

Green City, Clean Waters

Howard Neukrug, P.E. BCEE

Water Commissioner
City of Philadelphia

www.phillywatersheds.org



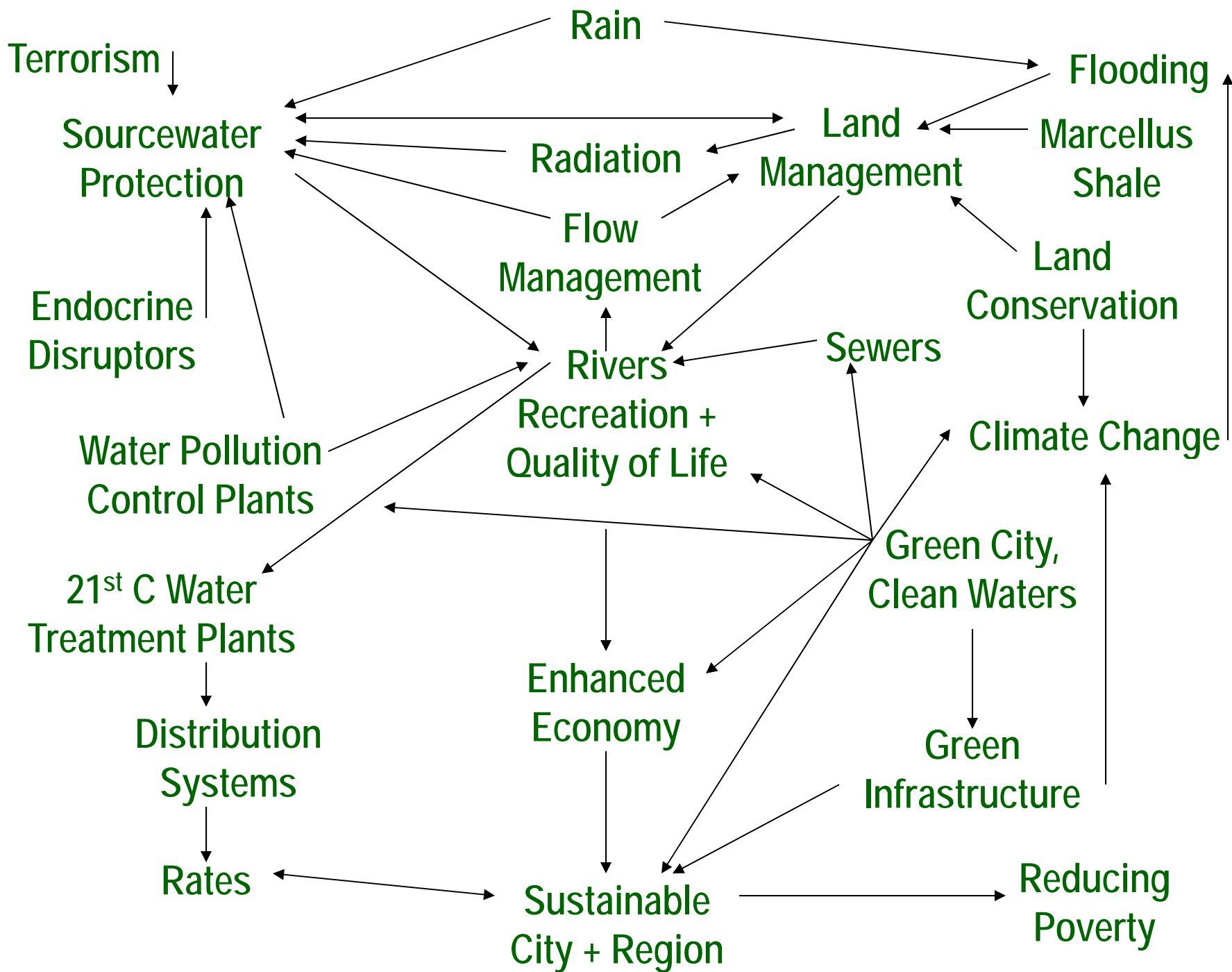
Through our leadership,
we have the opportunity to
shape the culture of our industry
and
the future landscape of our cities

One water, one city, one region



East Park, Fairmount Park (Schuylkill River), photo by Andrew Dobshinsky

One Water, One City



Harnessing Nature's Water



Three reasons to bury streams in sewers

1. Protect Public Health from polluted streams
2. Encourage real estate development
3. Cheapest way to provide drainage to the river



