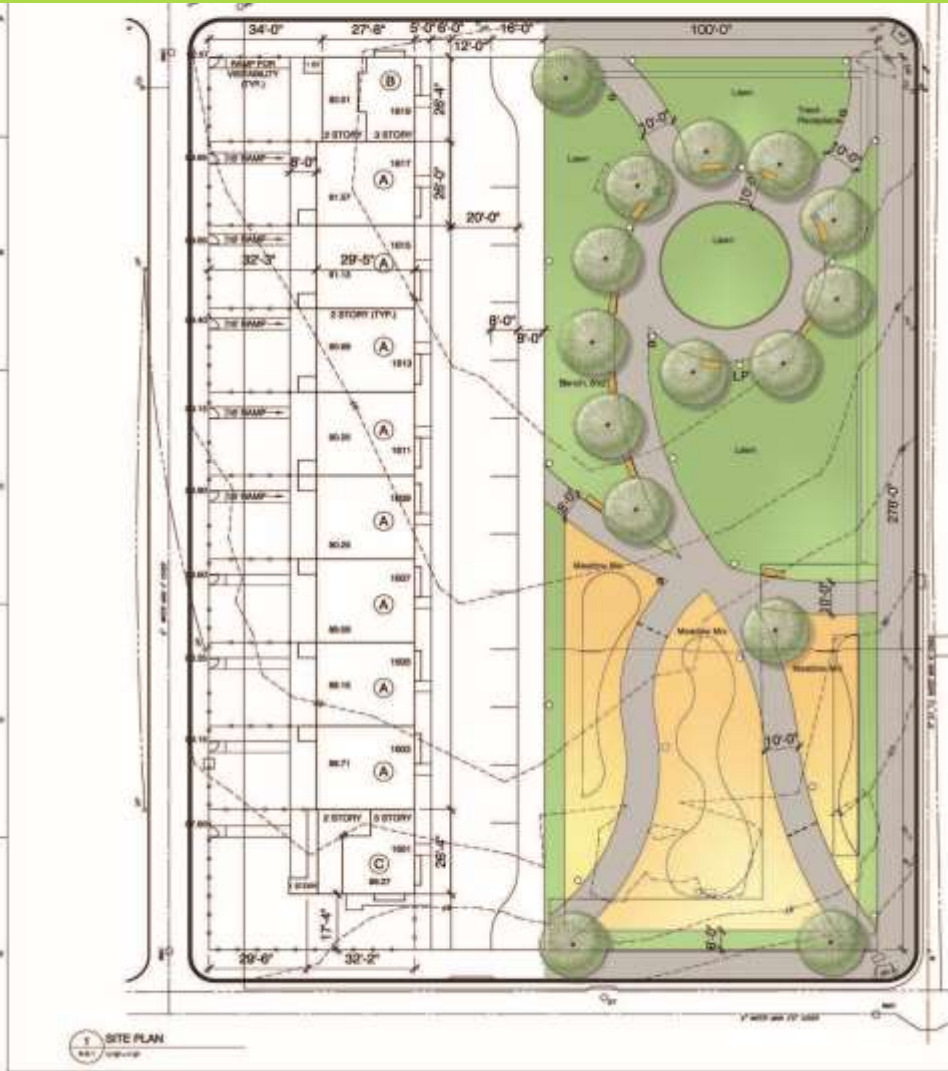


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Stormwater management, native grasses (Portland, OR)



Native grasses used in park (Seattle)

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GREEN CITY, CLEAN WATERS LESSONS LEARNED

- Importance of city-wide planning frameworks
- Strong mayoral commitment
- Increased resources
- Concurrent policy efforts
- New partnerships and shared agendas across city agencies
- Commitment to equity and sustainable investment
- Community support

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TRIPLE BOTTOM LINE BENEFITS

Economic Benefits

- Annually, **250 people** are expected to be employed in green jobs.
- Increase of up to **\$390 million** in property values near parks and green areas over the next 45 years.

Social Benefits

- Increase of up to **10% more** visits to Parks & Recreation sites.
- Reduction of up to **140 fatalities** caused by excessive heat over the next 45 years.
- Up to **1-2 avoided** premature deaths, **20 avoided** deaths from asthma and up to **250 fewer** missed school or work days per year.

Environmental Benefits

- Up to **1.5 billion lbs.** of carbon dioxide emission avoided or absorbed, equivalent to removing close to **3400 vehicles** from roadways each year.
- Up to **\$8.5 million** in water quality and habitat improvements over 40 years.

