

Green City Clean Waters

PHILADELPHIA'S GREEN SOLUTION TO COMBINED SEWER OVERFLOWS



- 1) COMBINED SEWER
OVERFLOW PROBLEM**
- 2) GREEN SOLUTION
- 3) CITY PARTNERS
- 4) EXTERNAL PARTNERS
- 5) RESULTS



Streams Of Philadelphia Before 1700



Streams Of Philadelphia

Current Environment

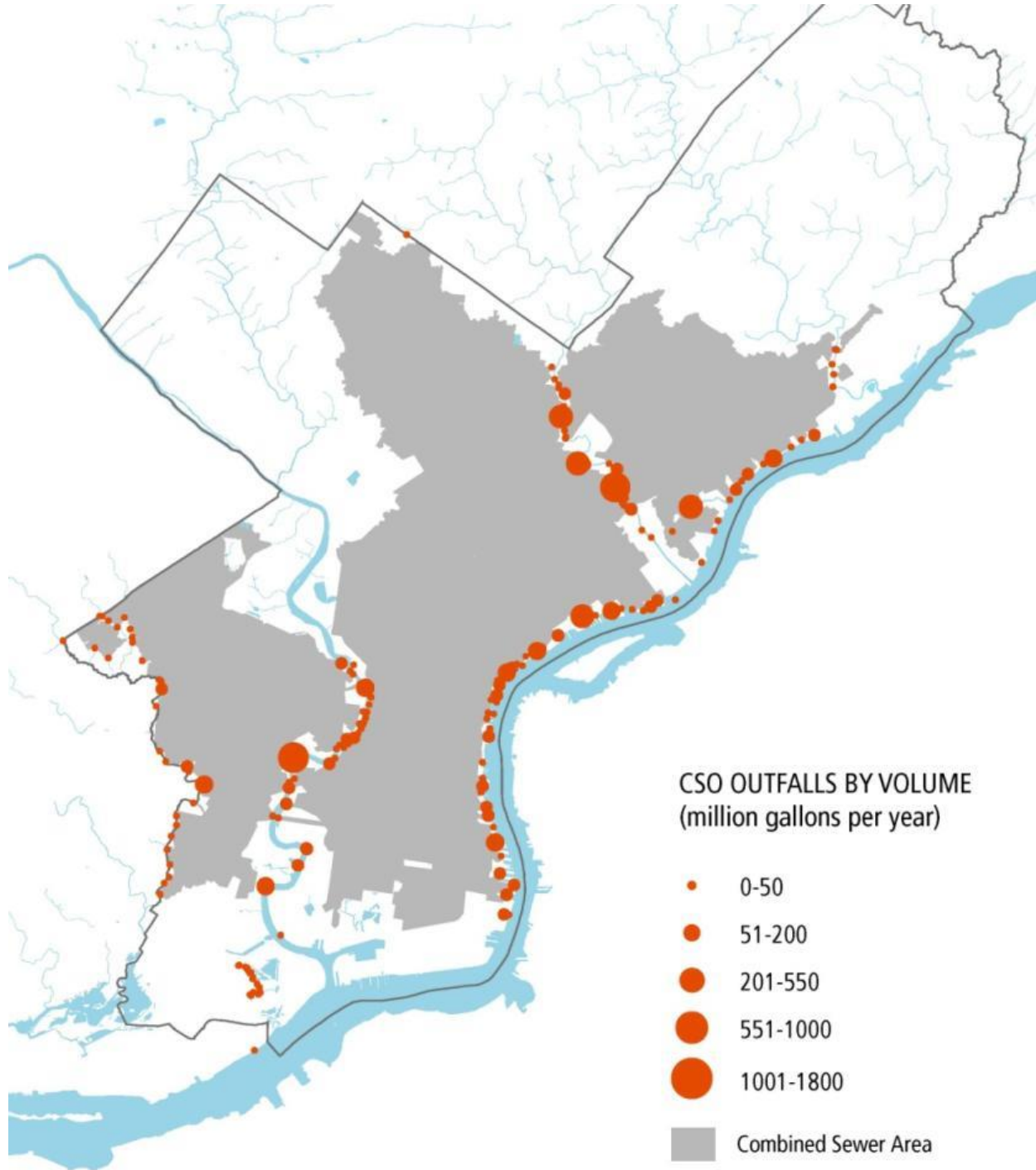


Streams Of Philadelphia Current (showing Main Sewers)