Philadelphia in 1702

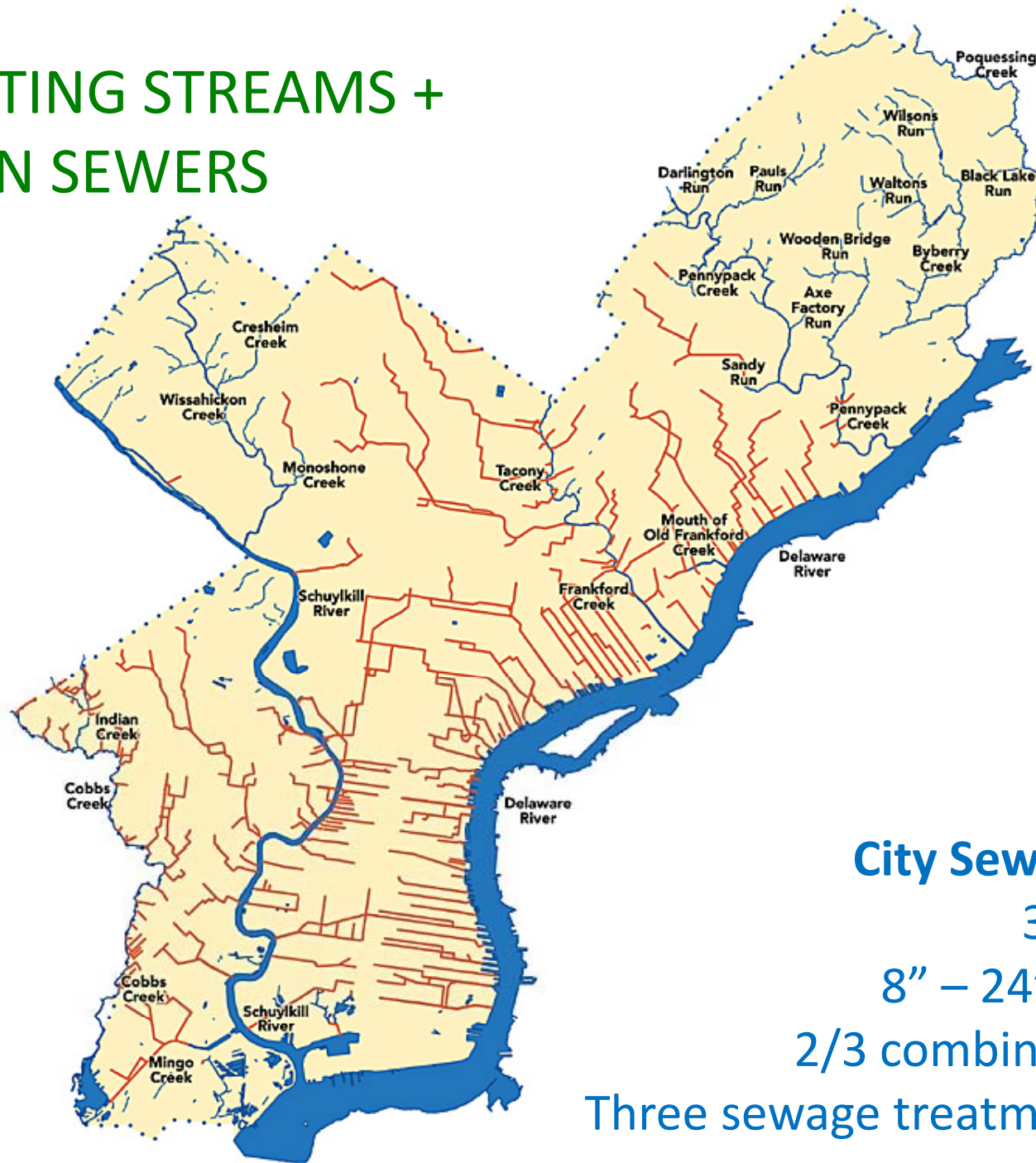
HISTORIC STREAMS OF PHILADELPHIA



EXISTING STREAMS OF PHILADELPHIA



EXISTING STREAMS + MAIN SEWERS



City Sewer System

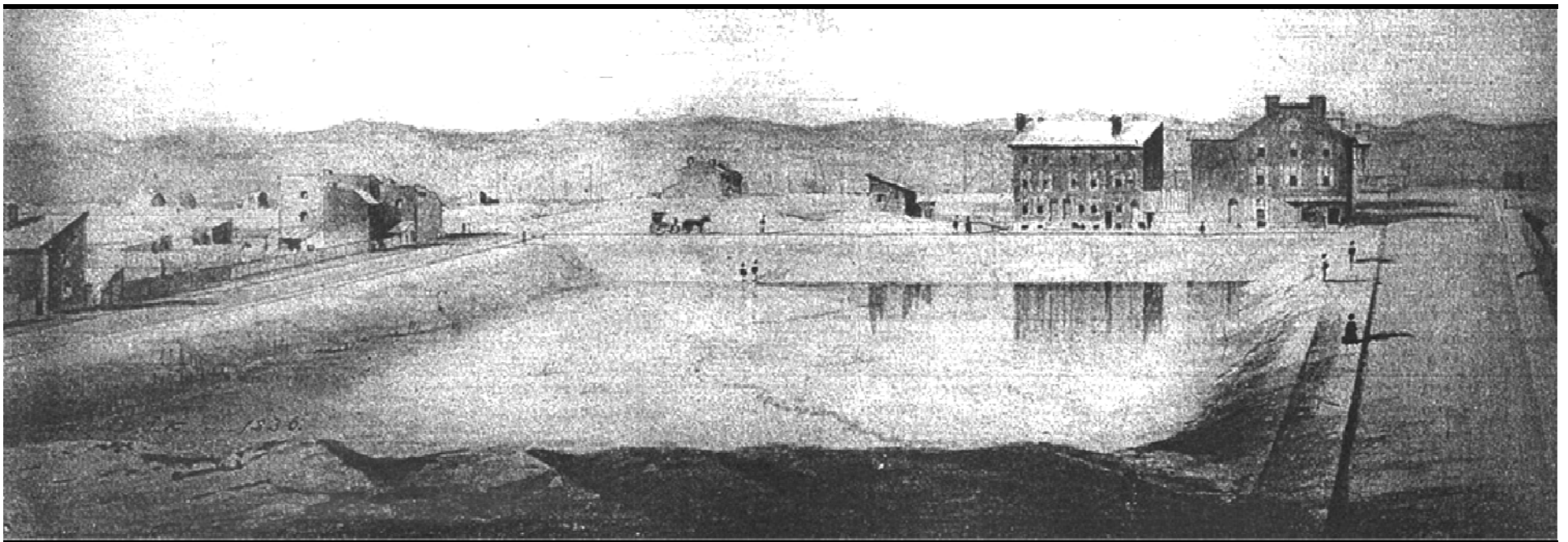
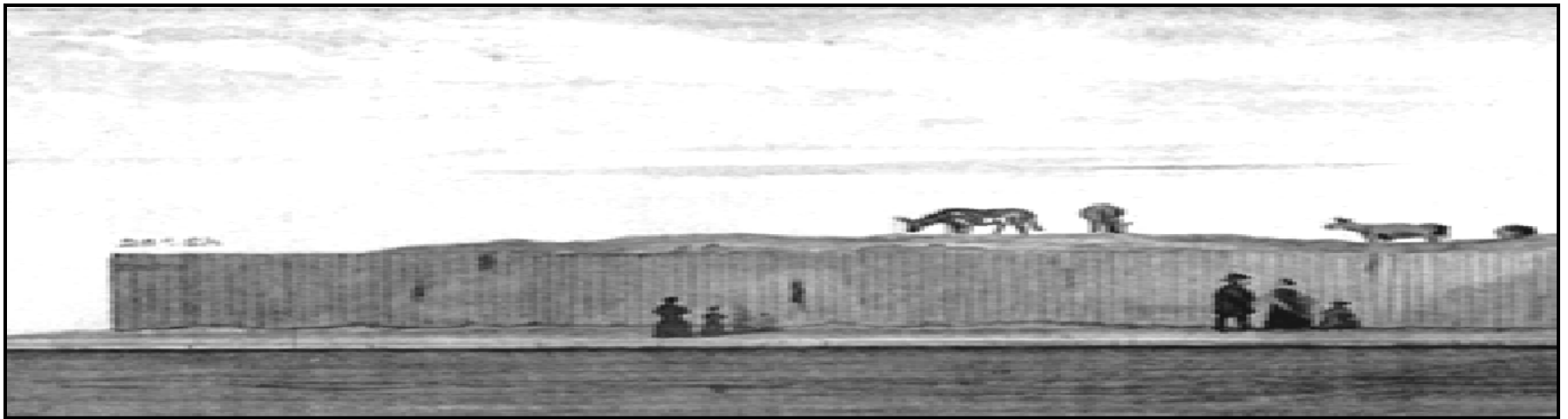
3000 miles