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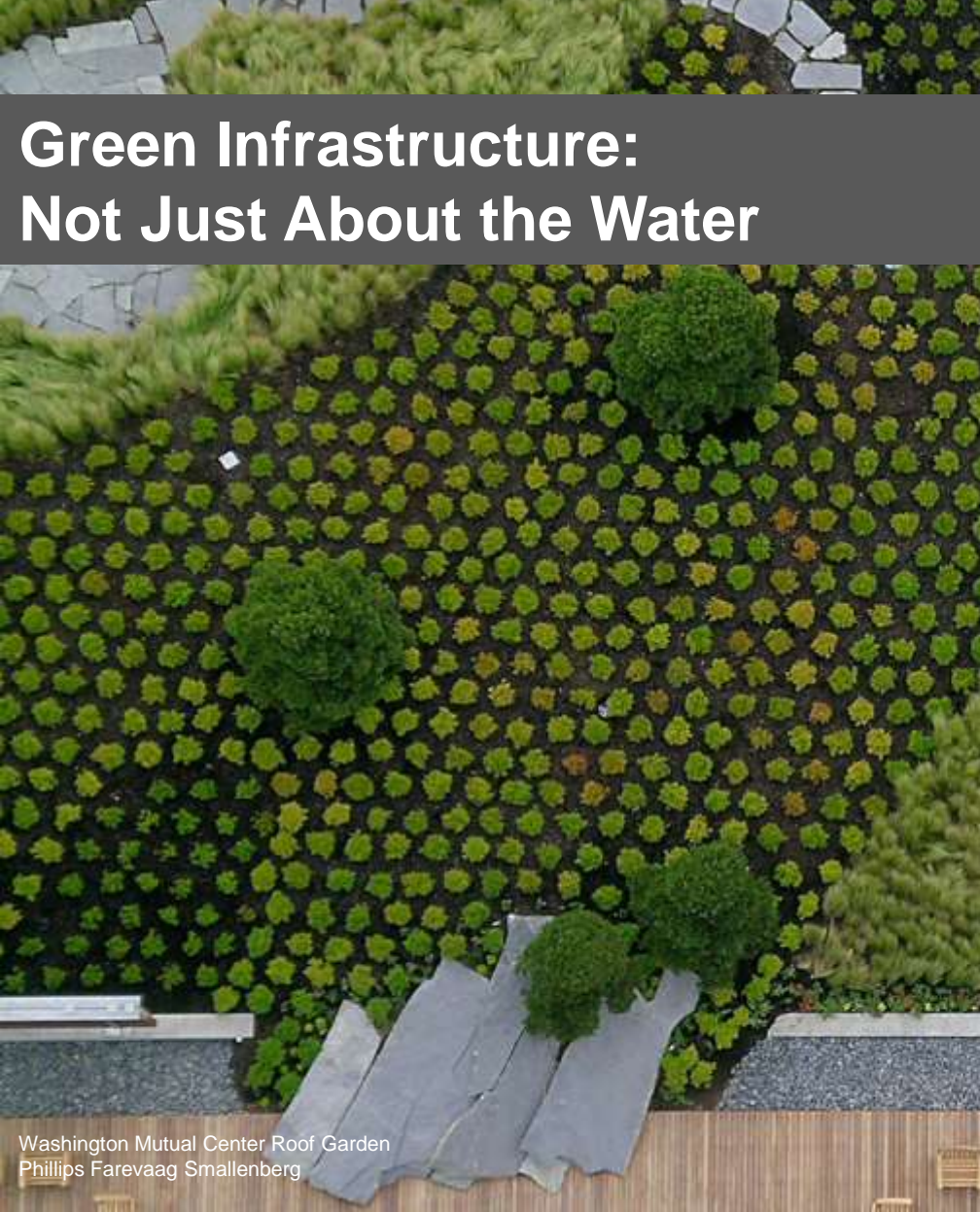
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Christopher Wierzbicki, PE
Deputy Director, Road Services Division,
King County Department of Transportation

Washington Mutual Center Roof Garden
Phillips Farevaag Smallerberg



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Winslow Way Reconstruction

City of Bainbridge Island, WA



Presenter: Christopher Wierzbicki, PE

Currently: King County DOT Roads Deputy Director

Formerly: City of Bainbridge Island Deputy Planning Director

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Severe Corrosion



Mis-Aligned Joints



Ponding Water



Inaccessibility



Fractured/Broken Pipes



Standing Water



Asphalt Cracking



Concrete Heaving



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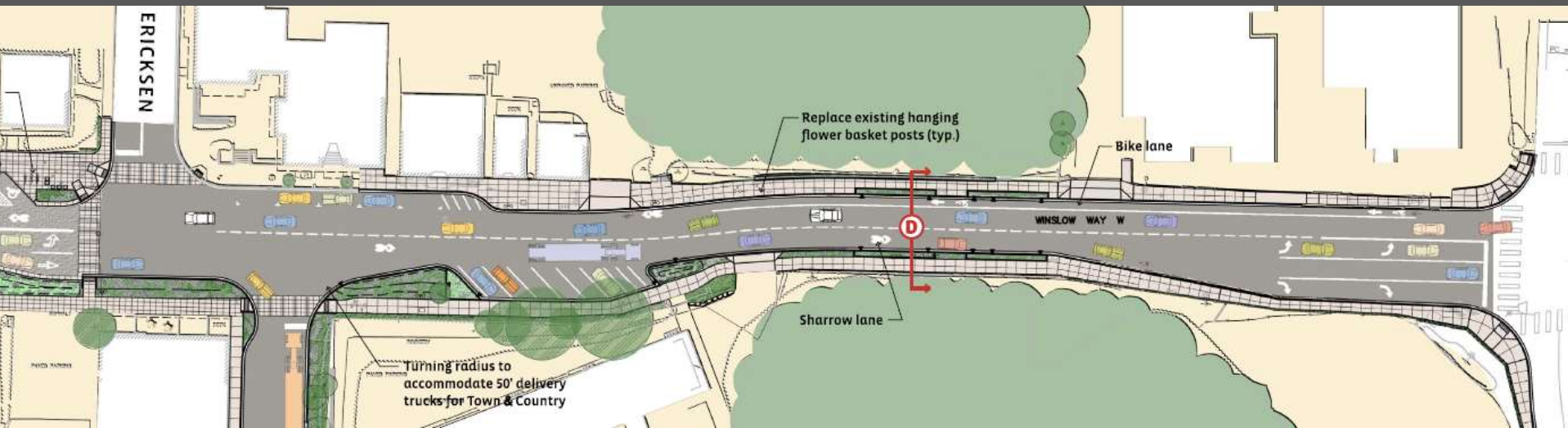
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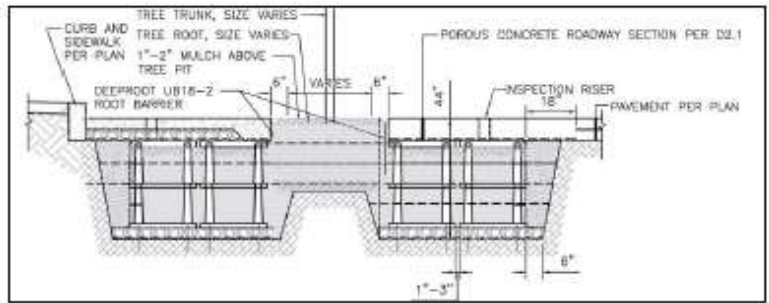
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Silva Cell system allows trees to grow to their natural size while preventing roots from breaking the pavement.



