Green City, Clean Waters

The Role of Green Stormwater Infrastructure in Creating a Sustainable Philadelphia

www.phillywatersheds.org

“A Sustainable Utility in Support of a Sustainable City”

Our Vision

To become America’s model 21st Century urban water, wastewater and stormwater utility

- **Drinking Water:** 1.73 million customers in Philadelphia, Bucks, Montgomery and Delaware Counties
- **Wastewater:** 2.22 million customers in Philadelphia, Bucks, Montgomery and Delaware Counties
- **Stormwater:** Philadelphia City/County only
- New integrated approach for water and resource management

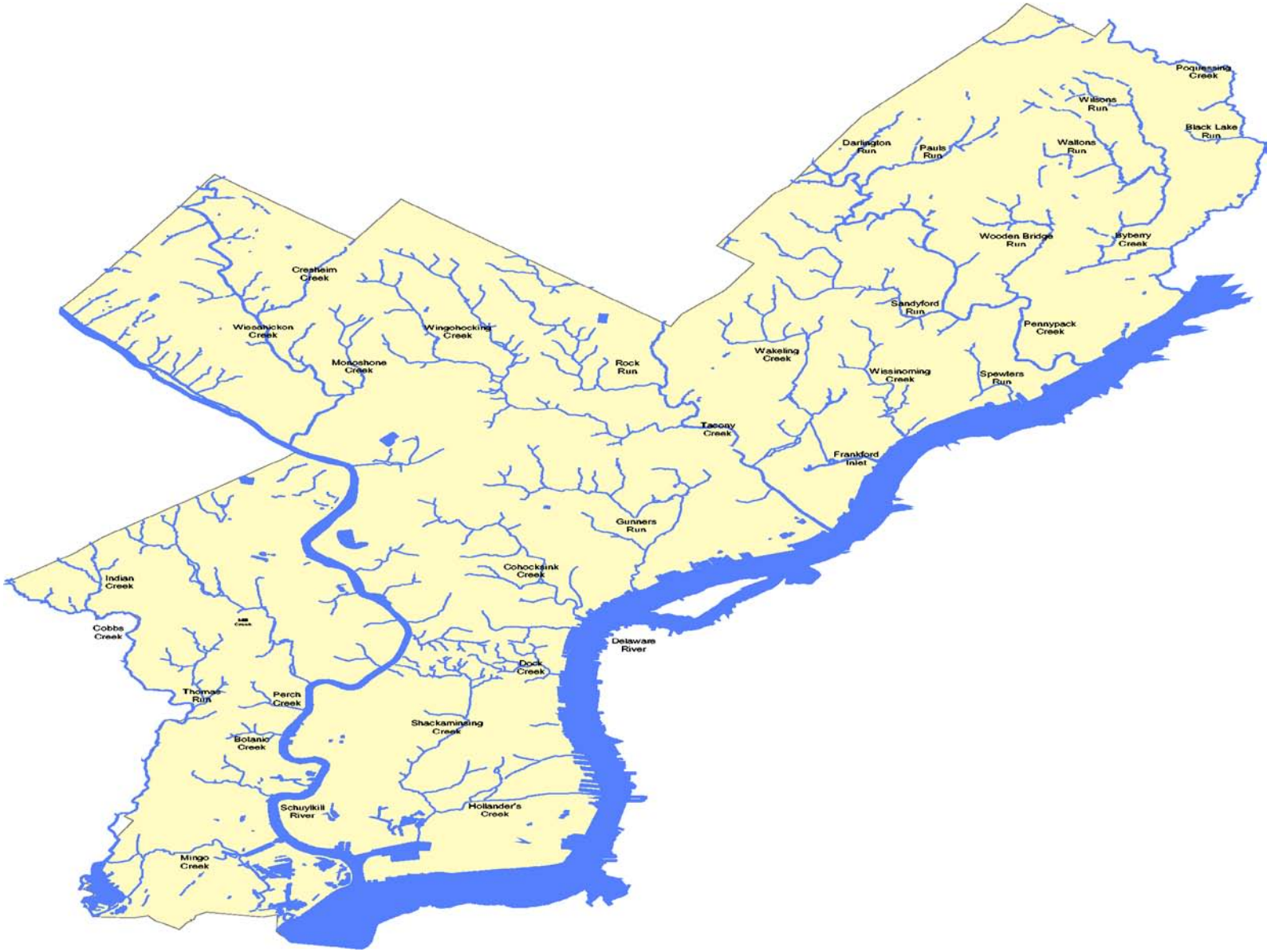
Poquessing Creek
Wilsons Run
Black Lake Run
Darlington Run
Pauls Run
Wallons Run
Wooden Bridge Run
Byberry Creek
Crestheim Creek
Sandyford Run
Pennypack Creek
Wissahickon Creek
Wingohocking Creek
Monoshone Creek
Rock Run
Wakeling Creek
Wissinoming Creek
Spewters Run
Tacony Creek
Frankford Inlet
Gunners Run
Cohocksink Creek
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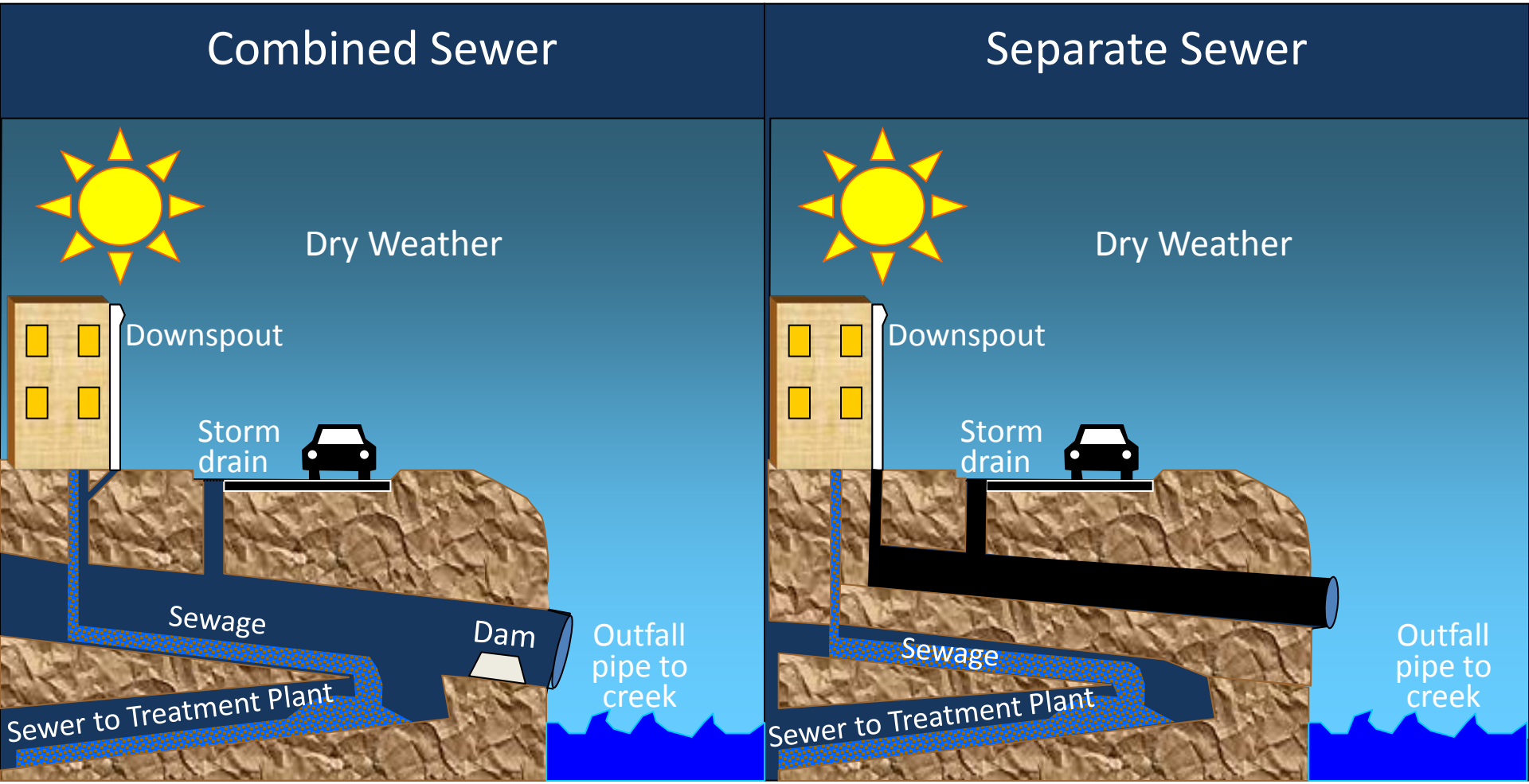
Photo Credit: Philadelphia Water Department Historical Collection