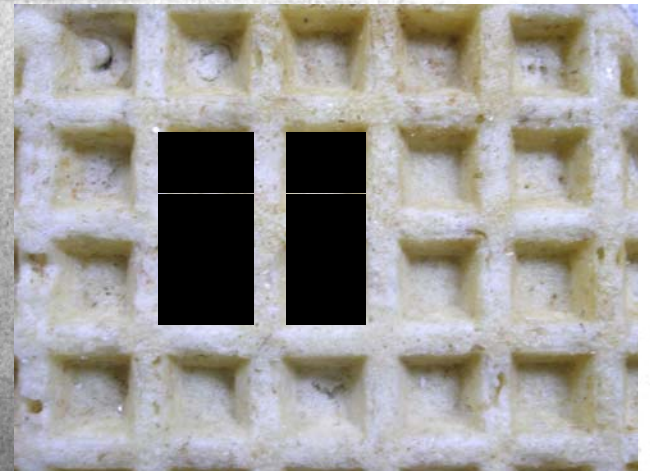
8" – 24' diameter

2/3 combined sewers

Three sewage treatment plants









Southeast Philadelphia (10th & Moyamensing), photo by Andrew Dobshinsky





7:37 AM

NEWS FOX A WINTER STORM WARNING IS IN EFFECT FOR

“Every time we raise the dyke,
we make the eventual
catastrophe that much worse”

Dyke Master of Delft
Holland, 2010

Resilience:
Don't only build tanks and tunnels,
reduce demand

(Keep the rain out of the sewer)

CHOOSING THE RIGHT INVESTMENT WITH LIMITED FUNDING



Our Investment in Green City, Clean Water

Improve our Rivers and Streams

- 1
 - *Fishable, Swimmable, Safe, Attractive and Accessible*

- 2
 - *Strengthen and renew our infrastructure*
 - *As our infrastructure grows older, it does not grow stronger*

- 3
 - *Support the growth of a sustainable city*
 - *Use water projects to leverage City re-investment*
 - *Make Philadelphia “the greenest city in America”*
 - *Nurture sustainable business leadership in Philadelphia*

New Kensington High School



GREEN CITY CLEAN WATERS: BIG GREEN BLOCK

Wissahickon Charter School



West Grays Ferry Rain Garden



West Mill Creek Tree Trench



Springside School Rain Garden



Springside School Rain Garden



Waterview Stormwater Tree Trench





2011 – PaDEP COA

2012 – USEPA AOC

- Affordability limited
- 67 to 85% Capture by Pollutant Mass
- more than 34% ‘Greening’
- Stream/Wetland restoration
- WPCP Wet Weather expansions
- Infrastructure renewal
- 1.2 Billion LEVERAGED dollars (present value)
- Evaluation and Adaptation 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

<http://vimeo.com/17306371>

June 1, 2011

25-year Program

June 1, 2036

2012 EPA / CITY Partnership Agreement

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

Lisa Jackson,
EPA Administrator



EPA-PWD Partnership and Letter of Agreement

Six working groups

1. GSI Research / Next Gen Technologies
2. GSI Demonstration and Implementation Projects
3. GSI Public Outreach and Education (Green Design Challenge)
4. Water Quality Studies
5. Alternative Financing
6. Administrative Order on Consent

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.