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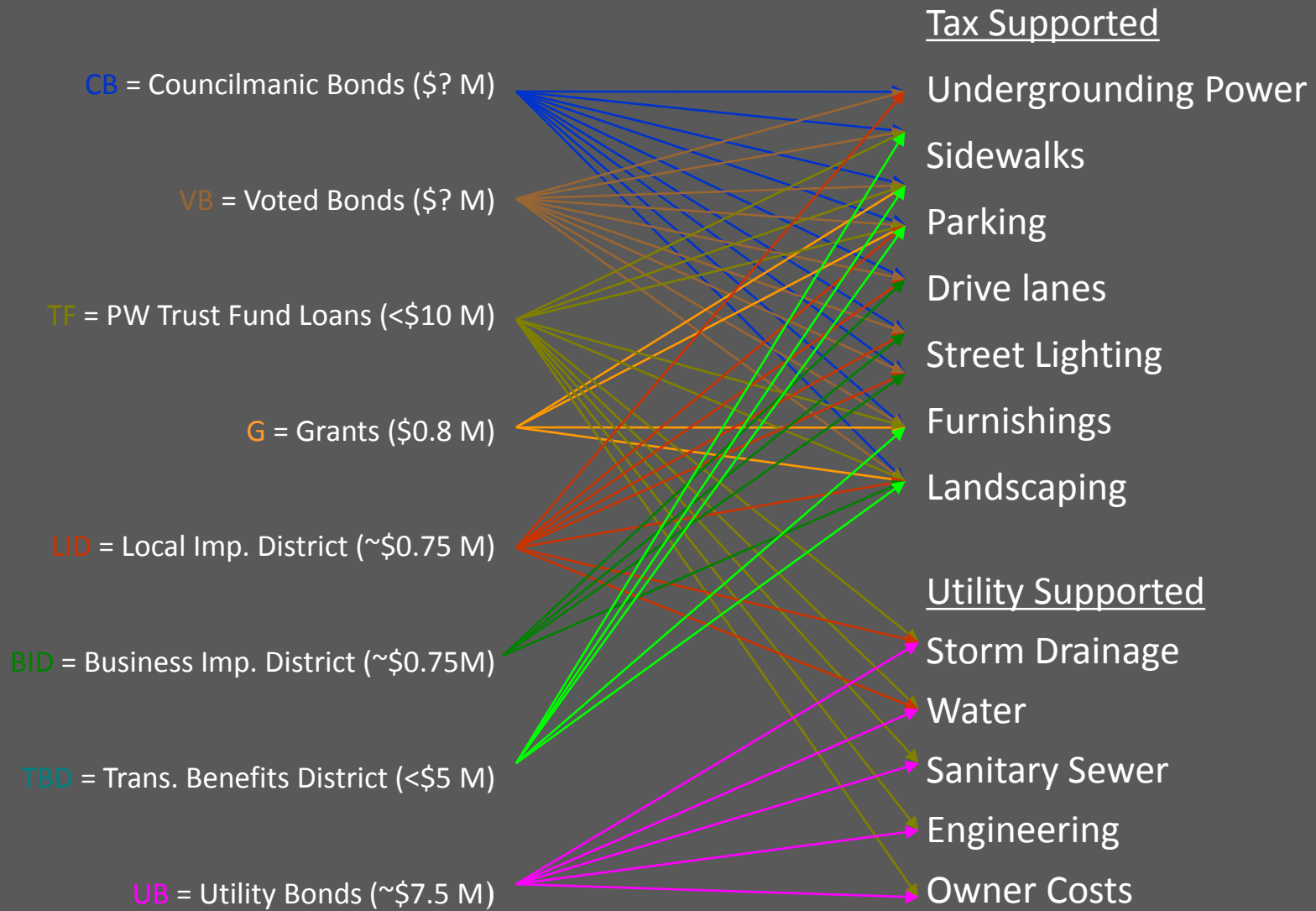
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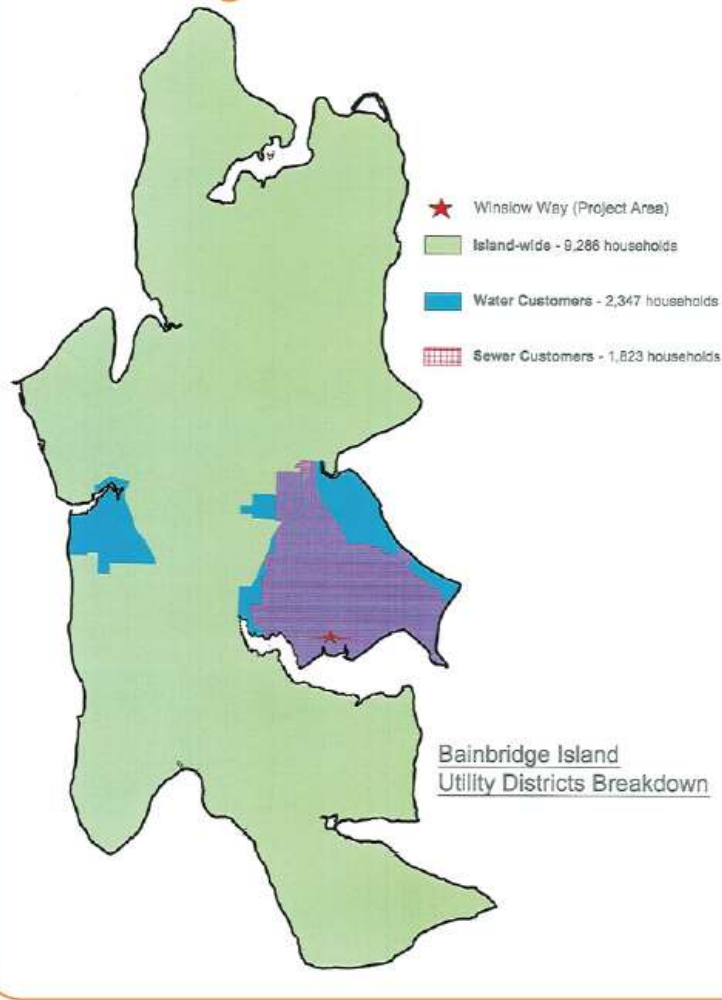