Philadelphia's Sewer System

- Nearly 3,000 miles of sewers
- Three water pollution control plants, treating an average of 471 million gallons per day

Types of Sewers in Philadelphia



60% of Philadelphia

40% of Philadelphia

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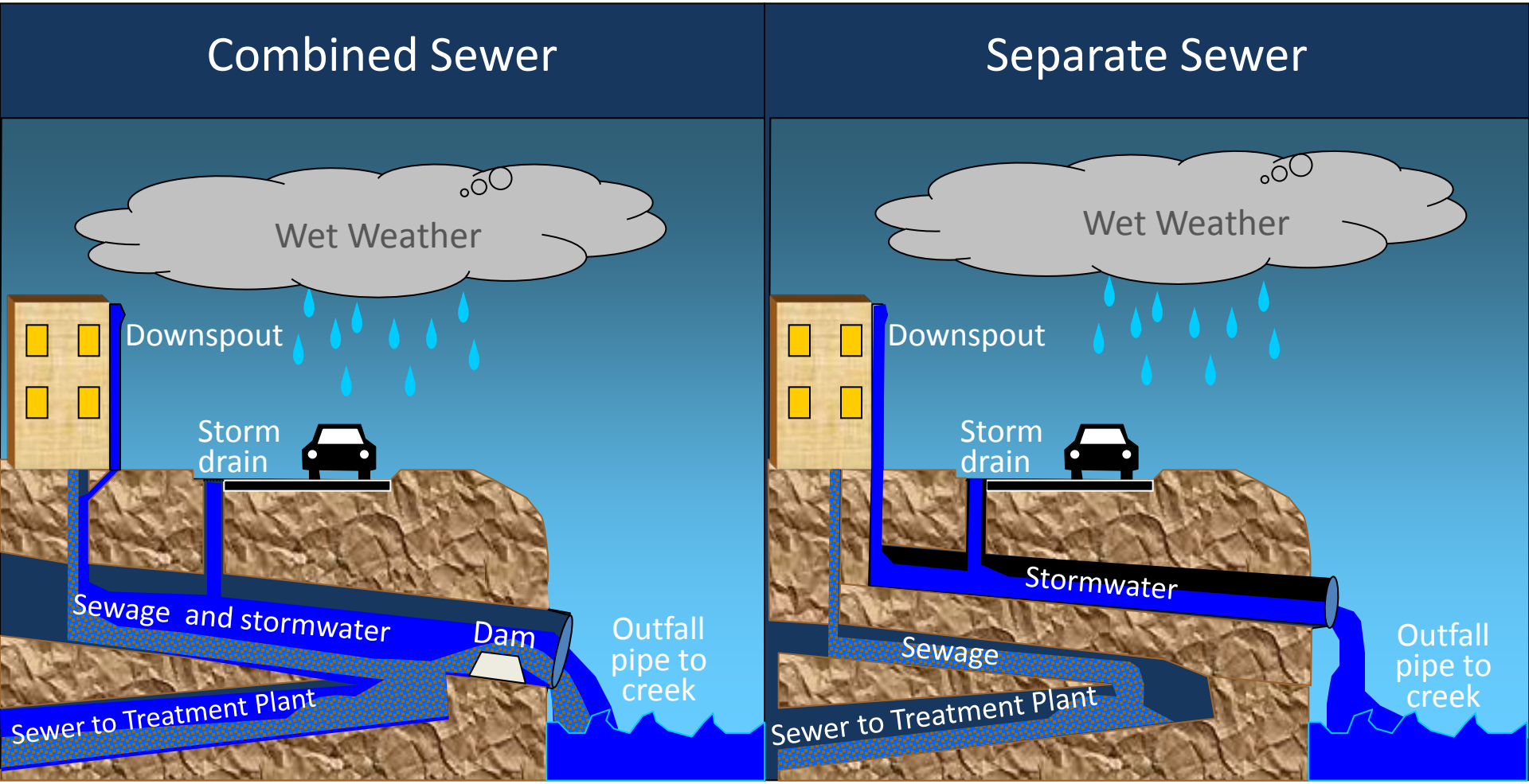

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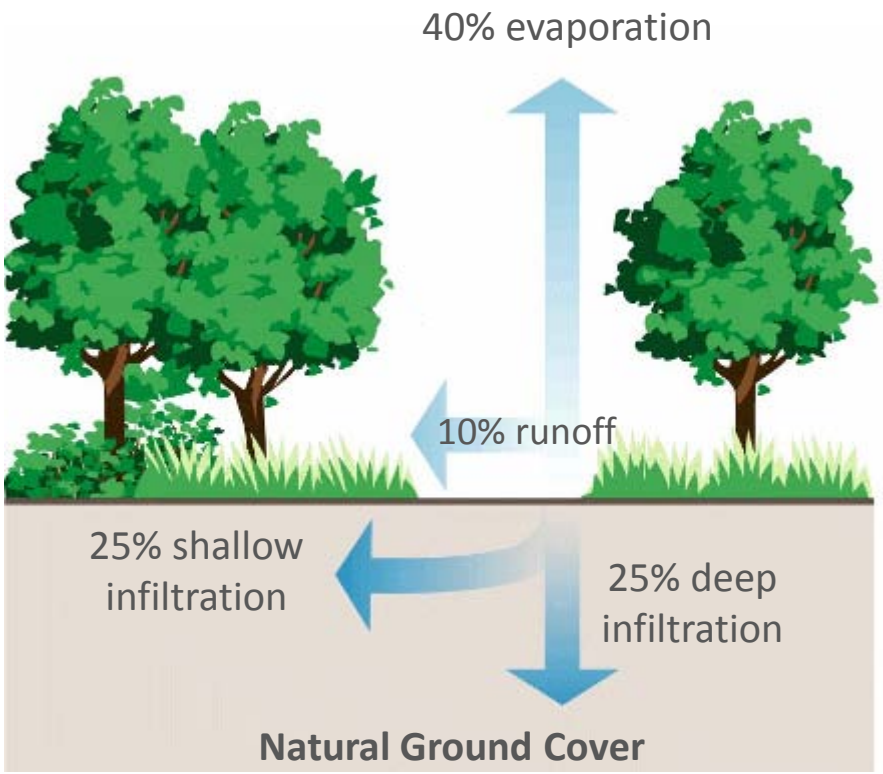
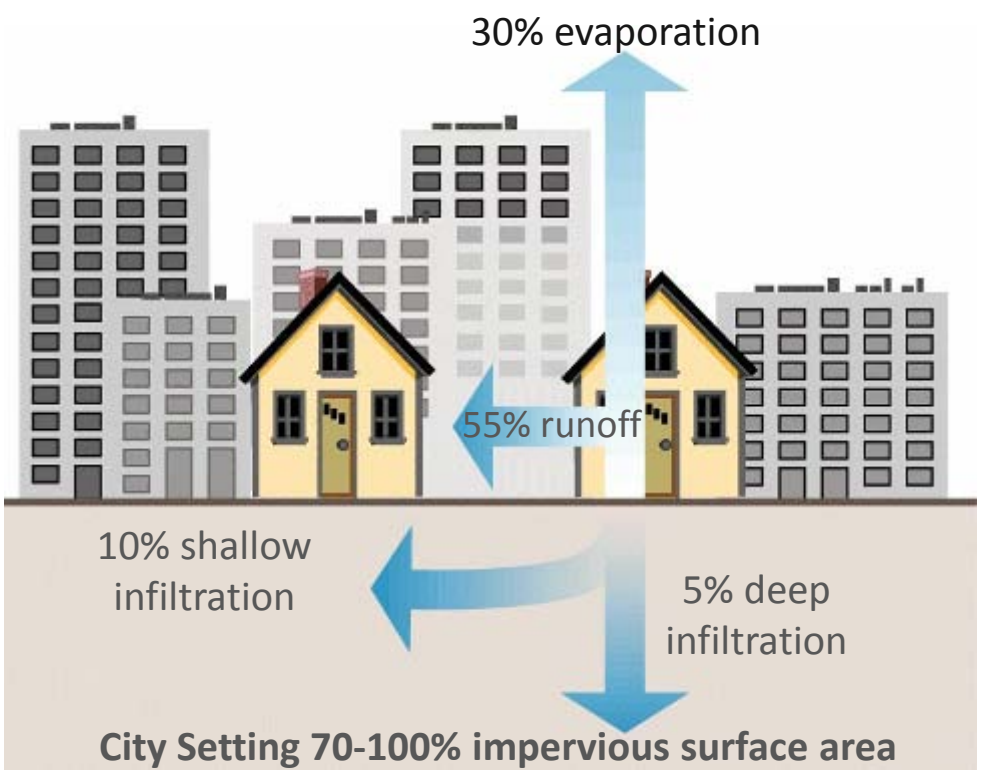
Natural vs. Urban Stormwater Drainage