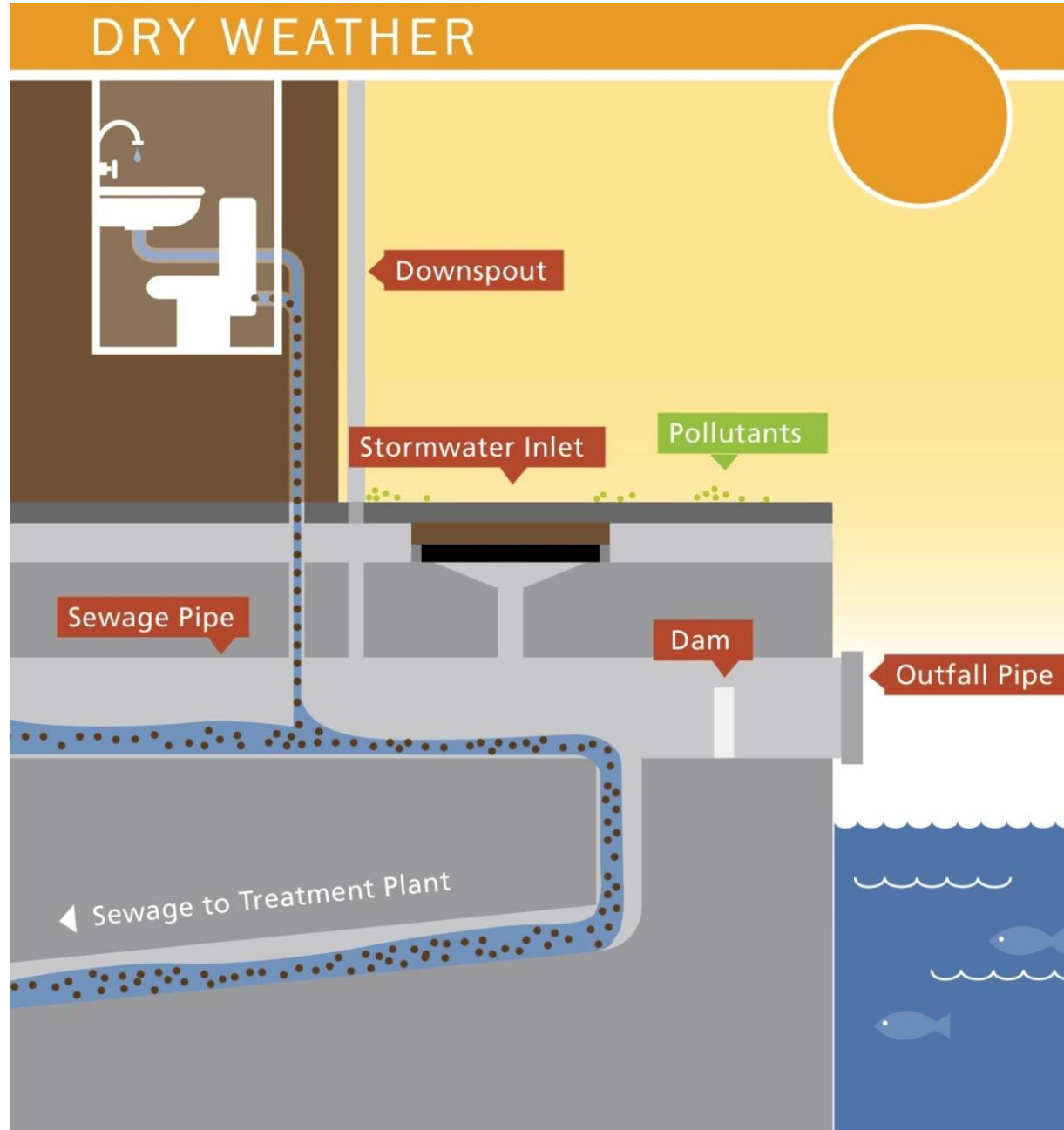


City Sewer System

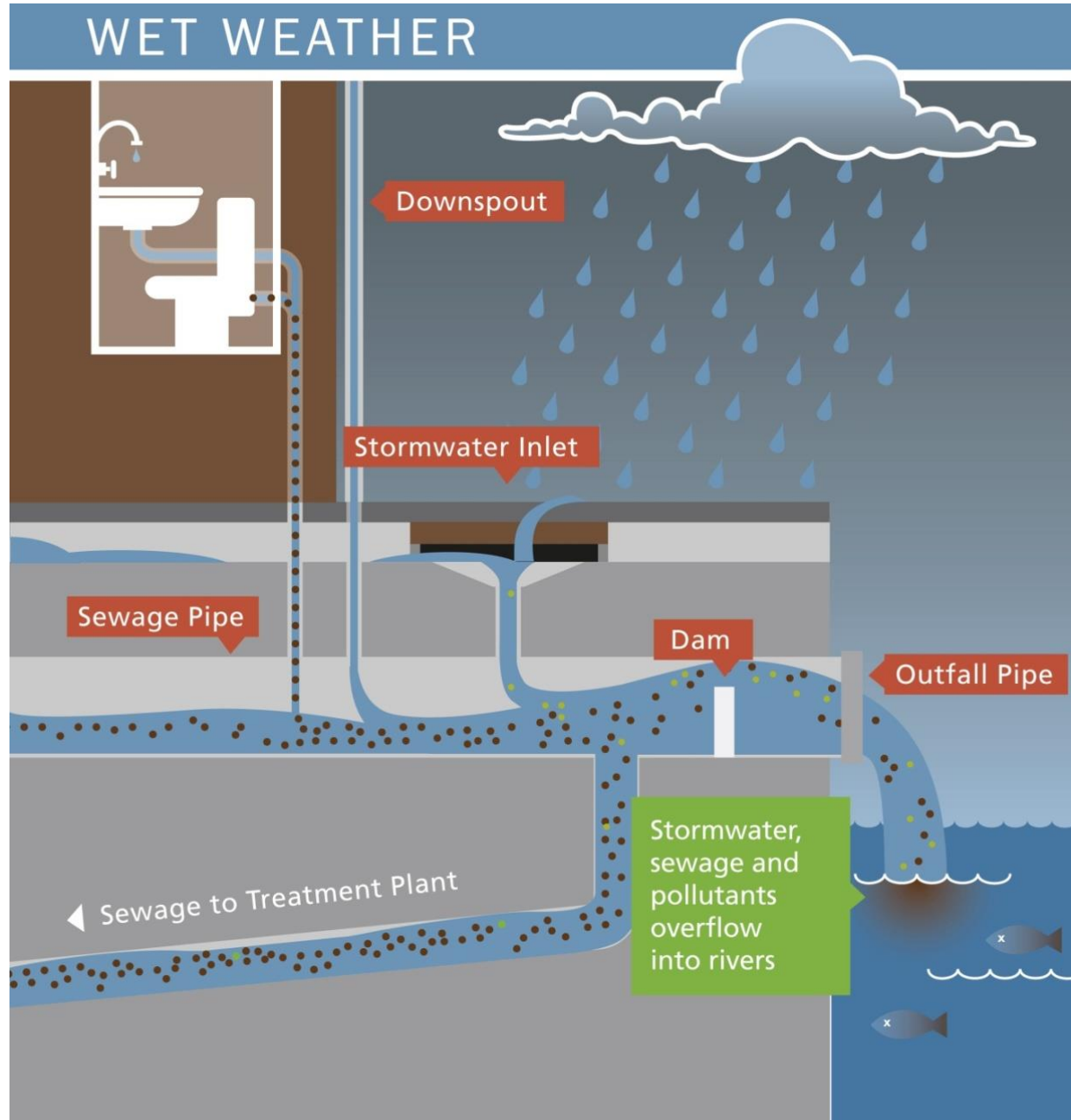
- 3000 miles of pipes
- 8 inches to 24 feet in diameter
- 2/3 Combined sewers
- Three sewage treatment plants



HOW COMBINED SEWER SYSTEMS WORK...AND SOMETIMES DON'T



HOW COMBINED SEWER SYSTEMS WORK...AND SOMETIMES DON'T



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GOAL: MANY GREEN SYSTEMS RATHER THAN COSTLY GREY SYSTEM



\$9 Billion Tank and Tunnel



\$2.4 Billion Green Approach

GOAL: MEET STATE AND FEDERAL COMPLIANCE

2009 Long Term Control Plan Update

2011 Consent Order & Agreement

- Clean Water Act
- Enacted by PA Dept of Environmental Protection (DEP)
- Reduce Combined Sewer Overflow pollution by 85%
- 25 year program
- Manage stormwater from 34% of impervious surface citywide
- Evaluation Plans every 5 years



Howard Neukrug (clockwise from left), city water commissioner; U.S. Rep. Allyson Y. Schwartz; Rina Cutler, deputy mayor for transportation; Lisa Jackson, EPA administrator; and Mayor Nutter join in the official approval of "Green City, Clean Waters." MICHAEL S. WIRTZ / Staff Photographer

Green City Clean Waters

The City of Philadelphia's Program for Combined Sewer Overflow Control
A Long Term Control Plan Update