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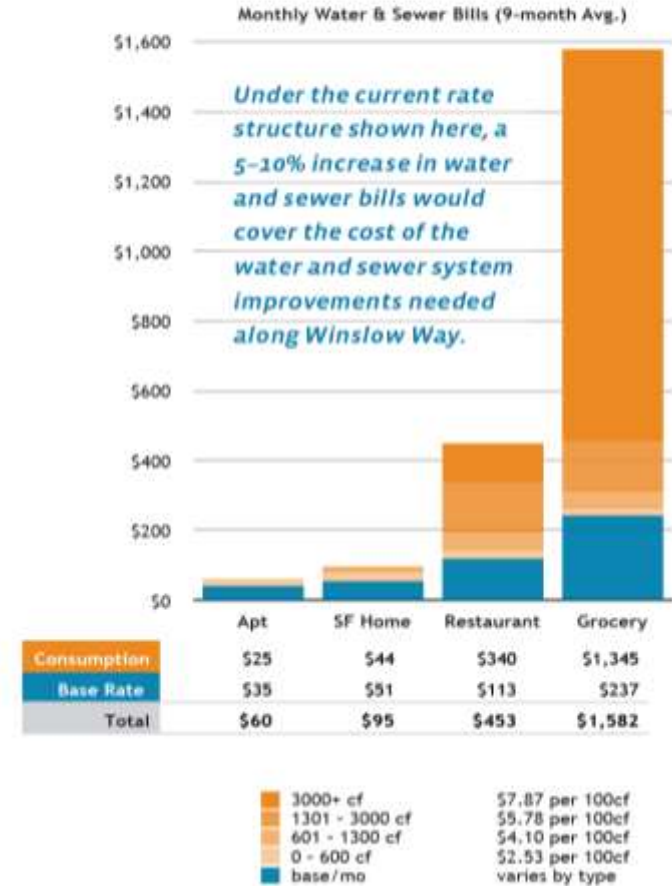
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Identify Service Areas



Conduct Rate Study (2008)

Determine the most equitable mechanism to allocate costs among individual rate payers.
 2,347 water customers • 1,823 sewer customers
 9,286 storm water customers



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LID (sewer):	\$1,000,000
Water Utility:	\$750,000
Sewer Utility:	\$0
SSWM Utility:	\$30,000
General Fund:	\$0
State Grant (trans, storm):	\$2,208,206
Federal Grant (trans, storm):	\$1,673,000
<u>WSDOT</u>	<u>\$50,000</u>
	\$5,711,206

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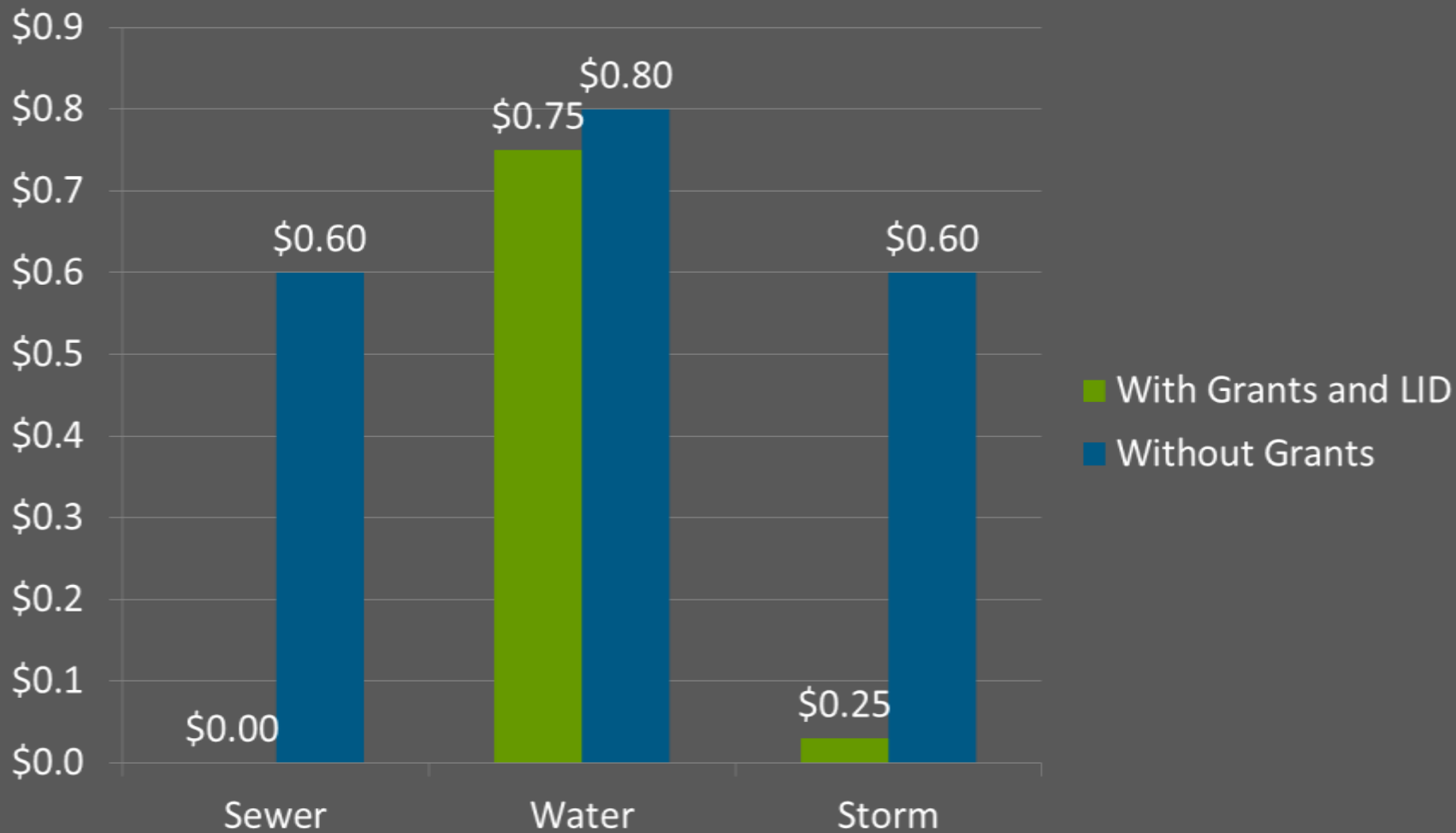
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7 new council members

1 change in the form of government

5 city managers

1 ratepayer lawsuit

7 new department heads

30 % downsizing of staff

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Stacey Eriksen

Urban Watershed Revitalization Coordinator
USEPA Region 8

Underwood Family Sonoran Landscape Laboratory
Ten Eyck Landscape Architects, Inc.