Stormwater infiltrates into the ground

Plants and trees work to absorb stormwater

Water hits impervious surface and runs off roofs, streets, parking lots etc.

Runoff goes into the sewers

http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/alphabetical/water/restoration/?&cid=nrcs143_026903

Why Manage Stormwater?

Stormwater Runoff Contributes to Combined Sewer Overflows

- Managing stormwater helps to protect and recharge drinking water supply

Stormwater Runoff Becomes Easily Polluted with:

- Fertilizers, herbicides, and insecticides
- Oil, grease, and toxic chemicals
- Sediment
- Bacteria and nutrients

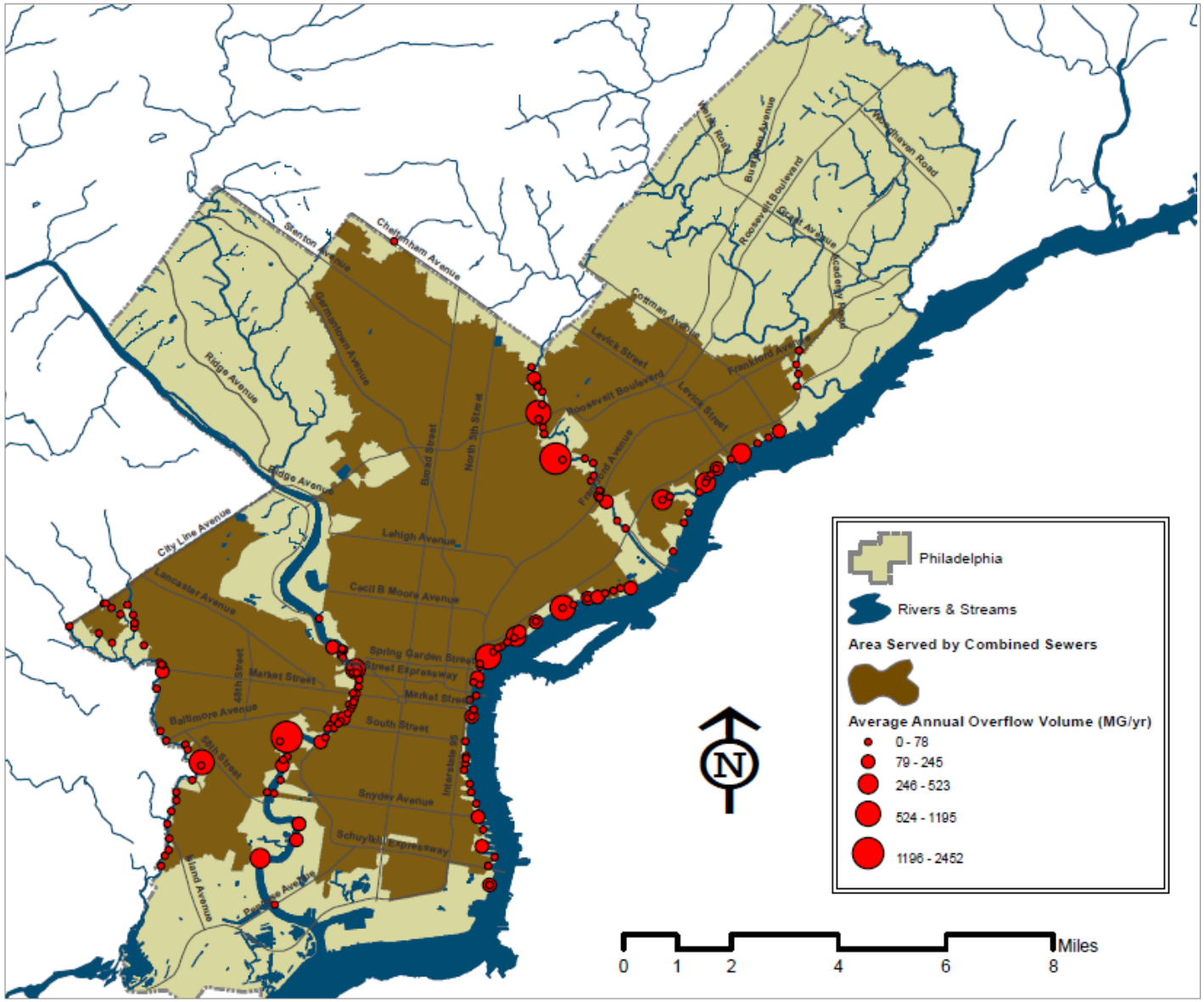
Stormwater Damages our Built and Natural Environment