9,500+ IMPERVIOUS ACRES CONVERTED TO “GREENED ACRES”



- Direct, leveraged GI investment
- Stormwater regulations on development
- Create stormwater billing structure that rewards green

GREEN STORMWATER INFRASTRUCTURE



Cliveden Park



Herron Playground



Free Library of Philadelphia

Intercept, infiltrate, evaporate and transpire

Greened Acre = one acre-inch = 27,158
gallons

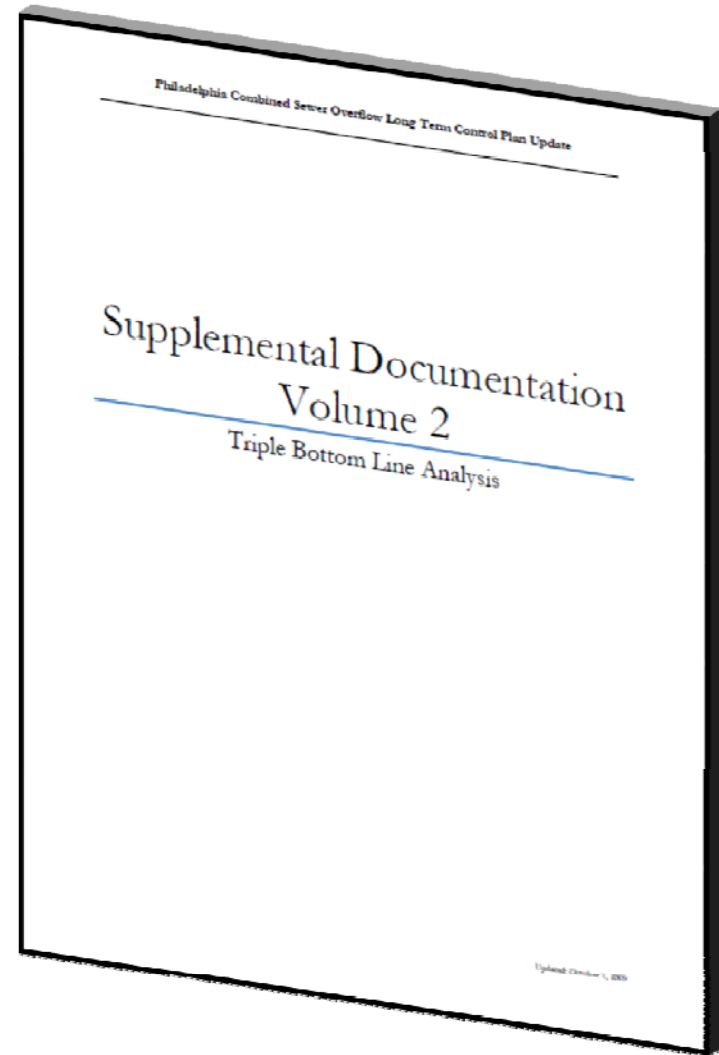
Greened Acre Stormwater Goals

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



TRIPLE BOTTOM LINE BENEFITS

- PWD undertook a Triple Bottom Line (TBL) analysis of the environmental, social, and economic benefits of the program.
- Expands upon the traditional financial reporting framework
 - Assess the impact of green stormwater infrastructure investment beyond water quality benefit