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Green Infrastructure in the Semi-Arid West

New Partners for Smart Growth Conference
February 15, 2014

Stacey Eriksen
Urban Watershed
Revitalization Coordinator
Eriksen.Stacey@epa.gov
303-312-6692

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EPA Voluntary Programs

- Urban Waters Partnership
- Partnership for Sustainable Communities
- Green Infrastructure
- Water Sense
- Brownfields
- Revitalization
- Support for FEMA



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Improving the Approach to Stormwater Management

Traditional approach - convey stormwater quickly from site to waterbody or detention ponds

Approach is not adequately controlling water quality & quantity impacts from discharges from increased development: pollutant loading, stream erosion, increased runoff/reduced infiltration, changes to stream geomorphology & impacts to aquatic habitat

New approach - using Low Impact Development / Green Infrastructure

- View stormwater as a resource
- Manage stormwater on-site
- Reduce pollutant loads to waterbodies



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Cost of Green vs Grey Infrastructure



Denver Housing Authority

- Rain gardens & pervious pavements in their Park Ave development.
- Decreased stormwater infrastructure costs from \$850K (vault) to \$350K (bioswales & permeable pavements).
- Estimates that they will save \$3M at it's Mariposa site using LID/GI rather than grey infrastructure.

Communities will spend 2-3 times more total to implement stormwater BMPs if each land owner goes it alone than if community pooled money & installed BMPs in optimal locations

<http://www.epa.gov/ne/topics/water/pdfs/OptimalSWMngtPlanAlternativesUpperCharlesPilotStudy.pdf>

Calculator <http://greenvalues.cnt.org/>

Use a systems thinking approach to calculate complete costs & benefits.

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Barriers to GI in the Semi-Arid West

- Perceived design, construction & maintenance costs
- Mixed messages & lack of connections from different governmental agencies & departments
- Misperception on economics
- Lack of integration into regional & site planning
- Lack of trust in new technologies



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Websites & Tools

- Western examples (CO, UT, MT, WY, ND, SD):
<http://www2.epa.gov/region8/green-infrastructure>
- Barriers analysis in Boulder area:
<http://www.keepitcleanpartnership.org/>
- UDFCD Volume 3 Criteria Manual
http://udfcd.org/downloads/down_critmanual_vollll.htm
- EPA National Green Infrastructure webpage
<http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm>
- New national stormwater calculator
<http://www.epa.gov/nrmrl/wswrd/wq/models/swc/>
- Green infrastructure tools
<http://water.epa.gov/infrastructure/greeninfrastructure/>
- Colorado Stormwater Center
<http://stormwatercenter.colostate.edu>



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UWP Green Infrastructure Projects Using EPA Funding

- DHA GI design charette
- Westerly Creek GI design
- ULC GI design for 38th & Blake
- S. Platte Brownfields corridor planning
- River North GI design
- Sun Valley & Johnson/Habitat Park GI design
- Dry Gulch GI Design



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Lessons Learned: Stormwater/GI Charette-DHA

- Look beyond project boundaries to ensure a comprehensive approach & solution
- Identify all key stakeholders & stormwater plans before developing a regional solution
- Identify priorities & tradeoffs between water quantity & water quality solutions
- Define clear goals & metrics of success
- Collaboration & prioritization among city players is crucial for the successful implementation of solutions
- Innovative solutions may require research & testing
- City policies may limit the implementation & effectiveness of some stormwater strategies

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Denver Housing Authority, Park Avenue Development

Conceptual Green Infrastructure Design for the Blake Street Transit-Oriented Development Site, City of Denver

JUNE 14, 2013

EPA EP-C-11-009

Leveraging Resources & Partnerships: GI Technical Assistance Program

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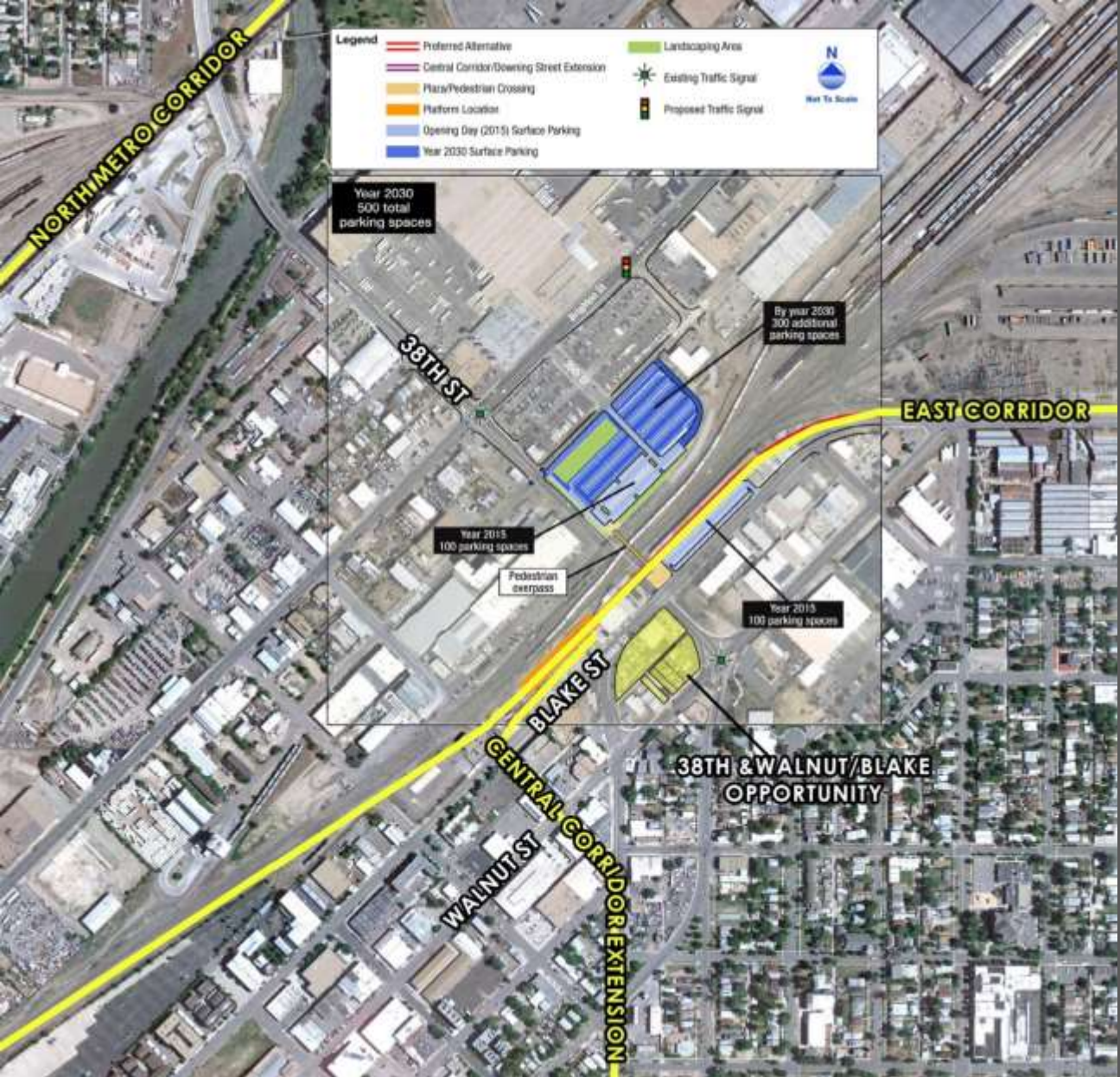
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Blake TOD:
 Located at the
 Intersection of
 2 transit lines