- Runoff damages valuable aquatic and riparian habitat
- Stormwater leads to flooding and property damage

We need to meet state and federal requirements (MS4 Phase I & II; CSO Control)

The Environmental Protection Agency estimates that this type of pollution is now the single largest cause of the deterioration of our nation's water quality

Philadelphia's Combined Sewer System



- 63 sq. miles
- 164 outfalls
- 4 receiving water bodies

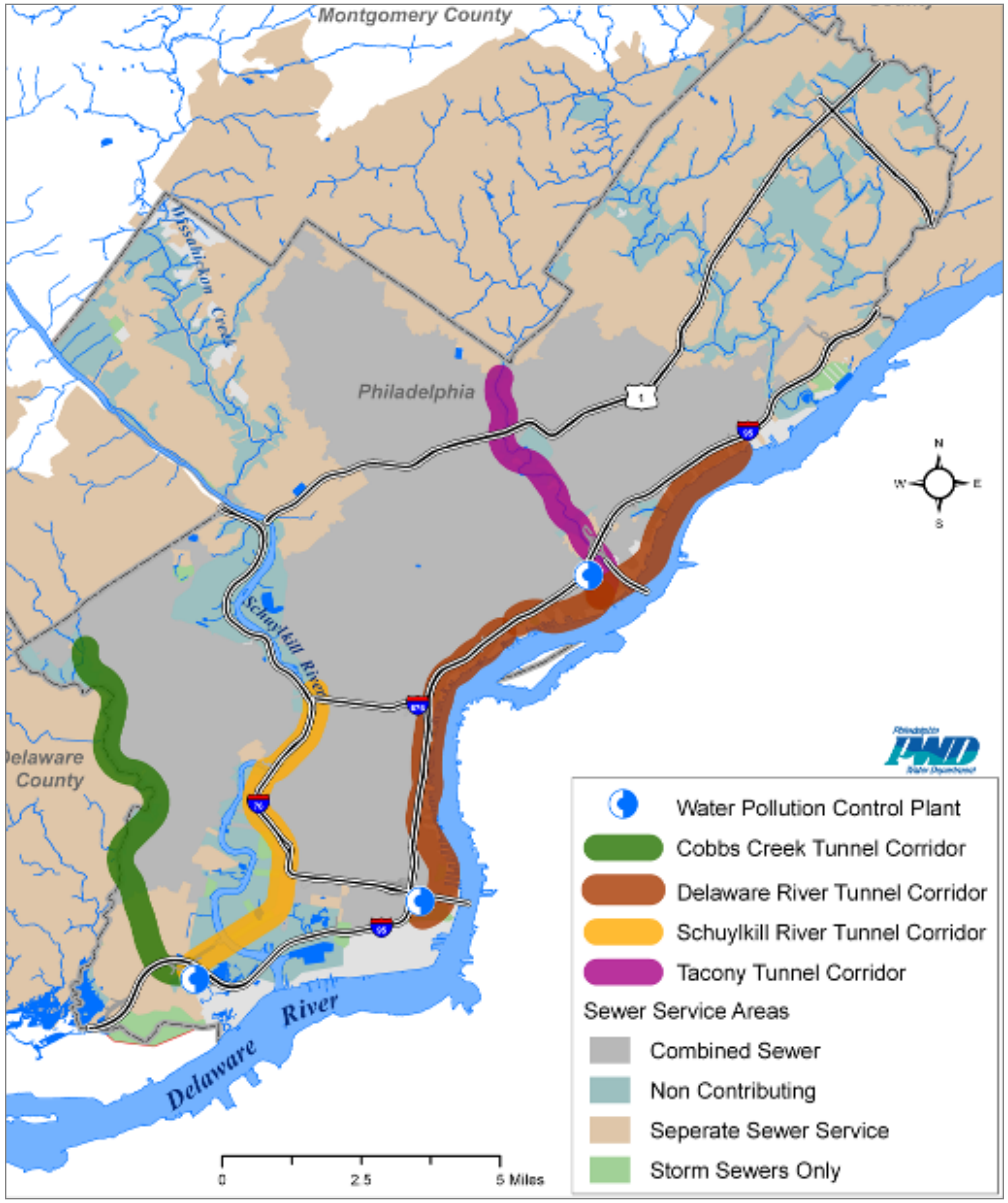
How to Reduce Combined Sewer Overflows (CSOs)