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

GREEN CITY, CLEAN WATERS

Green Stormwater Infrastructure

\$800 million

Wet Weather Treatment Plant Upgrades

\$200 million

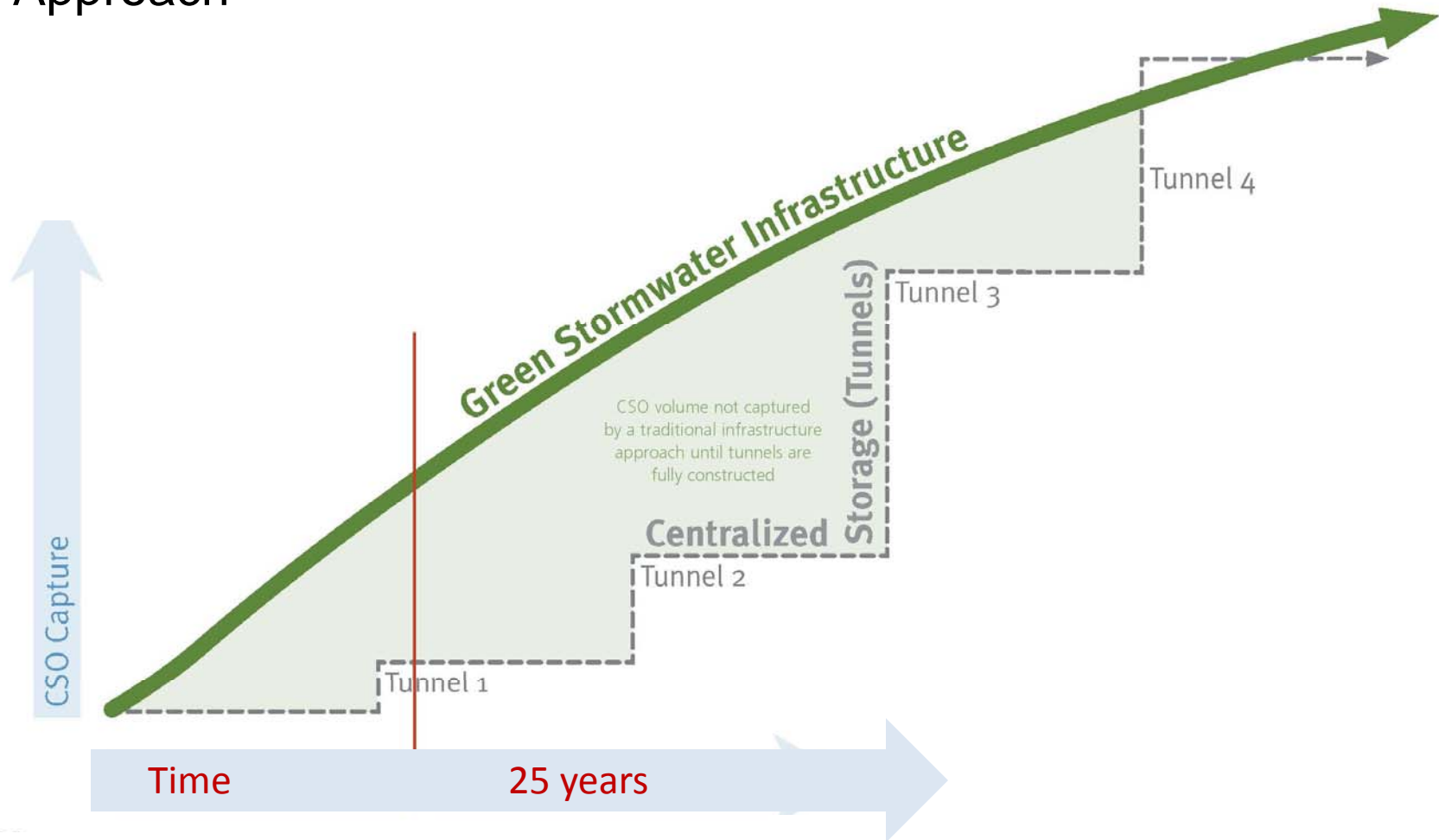
Adaptive Management

\$200 million



AN UNCONVENTIONAL PATH

Rationale for the Green Infrastructure Approach



Rain Garden



Wissahickon Charter School, Philadelphia, PA

Pervious Pavement



Mill Creek Basketball Court, Philadelphia, PA

Stormwater Wetland



Saylor Grove, Philadelphia, PA

Stormwater Tree Trench



West Mill Creek, Philadelphia, PA

Stormwater Planter



Columbus Square, Philadelphia, PA

Stormwater Bump-out



Queen Lane, Philadelphia, PA

Green Roof



PECO Building, Philadelphia, PA

Rain Barrel



Row home, Philadelphia, PA

Flow-Through Planter



Philadelphia Water Department, Philadelphia, PA

EIGHT GREEN PROGRAMS

Public Lands

- Streets
- Schools
- Public Facilities
- Open Spaces



Springside School "Water Wall" and Rain Garden

Saylor Grove Stormwater Wetland



Friends Center Green Roof

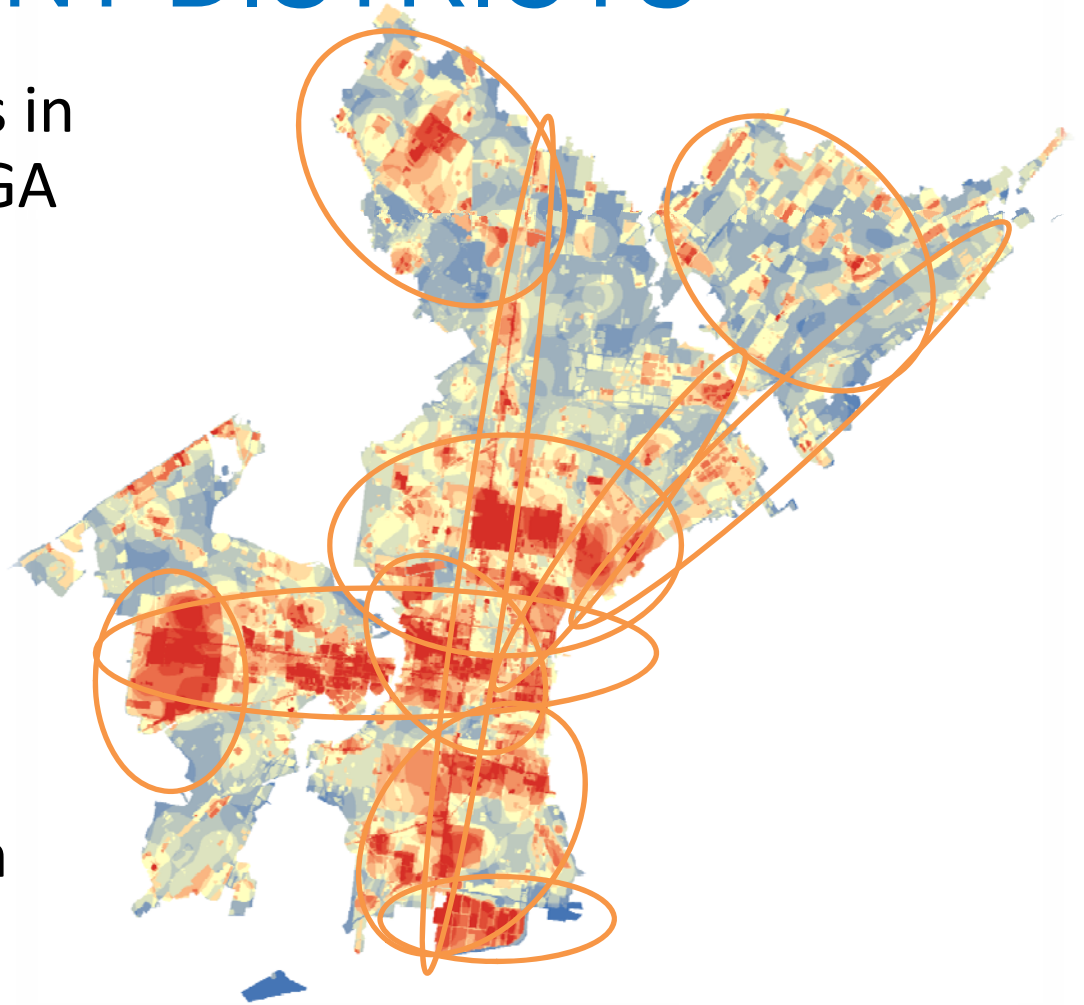


Private Lands

- Industrial/Commercial/Institutional
- Homes
- Parking
- Alleys, Driveways and Walkways