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Blake TOD: Before



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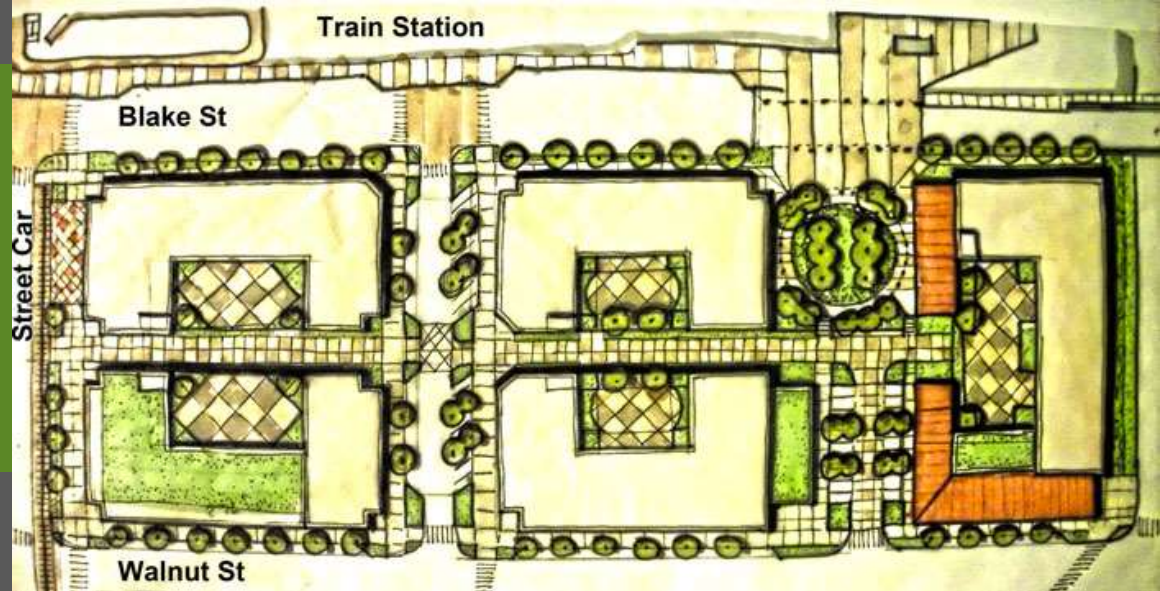


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A Broader Area Vision in 3 Phases



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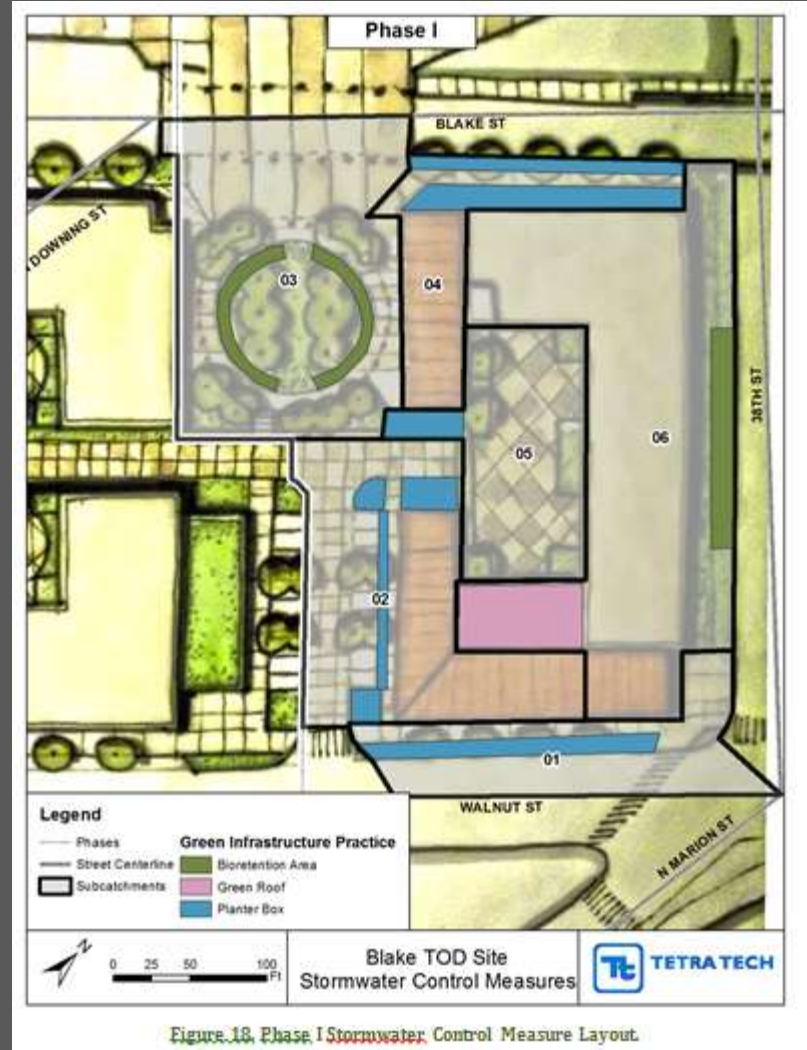
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Analyzing the Site

Designing to the Site



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Toolbox Examples



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Phase I Subcatchment Delineations & Runoff Volumes

Subcatchment	Subcatchment Drainage Area (sq ft)	C _{composite}	Required Storage Volume for 1-year, 2-hour Storm (cu ft)	Required Storage Volume for 100-year, 2-hour Storm (cu ft)
01	7,990	0.90	610	1,790
02	13,650	0.85	990	2,880
03	18,900	0.66	1,070	3,120
04	7,170	0.85	520	1,510
05	8,000	0.85	580	1,680
06	25,000	0.66	1,400	4,080