Submitted by the Philadelphia Water Department
September 1, 2009



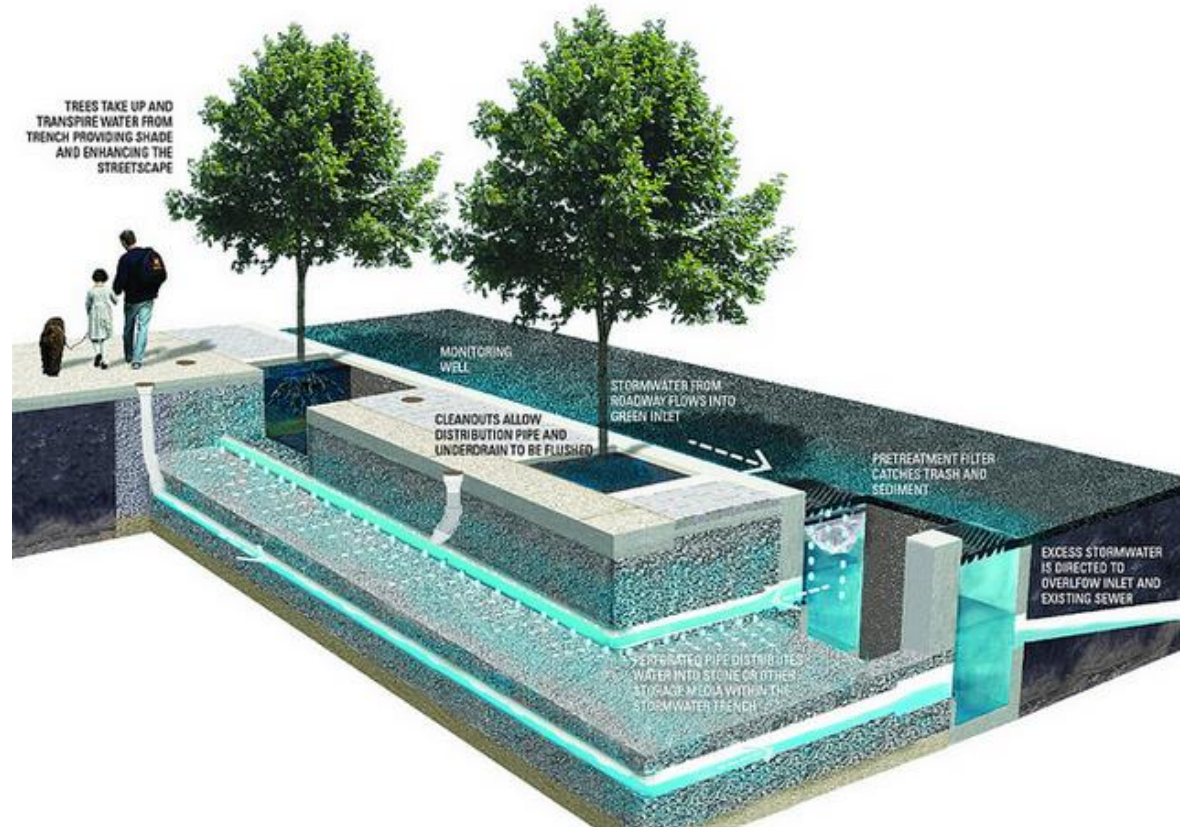
Philadelphia's 25-year Green Stormwater Infrastructure program

- ✓ Manage stormwater in the most cost-effective manner
- ✓ Use our massive infrastructure investments to beautify communities and increase green space
- ✓ Develop green infrastructure citywide
- ✓ Mandate stormwater management of new development and redevelopment
- ✓ Upgrade treatment plants

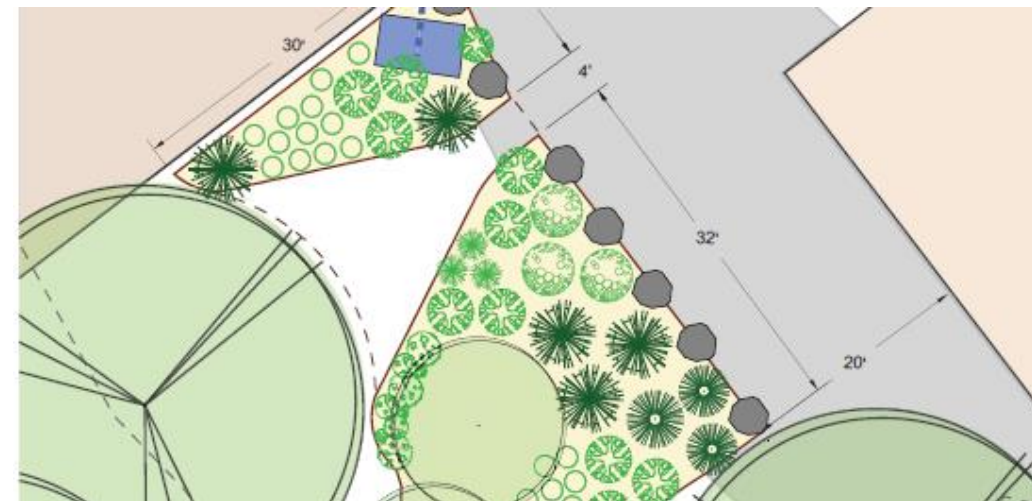
GOAL: DEVELOP GREEN INFRASTRUCTURE CITYWIDE

Green Stormwater Infrastructure:

- ✓ Capture stormwater from city streets and surfaces
- ✓ Detention area below ground
- ✓ Water filters through soil and back into groundwater aquifers
- ✓ Evapotranspiration through vegetation, plants
- ✓ Overflow to the City stormwater sewer
- ✓ Maximize stormwater management

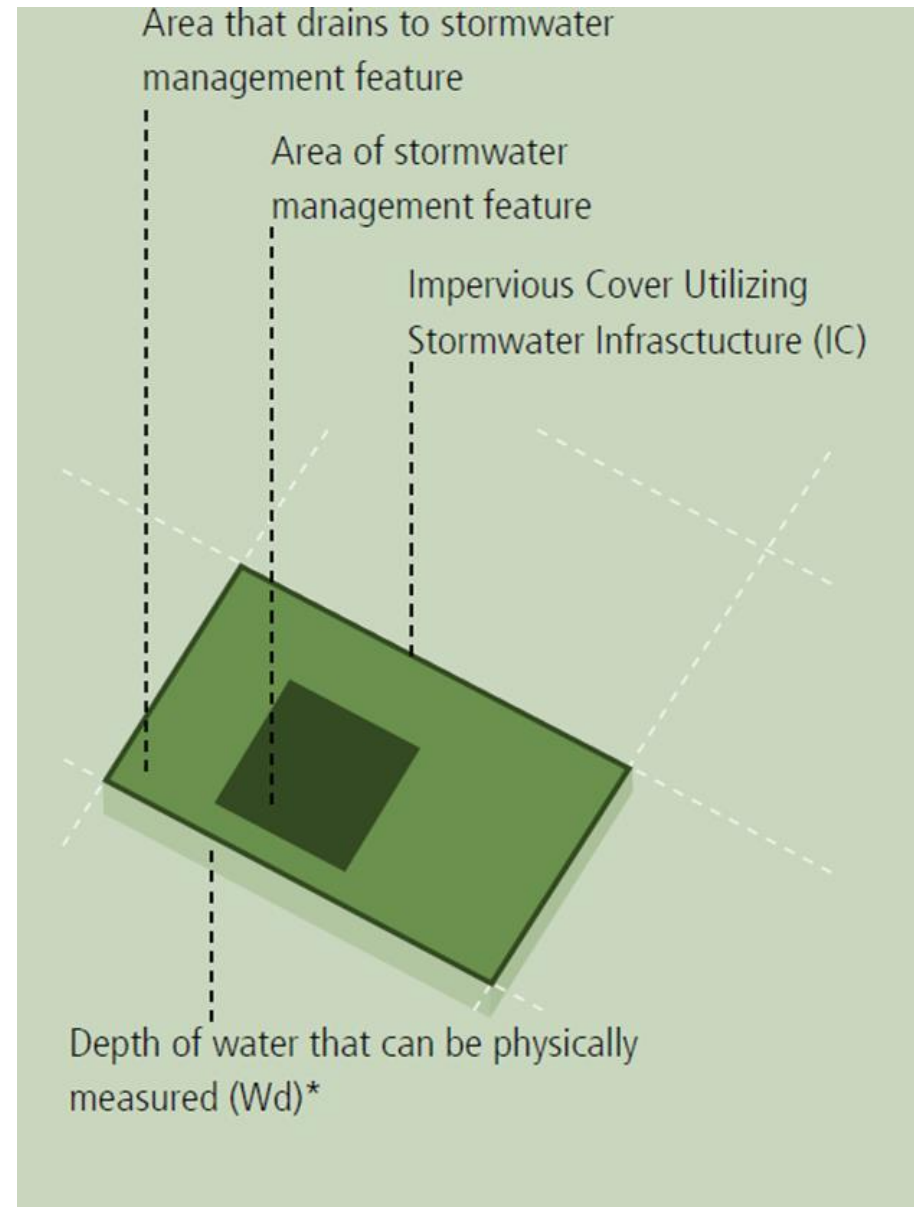


WHAT IS GREEN STORMWATER INFRASTRUCTURE?