STORMWATER MANAGEMENT ENHANCEMENT DISTRICTS

- Maximizing Green Acres in clustered areas → 50+ GA at a time
- Alternatives analysis for integrated implementation
- Potential leveraging of limited funding
- Innovative collaboration



GREENED ACRES ANNUAL GOALS

	Target of Greened Acres Designed by Type of Project					
Project Categories	FY11 ¹	FY12	FY13	FY14	FY15	FY16
Parking		5	10	15	20	30
Green Streets	15	25	30	40	50	60
Public Property		5	15	20	30	40
Water Sewer		5	20	30	40	50
School			5	10	15	20
Street Paving				10	25	60
Sub-total	15	40	80	125	180	260
SMED					50	
Total	15	40	80	125	230	260
Cumulative	15	55	135	260	490	750

PARTNERSHIPS & COLLABORATIVE EFFORTS

Philadelphia Parks and Recreation
Department of Public Property
Philadelphia Industrial Development Corporation
Philadelphia Planning Commission
City Council Office and Mayors Office of Sustainability
Philadelphia School District
Philadelphia Horticultural Society
Yorktown CDC
Fairmount Park Commission
Friends of the Schuylkill
New Kensington CDC
Shissler Recreation Center
Norris Square Community Association
Friends of Clark Park
Community Design Collaborative
Trust for Public Lands

CITYWIDE PLANNING INITIATIVES



INTERAGENCY COORDINATION



MOUs: PARKS & RECREATION, SCHOOL DISTRICT, TRUST FOR PUBLIC LAND



The ARAMARK Tower

Anthony Cucchi
New Jersey Field Office Director
The Trust for Public Land
20 Community Place, Suite 7
Morristown, NJ 07960

November 30, 2011

Dear Mr. Cucchi,

The Philadelphia Water Department (PWD) is providing funding support to the School District of Philadelphia (SDP) for the Green2015 program. This collaborative effort to green school sites will leverage green public spaces to better serve adjacent to and using these sites initiative will provide triple bottom

To help ensure that the "Green Waters" plan, PWD is committing the anticipated five (5) school sites. PWD intends to collaborate with SWMS designs to ensure a cohesive to monitor SWMS construction.

Throughout the design and construction of the stormwater management features, PWD will manage the amount of stormwater to be managed. A Greened Acre is an expression of practice and is typically designed areas may be any combination of budgeted will be derived based on amount of impervious area that funding shall not exceed \$2,000.

PWD is thrilled to support long-term stormwater management

Memorandum of Understanding
Philadelphia Parks and Recreation

This Agreement pertains to the initial Philadelphia Parks and Recreation (PPR) Pilot Phase, PPR and the Philadelphia Water Department (PWD) will provide funding pilot sites. PWD will provide funding meet PWD's design and performance approved design. This document includes among the parties.

Funding of Stormwater Management

All parties agree that PWD will provide monies will only fund the following of, or all of the following:

- Any improvements to the stormwater runoff, including cisterns, and planter boxes, adjacent impervious areas in practices.
- Any improvements to the stormwater runoff, including recreational opportunities on pavements.
- Any improvements to the stormwater runoff, including related to agreed-upon stormwater and other conveyance features.
- Any soil amendments, vegetation, and infrastructure for stormwater management features.
- Any labor needed for construction management features.

PPR, with its partners, agrees to fund administration costs (i.e., "soft costs")

Determination of PWD Funding Share

The amount of funding provided by PWD and construction project bidding process stormwater management features in unit cost per "Greened Acre".

A Greened Acre is an expression of the practice, using the equation:

Green 2015 MOU
PWD & PPR

Memorandum of Understanding
Philadelphia Parks and Recreation, Department of Public Property (DPP) and Phil MONKIEWICZ Playground

This Agreement pertains to the collaboration Department of Public Property (DPP) and Philadelphia stormwater infrastructure systems at Monkiewicz Playground.

Project Description:

PPR plans to develop a spray park on a portion of Allegheny Avenue. The project will result consultant for project design is Cairone Kaup

PWD has reviewed DPP's plans for Monkiewicz infrastructure on the site that will manage both disturbance resulting from the park renovation adjacent streets (including an I-95 southbound illustrating the locations of proposed green stormwater drainage areas for Monkiewicz Playground is

Project Management and Review:

PPR will manage the design and construction

PWD will provide a concept design for the stormwater drainage area to be managed by PPR and that

For its portion of the stormwater management necessary design phase reviews and have final

Upon completion of the final design documents stormwater management features as separate will have final approval of stormwater management of the system.

The renovation project itself will need to be created by the park renovation project. However, collaboration with PWD.

Monkiewicz Playground
PWD & PPR

Memorandum of Understanding
School District of Philadelphia and Philadelphia Water Department

This Memorandum of Understanding (MOU) establishes Philadelphia Water Department (PWD) and the School District of Philadelphia (SDP) Green Schools Initiative. The Green Schools Initiative construction of stormwater management features. The expanding and improving public green spaces to better school students, as well as manage stormwater runoff Philadelphia Water Department and the School District these objectives of the Green Schools Initiative. This SDP plan to collaborate on this Initiative.