Conventional Approach

Store sewage/stormwater in deep tanks and tunnels and pump back into sewer system after rain event

Photo Credits: Melbourne Water

Centralized Storage (Tunnel) Option



- **$9 - $10 Billion**
- Greatly exceeds residents' limit of affordability
- Construction and long-term operations use enormous amounts of energy
- Highly specialized design and construction limits local jobs
- Hard to adapt to uncertain climate changes

How to Reduce Combined Sewer Overflows (CSOs)

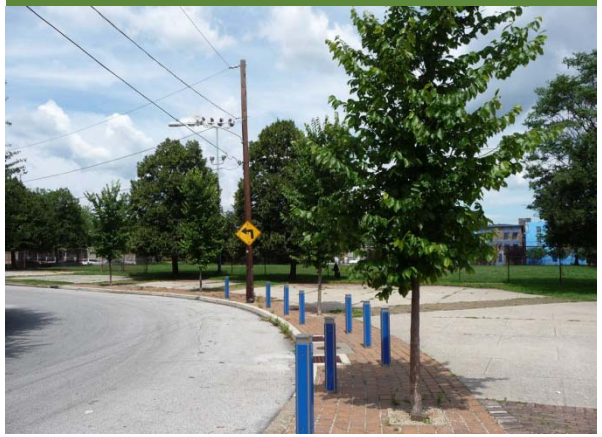
New Approach

Design urban sites so rainfall infiltrates, supports vegetation, and/or is reused

Photo Credits: Philadelphia Water Department and Meliora Environmental Design




Stormwater Tree Trench



West Mill Creek, Philadelphia, PA

Stormwater Planter

Columbus Square, Philadelphia, PA

Stormwater Bump-out

Queen Lane, Philadelphia, PA

Green Roof

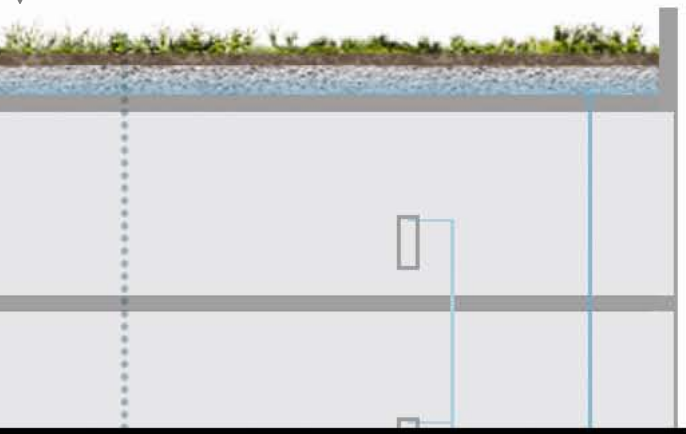
PECO Building, Philadelphia, PA

Rain Barrel

Row home, Philadelphia, PA

Flow-Through Planter

Philadelphia Water Department, Philadelphia, PA



Economic / Environmental / Social Benefits

Enhances Recreation and Restores Ecosystems

- 10% more recreation and stream related visits
- New & restored wetlands and restored streams

Improves Neighborhoods

- $390M increase to property value near parks and green areas
- 250 people employed annually

Improves Public Health

- 140 fewer heat related fatalities
- 1-2 avoided premature deaths per year
- 20 avoided asthma attacks per year

Saves Energy and Offsets Climate Change

- 1.5 billion lbs avoided/absorbed carbon dioxide emissions

Photo Credits: Philadelphia Water Department

Our Goal

9,500 Impervious Acres Converted to "Greened Acres"

Greened Acre: An acre of impervious cover that is retrofitted to utilize ***green stormwater infrastructure*** to manage stormwater using source controls such as infiltration, evaporation, transpiration, decentralized storage and reuse.