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Phase I Green Infrastructure Practice Proposed Location & Sizing

Subcatchment	Green Infrastructure Practice Type	Location	Width (ft)	Length (ft)	Surface Area (sq ft)	Available Water Storage Volume (cu ft)	Overflow Volume to Under-ground Detention (cu ft)
01	Planter Box ¹	Sidewalk	4.5	189	851	1,800	0
02	Planter Box	Sidewalk	5	95	452 212 264 475	2,896	0
03	Bioretention	Perimeter of circular park	11	261	2,871	3,184	0
04	Planter Box	Sidewalk	4.5 4.5	81 81	729	1,543	0
05	Planter Box	Adjacent to driveway	16	50.4	806	1,707	0
06	Green Roof ² , Bioretention	Open area behind building	17	167	2,839	4,081	0
Total					9,499	15,211	0

¹ If curbside parking is allowed on this block, pedestrian “bridges” will be needed to cross from the curbside parking to the sidewalk.

²Subcatchment 06 is partially treated by a green roof draining to the bioretention area.

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Operations & Maintenance Considerations

- Monitor infiltration & drainage
- Pruning & mowing
- Mulching and mulch removal
- Watering and fertilization
- Remove and replace dead plants
- Inlet, outlet, and underdrain inspections
- Miscellaneous upkeep
- All at different frequencies



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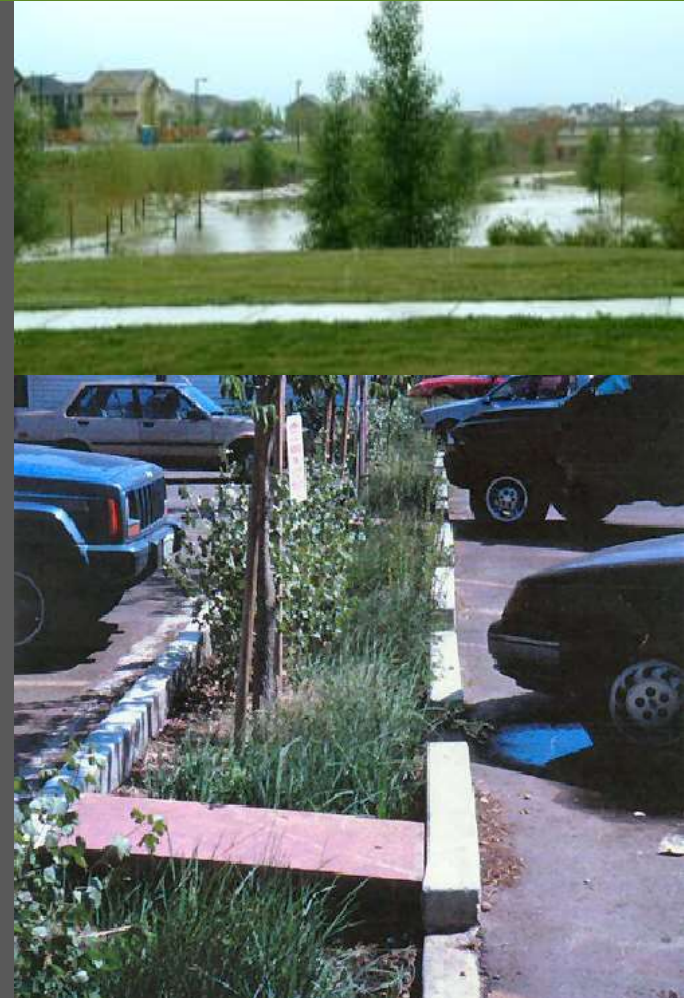
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Lessons Learned from ULC Design & Charrette

- Comprehensive gathering of local stakeholders leads to a better more implementable design.
- Holistic approach with GI incorporated into the site design improved design & saves money.
- Considering possible future phases led to a better design and made efficient use of resources.
- Environmental conditions affect GI options.
- Cost estimates make incorporating recommendations more likely.



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Thank You!

Reduce Runoff - Slow it Down, Spread it Out, Soak it in



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Glacier Club, Durango, Colorado
Design Workshop

Tamara Mittman

Environmental Engineer,
US EPA Office of Wastewater Management



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EPA's Green Infrastructure Program

GOAL: To support the use of green infrastructure to manage stormwater, protect public health and the environment, and enhance community livability.

FOCUS AREAS:

- Federal coordination
- Clean Water Act regulatory support
- Research and information exchange
- Funding and financing
- Partnerships and capacity building

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EPA's Smart Growth Program

GOAL: To help communities grow in ways that expand economic opportunity, protect public health and the environment, and create and enhance the places that people love.

FOCUS AREAS:

- Research
- Tools
- Partnerships
- Case studies
- Grants and technical assistance

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Capacity Building

- Technical Assistance Programs
- Funding Sources
- Green Infrastructure Partners
- Campus RainWorks



Mount Tabor Middle School Rain Garden
Kevin Robert Perry, ASLA

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Green Infrastructure Technical Assistance Program

- Since 2012, EPA's Office of Water has provided more than \$1.7 million in direct assistance to local communities
- Goal is to build capacity to implement green infrastructure and share lessons learned
- Projects are identified through a Request for Letters of Interest posted on the Green Infrastructure website (www.epa.gov/greeninfrastructure)
- Selected projects have included code and ordinance reviews, cost benefit analyses, and development of green infrastructure designs

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Community Summit on Green Infrastructure

- In October 2013 EPA and Onondaga County, NY hosted a summit for EPA's green infrastructure technical assistance communities
- 27 communities gathered to share their experiences implementing green infrastructure
- Best management practices identified at the Summit will be compiled into a recommendations report



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Building Blocks for Sustainable Communities

- Since 2011, EPA's Office of Policy has provided assistance to 131 communities
- Assistance consists of one- to two-day workshops to stimulate discussion about growth and development and build local capacity to implement sustainable approaches
- Workshops that address green infrastructure include:
 - Creating a green streets strategy
 - Land use strategies to protect water quality
 - Sustainable land use code audit

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Greening America's Capitals

- Since 2010, EPA's Office of Policy has provided assistance to 18 capital cities
- Goal is to help state capitals develop an implementable vision of environmentally friendly neighborhoods that incorporate innovative green infrastructure strategies
- Projects are identified through a Request for Letters of Interest posted on the Smart Growth website (www.epa.gov/dced/)
- Outcomes of design assistance as well as lessons learned are posted on the Smart Growth website