Models of Collaboration

PWD and SDP anticipate three potential models of collaboration:

- Turnkey Model:** PWD will independently design and construct stormwater management features on the selected school sites. SDP will transfer all improvements to SDP upon completion.
- Capital Planning Model:** SDP has a strategic plan and opportunity for PWD to align its investment in planned investments. SDP will inform PWD of potential stormwater management in the proposed site and provide SDP with a pre-approval. If both parties agree to the construction of stormwater management features, SDP during the design phase to develop the management solutions.
- Third Party Model:** SDP will inform PWD when construction improvements to a school district plan to review any plans or designs and to suggest parties agree to the conceptual plan, PWD will construction of the stormwater management improvements will transfer to SDP.

Responsibilities

Both PWD and SDP agree to the following:

Memorandum of Understanding Stormwater Management Practice – Operations and Maintenance

THIS MEMORANDUM OF UNDERSTANDING is made this day of , 20 , between the Department of Parks and Recreation ("Department"), and the Philadelphia Water Department ("Water Department").

Background

A. The Department has jurisdiction over the Fairmount Park system and recreation land and facilities throughout the City of Philadelphia.

B. From time to time, the Department performs construction or other development projects in areas of the Fairmount Park system or at recreation centers. In addition, from time to time, the Department permits outside persons and organizations to perform construction or development in areas of the Fairmount Park system or on recreation land.

C. Some proposed construction or development sites in the Fairmount Park system or on recreation land are subject to the Stormwater Management Regulations set forth in the Philadelphia Code at Section 14-1603.1.

D. Federal, Commonwealth, and local laws, require that, in certain circumstances, on-site stormwater management facilities be constructed and maintained on property where construction or other development occurs.

E. On-site stormwater management facilities will benefit the health, safety, and welfare of the residents of Philadelphia.

F. The Water Department, under federal, Commonwealth, and local law, must require that on-site stormwater management measures as shown on the Operations and Maintenance Plan be constructed and adequately maintained.

G. The Water Department has developed regulations that, for certain construction and development, require construction of stormwater management facilities and to ensure the long-term maintenance of those facilities. The regulations are set forth in Philadelphia Water Department Regulations, Chapter 6, Stormwater ("Regulations"), and an accompanying Water Department Stormwater Management Manual ("Manual"). The Regulations require that certain projects and developments include an "Erosion and Sediment Control Plan," a "Stormwater Management Practice," and a "Post Construction Stormwater Management Plan," which also includes an "Operations and Maintenance Plan," as each of these phrases is defined in the Regulations at Section 600.1.



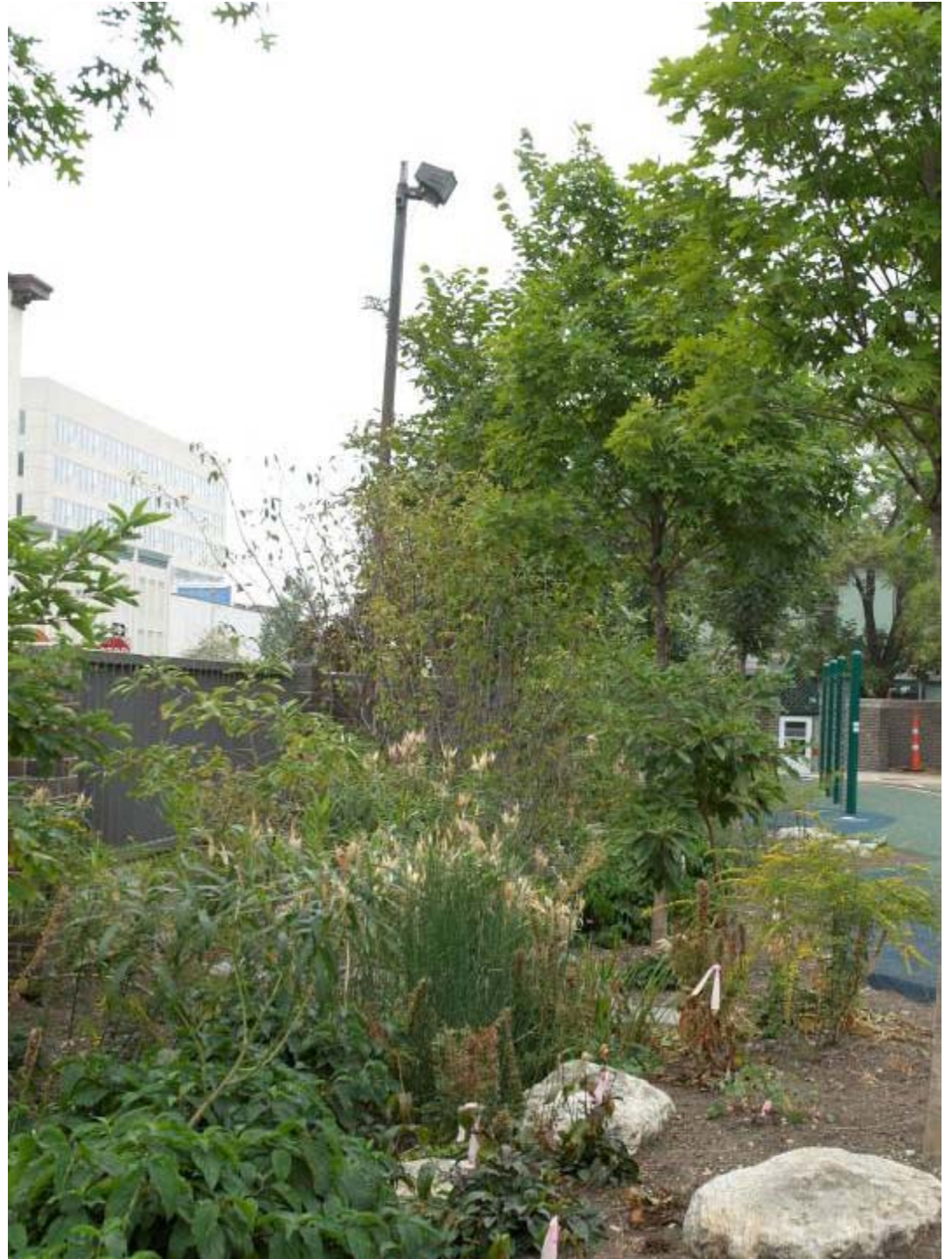
Photo Credit: Pennsylvania Horticultural Society