- Enforce strong stormwater **regulations** on development
- Create stormwater **billing** structure that rewards good practices
- Design and construct **Capital Investments** in green stormwater infrastructure and **Leverage Private Investment**

Citywide Planning Initiatives

PWD Stormwater Regulations

- Every development project that meets earth disturbance trigger (5,000 or 15,000 SF) must manage at least first inch of rainfall on site
- Since 2006, 478 projects have been approved, that collectively will manage over **1.5 billion gallons** of rainfall annually

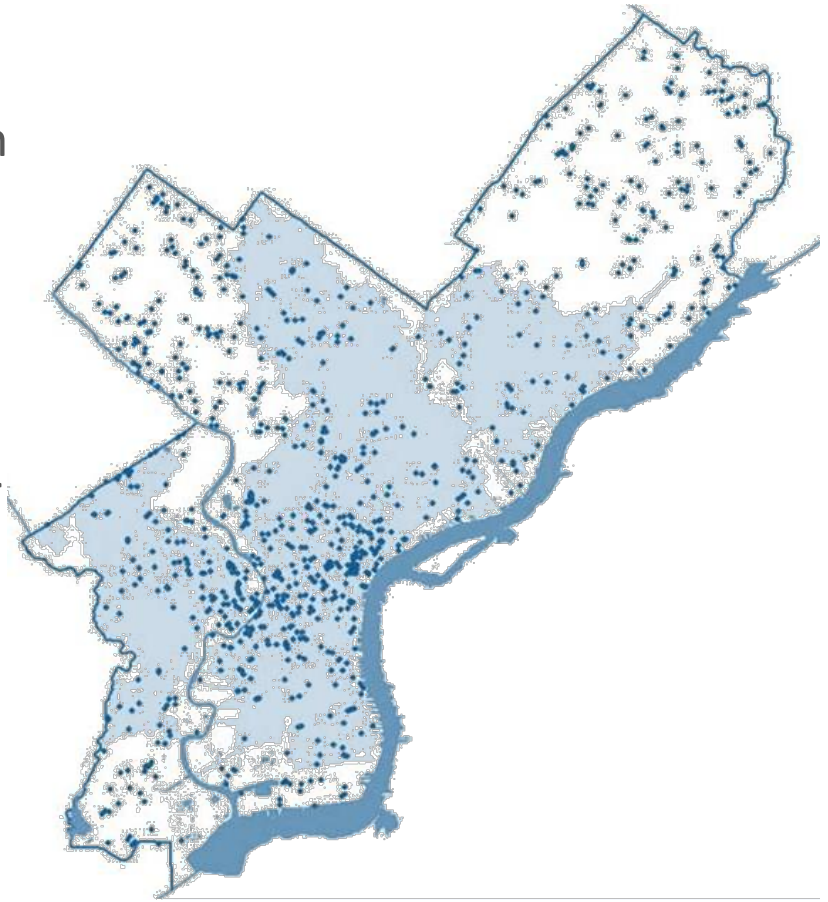
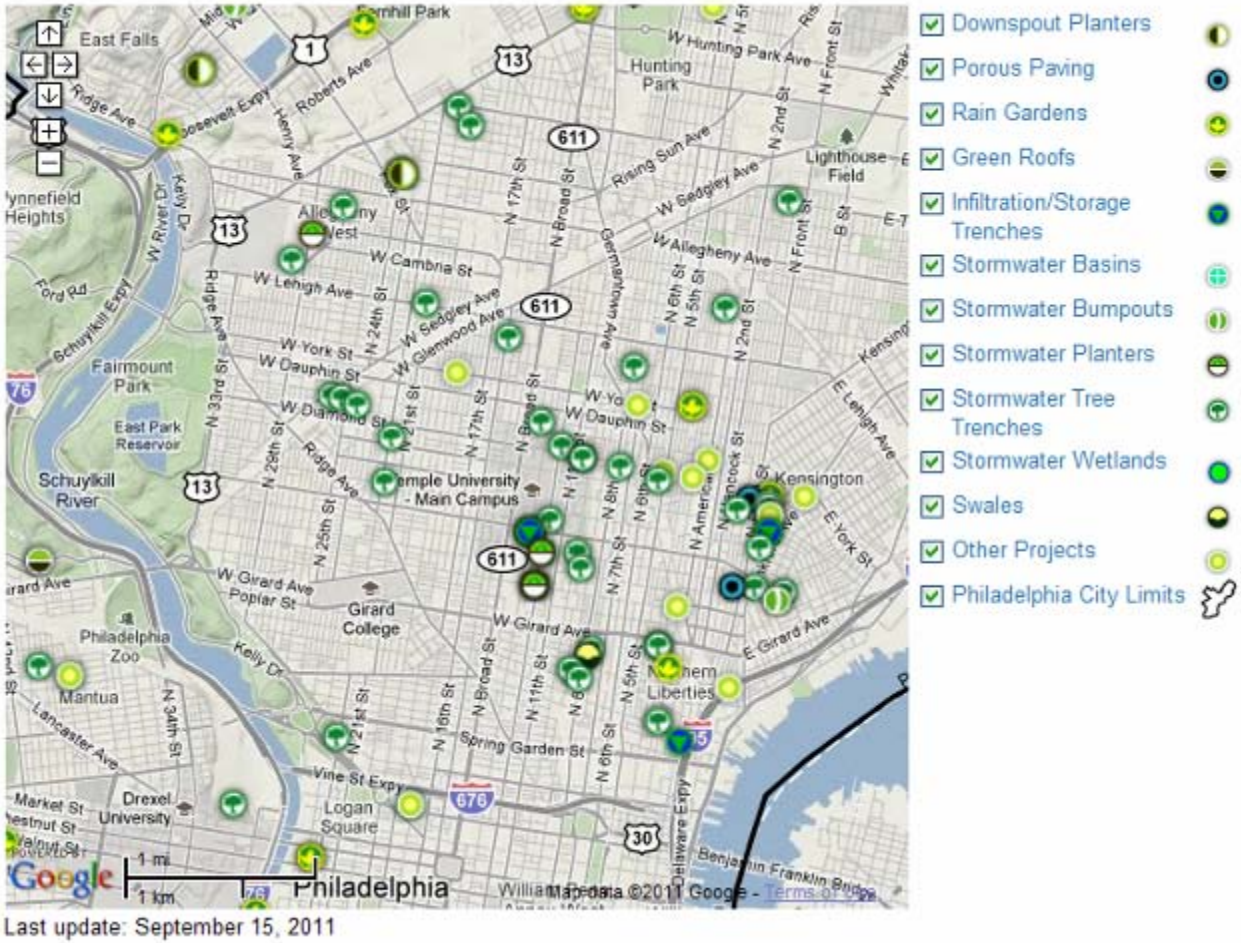