What Is a Greened Acre?

- An acre of impervious surface for which the stormwater is managed up to 1 inch by a green practice
- **1 Greened Acre** prevents stormwater from one acre-inch of stormwater or **27,158 gallons** from entering the combined sewer system



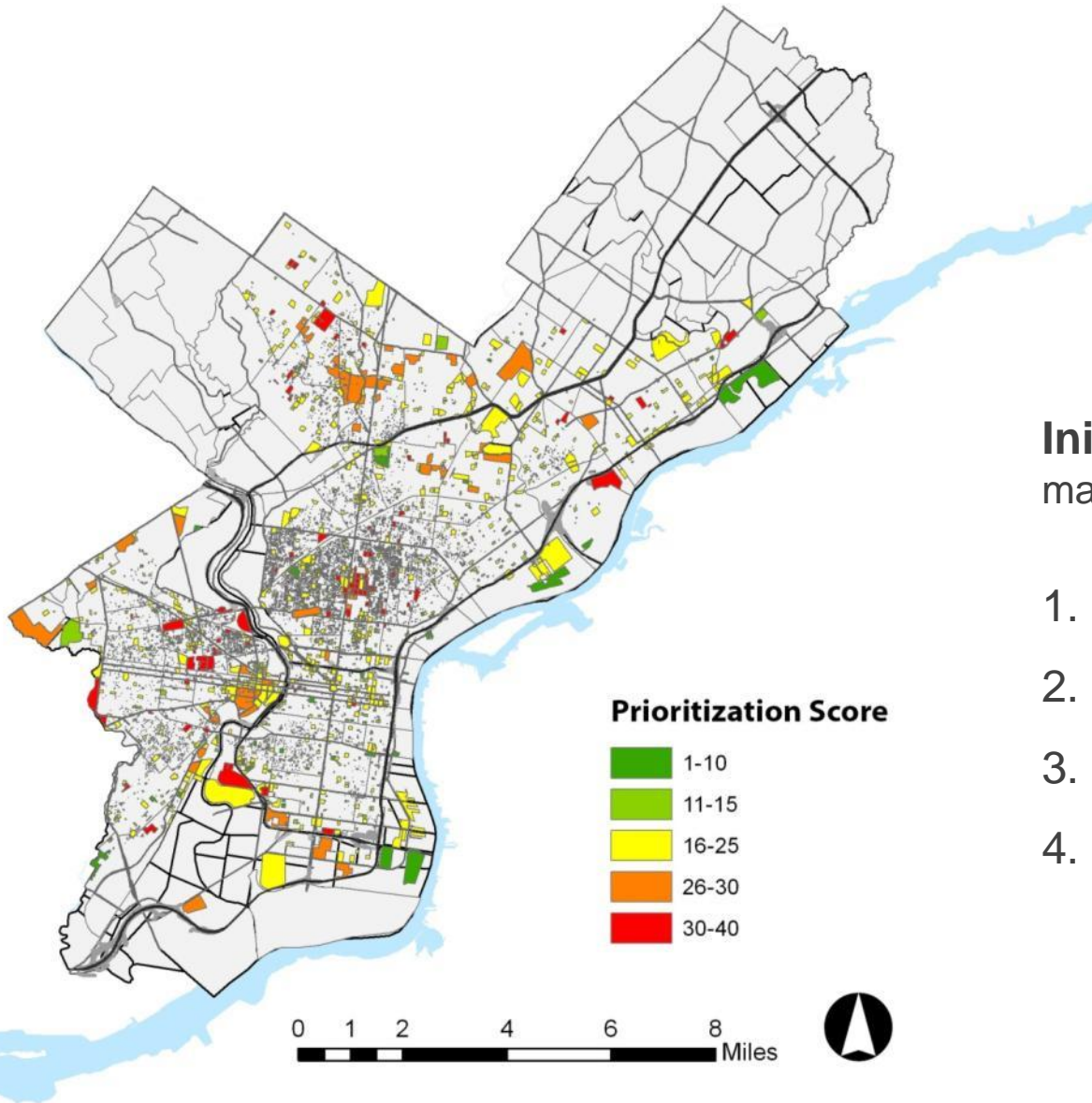
Green Stormwater Goals: 25-Year Implementation of Green City, Clean Waters

Metric	Units	Cumulative amount as of Year 25 (2036)
NE / SW / SE WPCP upgrade: Design & Construction	Percent complete	100%
Miles of interceptor lined	Miles	14.5
Overflow Reduction Volume	Million Gallons per year	7,960
Equivalent Mass Capture TSS / BOD / Fecal Coliform	Percent	85%
Total Greened Acres	Greened Acres	9,564

Green Stormwater Goals: 25-Year Implementation of Green City, Clean Waters

Year	Greened Acres	Square Miles	% impervious cover runoff removed
2016	750	1	3%
2021	2,100	3	8%
2026	3,800	6	14%
2031	6,400	10	23%
2036	9,600	15	34%