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Smart Growth Implementation Assistance

- Since 2005, EPA's Office of Policy has provided direct technical assistance to 34 communities
- Assistance addresses either policy analysis (e.g., reviewing state and local codes, school siting guidelines, transportation policies) or public participatory processes (e.g., visioning, design workshops, alternative analysis, build-out analysis)
- Projects are identified through a Request for Letters of Interest posted on the Smart Growth website (www.epa.gov/dced/)
- Final reports are also posted on the Smart Growth website

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Clean Water State Revolving Fund

- The CWSRF program is available to fund a wide variety of water quality projects including all types of nonpoint source, watershed protection or restoration, and estuary management projects
- Since 2009, the Green Project Reserve, or GPR, has required all CWSRF programs to direct a portion of their capitalization grant toward projects that address green infrastructure, water efficiency, energy efficiency, or other environmentally innovative activities.
- To date the GPR has provided \$2 billion in loans, including \$400 million for green infrastructure projects

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Section 319 Nonpoint Source Grants

- Under Section 319 of the CWA, EPA provides grants to states, territories and tribes to implement projects or programs that will help to reduce nonpoint sources of pollution
- In accordance with guidance issued by EPA, Section 319(h) funding decisions are made by the states. States submit their proposed funding plans to EPA. If a state's funding plan is consistent with grant eligibility requirements and procedures, EPA then awards the funds to the state
- Total grant funding in 2013 was \$155.9 million

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Urban Waters Small Grants

- The goal of the Urban Waters Small Grants program is to fund local projects that will advance the restoration of urban waters while supporting community revitalization and other local priorities
- Through the 2011/2012 competition, the program funded 55 projects in 36 states and Puerto Rico. Organizations received grants of \$30,000-\$60,000 for a total of \$3.2 million
- Through the 2012/2013 competition, the program will award approximately \$1.6 million in grants of \$40,000 - \$60,000 each

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Brownfields Grants

- EPA's Brownfields Program provides direct funding for brownfields assessment, cleanup, revolving loans, and environmental job training
- Green infrastructure can be integrated into the reuse of brownfields properties to promote sustainable stormwater management as well as revitalization



Implementing Stormwater Infiltration Practices at Vacant Parcels and Brownfield Sites

U.S. Environmental Protection Agency
Office of Water
Office of Solid Waste and Emergency Response

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Catalog of Federal Funding Sources for Watershed Protection

A searchable database of financial assistance sources (grants, loans, cost-sharing) available to fund a variety of watershed protection projects.

Type of Assistance:
Grants
Loans

Eligible Organization:
Business
Clubs and Organizations
Community/Watershed Group

Match Required:
Yes
No
Case-dependant

Agency:
Economic Development Administration
Federal Emergency Management Agency
National Fish and Wildlife Foundation

Additional Keyword Search:

Keywords:
Agriculture
Air Quality/Deposition
Best Management Practices
Biodiversity
Carbon Sequestration
Climate Change
Coastal Waters
Community
Competitive Grant
Dam Rehabilitation
Dam Rehabilitation
Drinking Water
Economic Development
Enforcement/Compliance
Fisheries
Floodplains/Riparian Zones
Forests
Green Infrastructure/LID
Ground Water
Habitat
Integrated Pest Management
Invasive Species
Land Acquisition
Marine Debris

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Green Infrastructure Partners

- EPA collaborates with 7 partner organizations to promote green infrastructure as an environmentally preferable approach to stormwater management
 - American Rivers
 - Association of Clean Water Administrators
 - Low Impact Development Center
 - National Association of Clean Water Agencies
 - Natural Resources Defense Council
 - Water Environment Federation
 - US Water Alliance

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Green Infrastructure Partners

Recent publications/tools prepared by our partners include:

- The Green Edge: How Commercial Property Investment in Green Infrastructure Creates Value (NRDC, 2013)
- Hosting a Low Impact Development Design Competition (WEF, 2013)
- The Economic Benefits of Green Infrastructure: A Case Study of Lancaster, PA (CNT and American Rivers, 2014)



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Campus RainWorks Challenge

- EPA's Office of Water conducts an annual green infrastructure design contest for college and university students
- Goals are to engage students in assessing the technical and economic potential of green infrastructure, to provide a hands-on learning experience, and to promote the use of green infrastructure on campuses
- Since 2012, more than 300 student teams have submitted green infrastructure designs
- Contest rules and winners are posted on the Campus RainWorks website (www.epa.gov/campusrainworks)



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Green Infrastructure Tools

- EPA National Stormwater Calculator
- EPA Water Quality Scorecard
- USFS i-Tree
- CNT The Value of Green Infrastructure



Arizona State University Polytechnic Campus — New Academic Complex
Ten Eyck Landscape Architects, Inc.

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National Stormwater Calculator

- In July of 2013, EPA released the National SW Calculator
- Goal is to assist development and design community in estimating runoff from a site given different land cover and BMP scenarios
- The National SW Calculator is a SWMM-based modeling tool that automatically accesses national soil and meteorological databases and calculates rainfall and runoff statistics for a site
- The green infrastructure controls that can be modeled include: downspout disconnection, rain gardens, planter boxes, infiltration trenches, green roofs, and permeable pavement
- A climate change module will be released in 2014

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Water Quality Scorecard

- Released October, 2009
- Developed by EPA's Smart Growth Program and EPA's Office of Water with more than 11 external reviewers
- An auditing tool to
 - Assess local ordinances, codes, plans, and programs through the lens of water quality management
 - Guide municipal staff in adapting diverse policies and programs to consistently support green infrastructure

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i-Tree

- Released in August 2006
- A software suite that helps communities to strengthen their urban forest management efforts by quantifying the structure of community trees and the environmental services that trees provide
 - i-Tree Eco quantifies urban forest structure, environmental effects, and value to communities
 - i-Tree Streets assesses street tree populations
 - i-Tree Hydro assesses hydrological impact of vegetation and impervious cover on a watershed scale



The Value of Green Infrastructure

- Guide produced by the Center for Neighborhood Technology and American Rivers
- Provides a generalized methodology for valuing the multiple benefits of green infrastructure
- Compiles extensive research on the benefits of five green infrastructure practices in eight benefit categories: Water, Energy, Air Quality, Climate Change, Urban Heat Island, Community Livability, Habitat Improvement, Public Education

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Questions?



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