Photo Credit: Philadelphia Water Department



Photo Credit: Paul Rider for Philadelphia Water Department



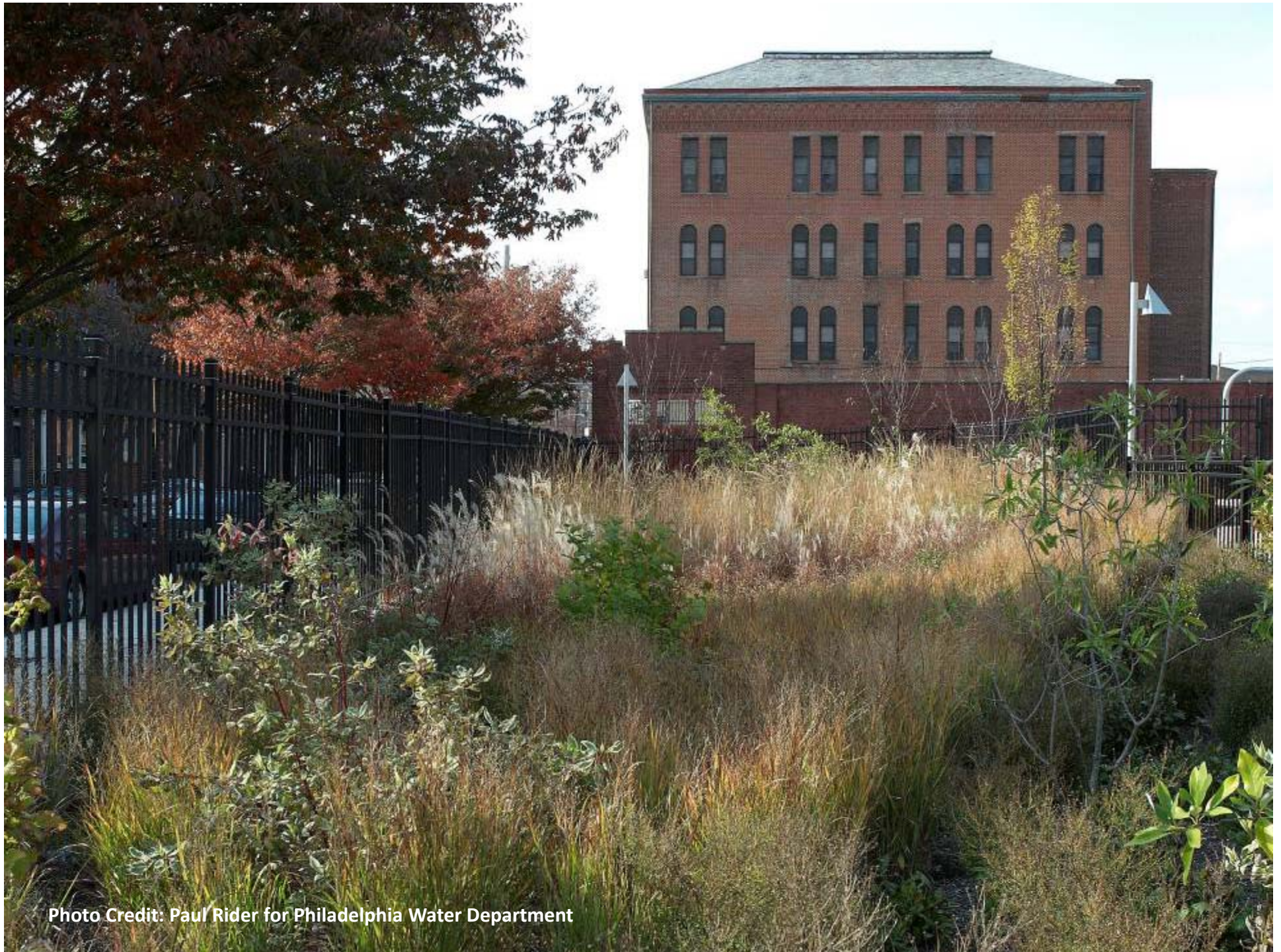


Photo Credit: Paul Rider for Philadelphia Water Department



Photo Credit: Philadelphia Water Department



Photo Credit: Paul Rider for Philadelphia Water Department

ENVIRONMENTAL RESTORATION EFFORTS

- Stream restoration
- Native plant installation
- Invasive control
- Stormwater BMPs
- Dam removal
- Fish ladder construction and O&M
- Debris removal
- Waterways Restoration Team



Lower Reach of Wises Mill



Marshall Road, Cobbs Creek

CONCLUSIONS

- **Strong Leadership**, coupled with a clear **Vision**, is critical to change
 - Local, State & Federal
- **Passion and Patience** are necessary when embarking on a program that diverges from traditional paths
- **Collaboration** is a must:
 - Planners, Landscape Architects, Engineers, Business Owners, Developers, Community Representatives, Local Institutions, City & State Agencies
- Important to have **Multiple Pathways** to success and **Remain Flexible**
- In order to ensure long-term success, the program must be **Fully Integrated** into day-to-day processes and activities

THANK YOU



<http://www.phillywatersheds.org>