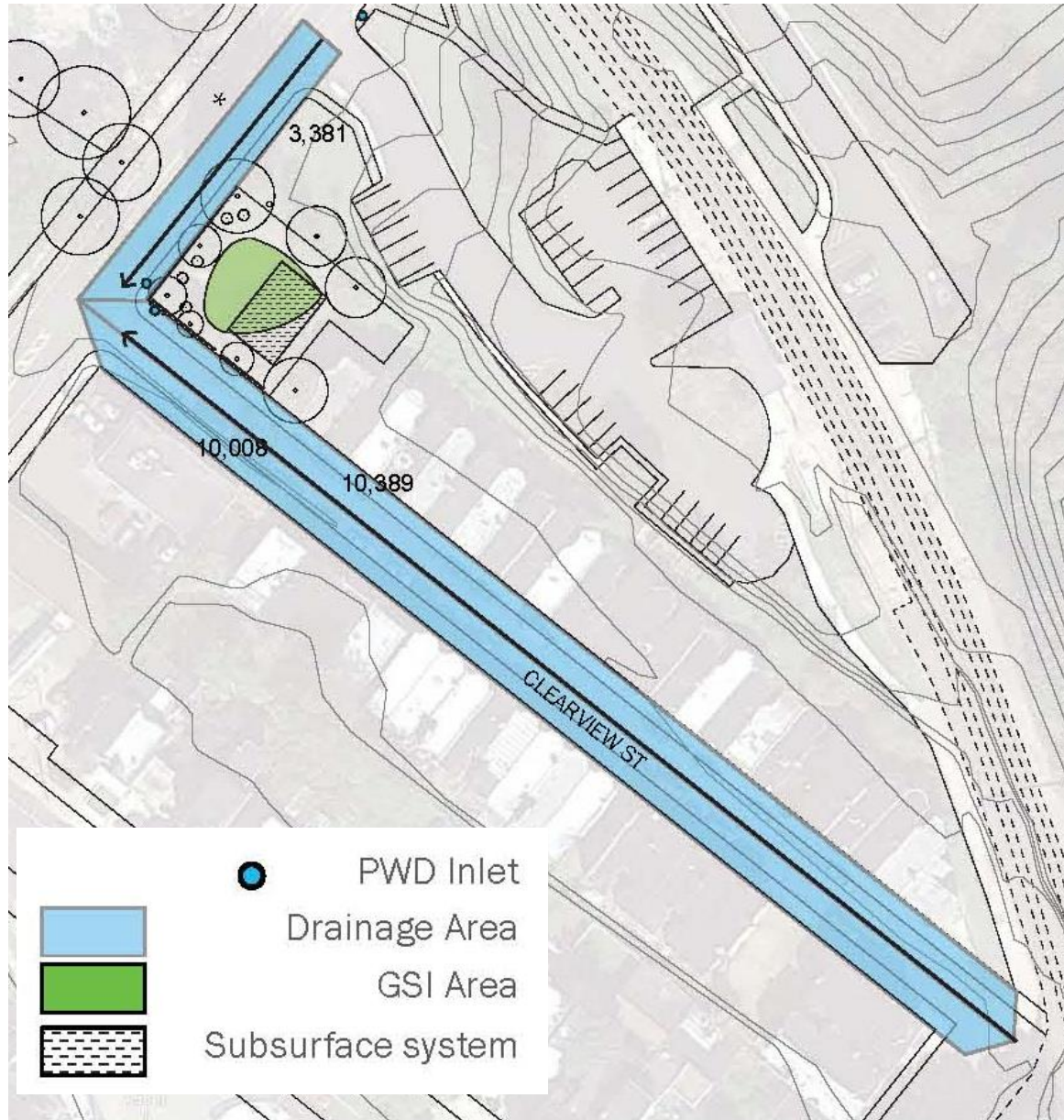
GREEN STORMWATER INFRASTRUCTURE PLANNING



Initial Prioritization Factors:
maximum score of 40

1. Parcel size
2. Proximity to a low point
3. Drainage area to low point
4. Proximity to a capital project

STORMWATER DRAINAGE ANALYSIS FOR GREEN INFRASTRUCTURE SITES



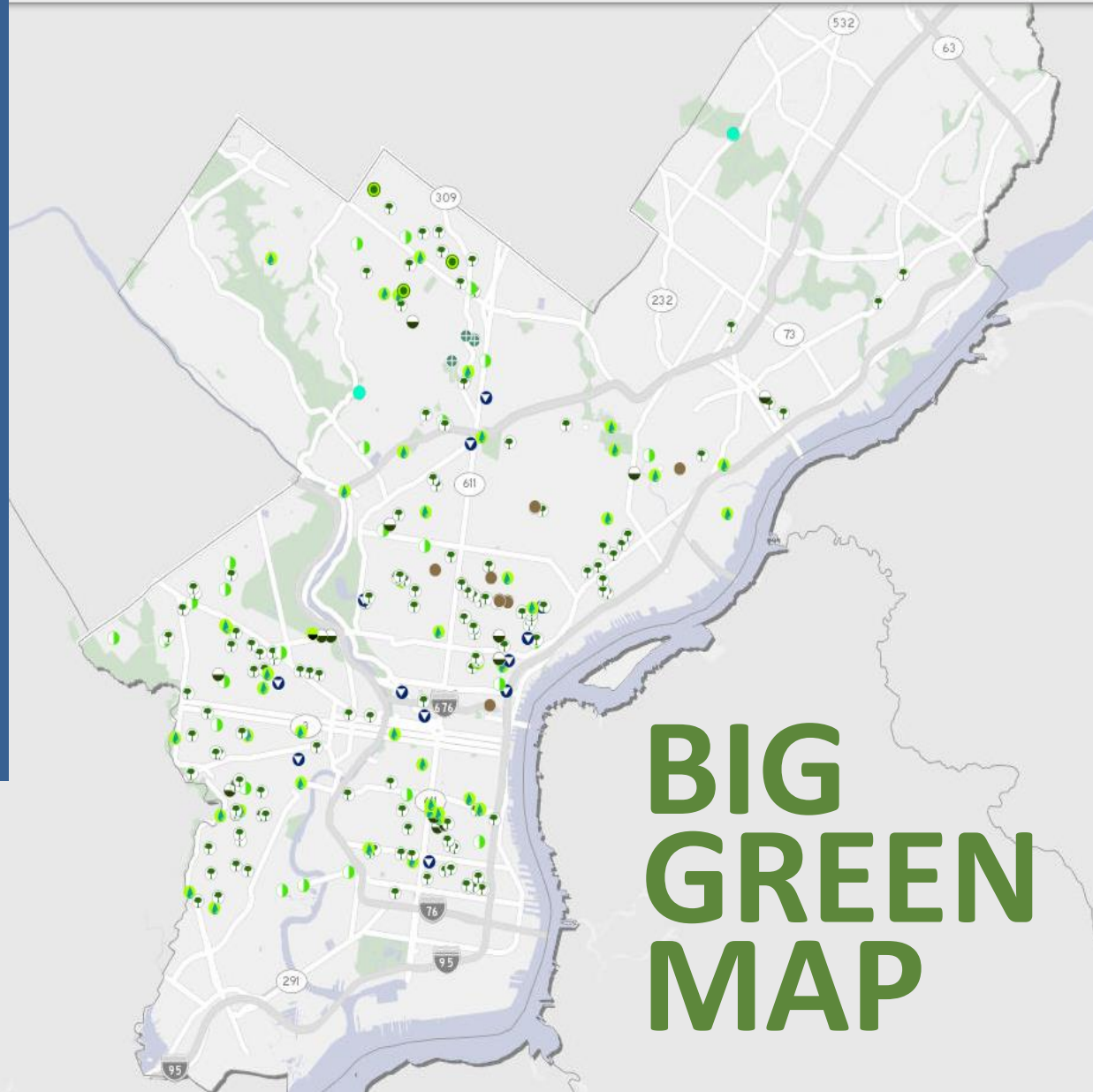
PHILADELPHIA'S GREEN CITY CLEAN WATERS PROGRAM: 2011-Present

- 342 Stormwater Tree Trenches
- 38 Stormwater Planters
- 45 Stormwater Bumpouts
- 101 Rain Gardens
- 5 Stormwater Basins
- 112 Infiltration/Storage Trenches
- 37 Porous Paving Projects
- 23 Swales
- 2 Stormwater Wetlands
- 33 Downspout planters

= 743 GSI Tools in Design,
Construction or Complete

115 Sites Complete

750 Greened Acres



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Green Streets:

- **125 Green Streets Complete**
- **175 Green Streets Underway**
- Tree trenches, stormwater planters, bumpouts, porous streets
- **Partners:** Streets Department, Commerce, PennDOT, SEPTA, PCPC
- **GOAL:** Incorporate Green Stormwater Infrastructure into all City transportation investments



CITY AGENCY PARTNERSHIPS: GREEN STREETS

Passyunk Avenue Lane Removal - 2014



CITY AGENCY PARTNERSHIPS: GREEN STREETS

58th St Greenway - 2014



CITY AGENCY PARTNERSHIPS: GREEN STREETS

Porous Streets & Parking Lots



CITY AGENCY PARTNERSHIPS: GREEN STREETS

American Street Reconstruction: 2016-2018



**\$5 MILLION TIGER GRANT
2016-2019**

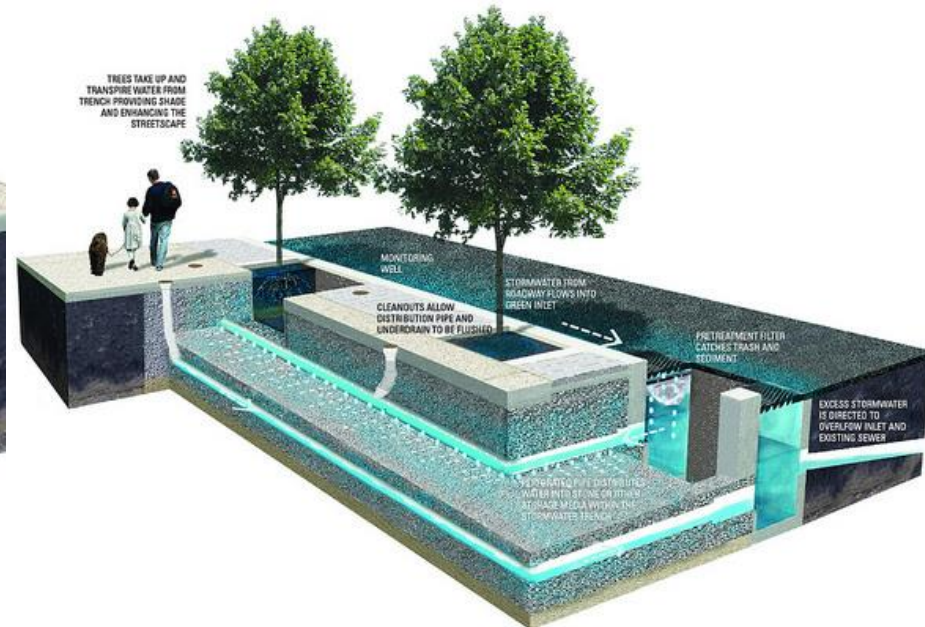
City of Philadelphia Green Streets Design Manual

2014

STORMWATER PLANTER



STORMWATER TREE TRENCH



CITY AGENCY PARTNERSHIPS: PARKS AND RECREATION LANDS

Parks:

- **12 Park Projects Complete**
- **40 Park Projects In Design**
- **City Partner:** Parks and Recreation, Dept Public Property
- **Non-Profit Partners:** Fairmount Park Conservancy, Pennsylvania Horticultural Society, Trust for Public Land
- **GOAL:** Maximize the benefits of green infrastructure within our citywide parks and recreation center system.



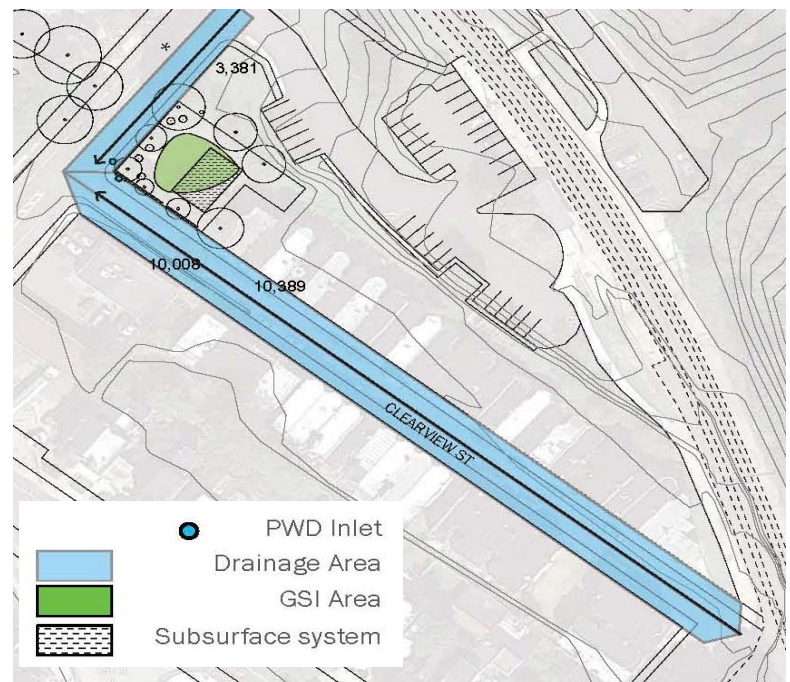
CITY AGENCY PARTNERSHIPS: PARKS AND RECREATION LANDS

Ralph Brooks Park – 2015



Vacant Lands:

- **3 Projects in Design**
- **~15 Projects in Planning**
- **City Partners:** City Council
Dept Public Property,
Redevelopment Authority,
Philadelphia Land Bank, Parks
and Recreation, PCPC
- **Non-Profit Partners:** PHS,
Neighborhood Gardens Trust,
NKCDC, APM and more
- **GOAL:** Develop green
infrastructure on vacant lands
prioritized for greening by
communities and Council



CITY AGENCY PARTNERSHIPS: VACANT LANDS

Trenton & Norris Triangle - 2014



City Facilities:

- **Successful Partnership Project:** Philadelphia Zoo
- **Partners:** Dept of Public Property, Art Museum, Philadelphia Free Library, Police Department, Fire Department, Prisons, Health Department
- **GOAL:** Incorporate green infrastructure into all major capital investments.



CITY AGENCY PARTNERSHIPS: CITY FACILITIES

Philadelphia Zoo – 2012-2014



Green Schoolyards:

- **8 Green Schools Complete**
- **50+ Schools** utilizing Urban Watershed Curriculum
- **5 Green STEM Schools**
- **Partners:** Philadelphia School District, Community Design Collaborative, Trust for Public Land, The Big Sandbox



CITY AGENCY PARTNERSHIPS: GREEN SCHOOLS

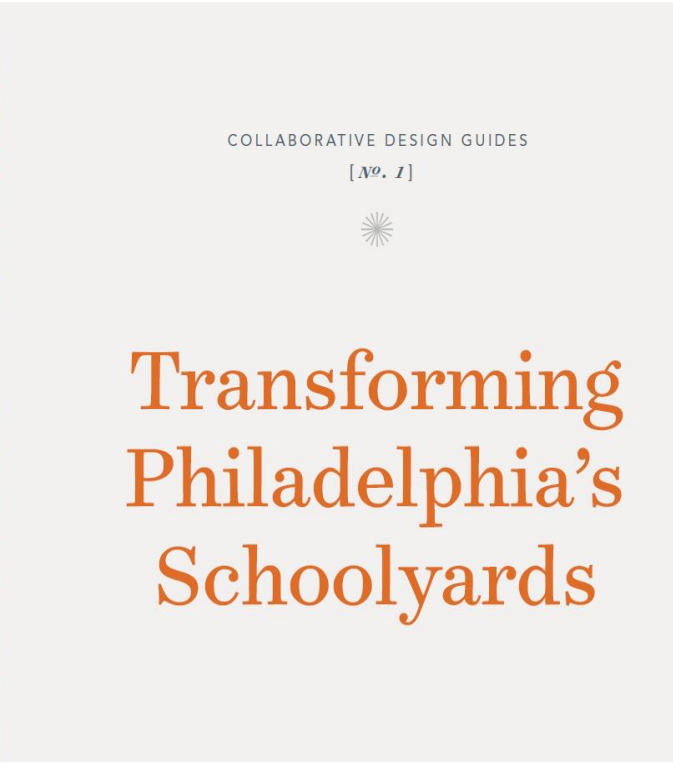
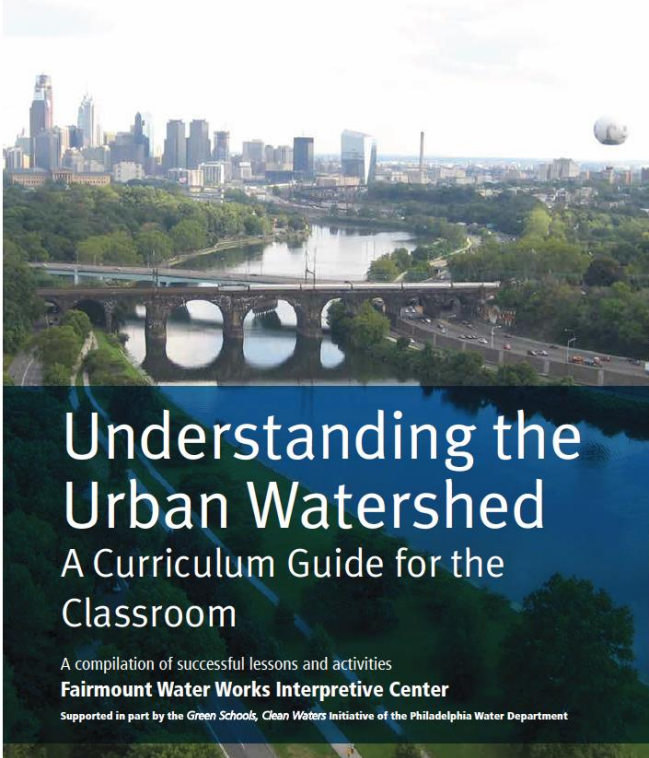
William Dick Elementary School – 2014



**TRUST FOR PUBLIC LAND GREEN SCHOOLS PARTNERSHIP
PHILADELPHIA SCHOOL DISTRICT
\$5 MILLION FOR GREEN SCHOOLS**

CITY AGENCY PARTNERSHIPS: GREEN SCHOOLS

Green Schools Curriculum and Guidebook



**FAIRMOUNT WATERWORKS
COMMUNITY DESIGN COLLABORATIVE
50+ Schools Using Urban Waters Curriculum
5 Green STEM Schools**

EAST CALLOWHILL Overlay District



**Additional height and density in exchange
for stormwater management**

EXTERNAL PARTNERSHIPS

- Temple, UPenn, Drexel
- Philadelphia Housing Authority
- Delaware River Waterfront Corporation
- SEPTA
- PECO, PGW
- Girard College
- Private Developers
- Homeowners
- Community Development Corporations



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PHILADELPHIA'S STORMWATER MANAGEMENT REGULATIONS

Stormwater Management Regulations:

- Regulations began **2006**
- **Earth Disturbance >15,000 sf** must manage all on-site runoff
- Green practices whenever feasible
- Water Quality; Channel Protection; Flood Control
- PWD has approved **>600** Stormwater Management plans controlling over **1.5 billion gallons** annually
- **JULY 1, 2015: REGULATION UPDATE:** Requires 1.5 inch management, slower drainage release rate, greater water quality treatment



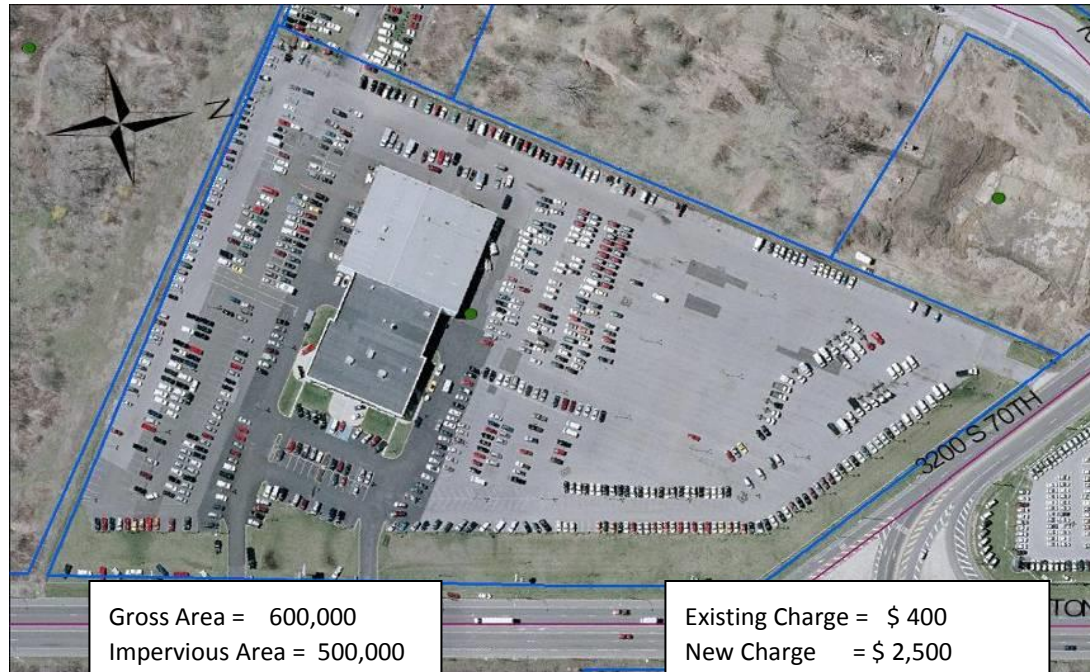
PHILADELPHIA'S PARCEL-BASED BILLING SYSTEM

- 2009
- **Revenue Neutral: Simply redistributes burden**
- Shift from a meter-based charge for stormwater to a parcel-based stormwater charge
- Stormwater Credits available for managing on-site stormwater



Gross Area = 24,000
Impervious Area = 24,000

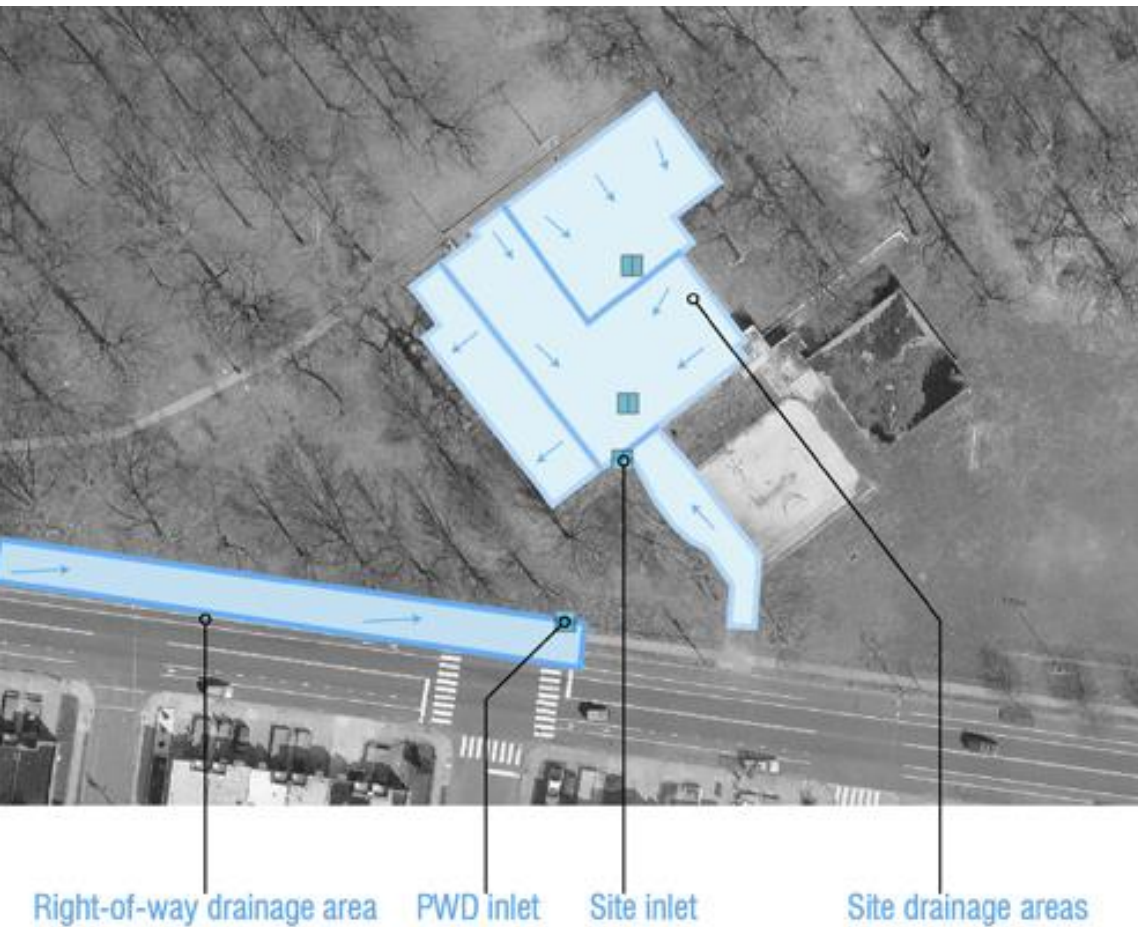
Existing Charge = \$ 4,700
New Charge = \$ 120



Gross Area = 600,000
Impervious Area = 500,000

Existing Charge = \$ 400
New Charge = \$ 2,500

STORMWATER MANAGEMENT IMPROVEMENTS PROGRAM



Private Retrofits: Stormwater Management Grant [SMIP]

37 Grants / \$14 million

- Began 2012
- Private non-residential customers
- Property owner must own and maintain
- Awards based on amount of greened acres achieved [stormwater management]
- Cost-efficient greened acres

Stormwater Management Incentive Program [SMIP] Grant

- Retrofit existing properties
- Competitive, rolling application
- Manage site runoff and street runoff on site
- **Funding:** <\$100k per acre of stormwater managed on site
- Requires **easement and maintenance agreement** for minimum of 45 years
- Receive **credits** on stormwater bill





Private Retrofits: Greened Acre Retrofit Program [GARP]

- Began July 2014
- Proposals of >10 Greened Acres
- Only within the Combined Sewer System
- Targets developers and investors rather than property owners
- Proposals will aggregate multiple sites as retrofit packages
- Cost-efficient greened acres

RESIDENTIAL STORMWATER MANAGEMENT SUBSIDY PROGRAM



- Yard Tree
- Rain garden
- Downspout planter
- Porous pavers
- De-paving



Soak It Up Community Maintenance Grant

- For 501(C)3 Community Organizations
- Adopt and maintain PWD green stormwater infrastructure systems in neighborhoods
- **Funding:** \$5,000 Soak It Up Adoption Grants



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GRANTS & LEVERAGED FUNDS

- \$10.8 MILLION STREETS
- \$3.3 MILLION SCHOOLS
- \$2.9 MILLION PARKS
- \$30 MILLION PUBLIC HOUSING
- \$2 MILLION GSI RESEARCH

➔ **\$49 MILLION TOTAL**



ECONOMIC IMPACT OF FIRST 5 YEARS

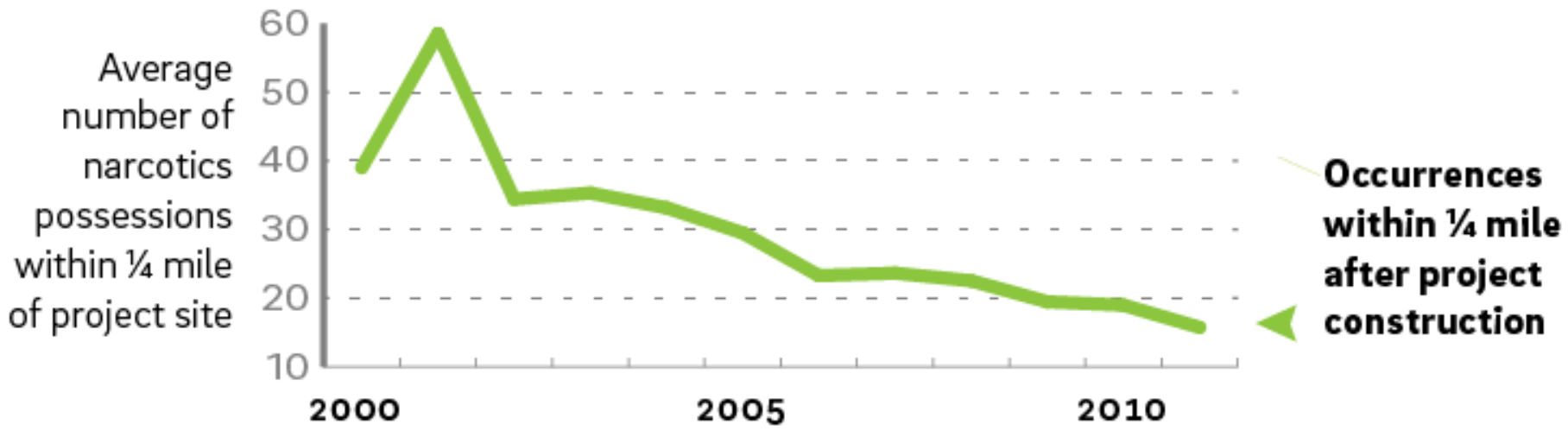
- **\$47 MILLION PWD INVESTMENT + \$60 MILLION PRIVATE**
- **\$1 MILLION LOCAL TAX REVENUE**
- **\$1.46 MILLION LOCAL GSI INDUSTRY**
- **14% INCREASE GSI INDUSTRY, 2013-14**
- **1,430 LOCAL JOBS EACH YEAR**



**GREEN STORMWATER
INFRASTRUCTURE
PARTNERS**
REIMAGINING STORMWATER



FACT: PHILADELPHIA WATER'S GREEN INFRASTRUCTURE PROJECTS (SUCH AS PLANTERS AND RAIN GARDENS) MAY SIGNIFICANTLY REDUCE CERTAIN CRIMES IN SURROUNDING AREAS OVER TIME.



Michelle Kondo
The Impact of Green Stormwater Infrastructure Installation on Surrounding Health and Safety
American Journal of Public Health
September, 2014

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**PHILADELPHIA
WATER**

EST. 1801