Photo Credits: Paul Rider, Dan Reed, Marissa Huber




Demonstration Projects

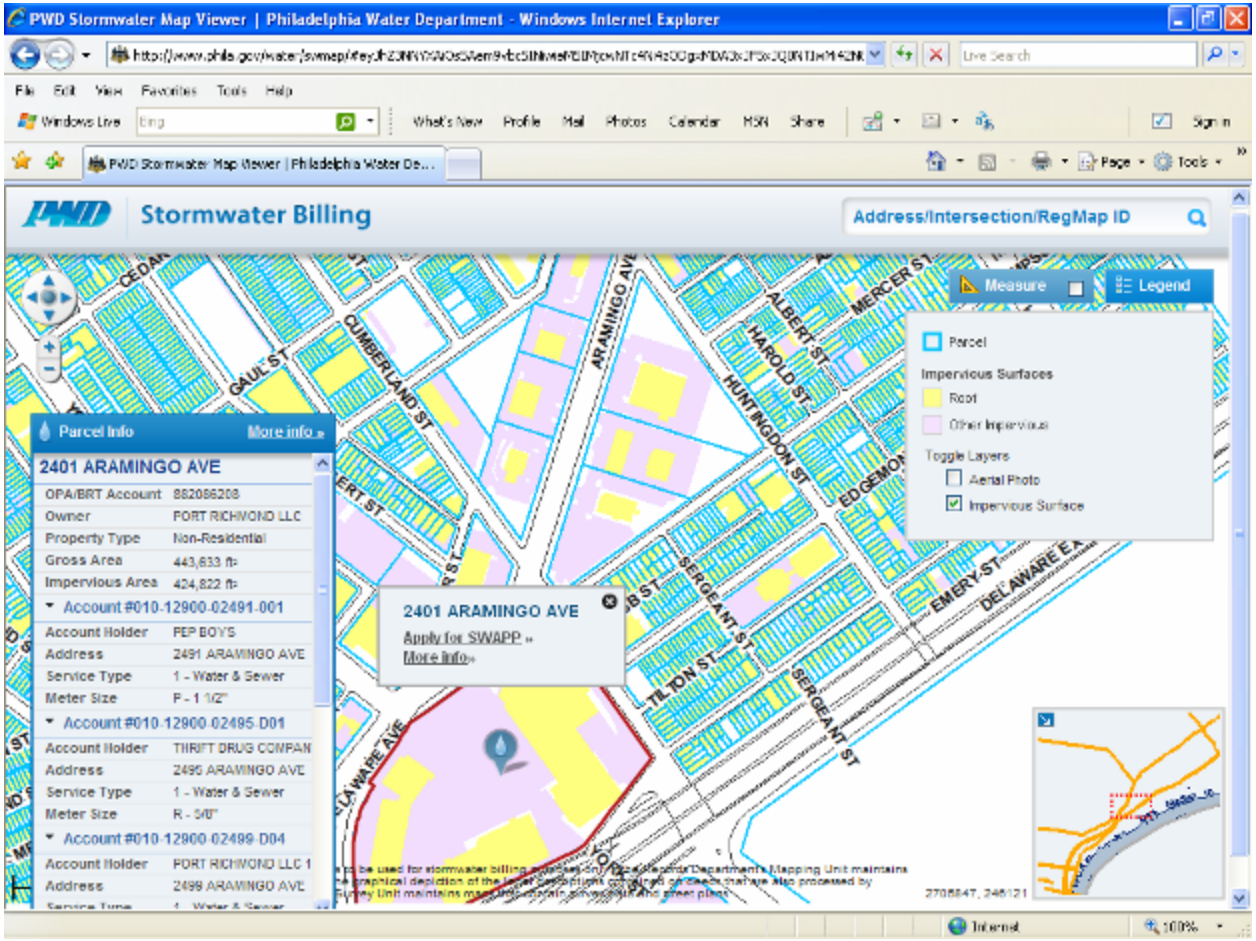


Last update: September 15, 2011

Check on more projects at http://www.phillywatersheds.org/BigGreenMap

Photo Credits: Pennsylvania Horticultural Society and Meliora Environmental Design

Stormwater Billing & Crediting



Monthly Stormwater Billing based on property characteristics:

* Gross Area Charge = $0.528 / GA unit
* Impervious Cover = $4.169 / IA unit

Encourage site retrofits by offering **billing credits** for on-site stormwater management

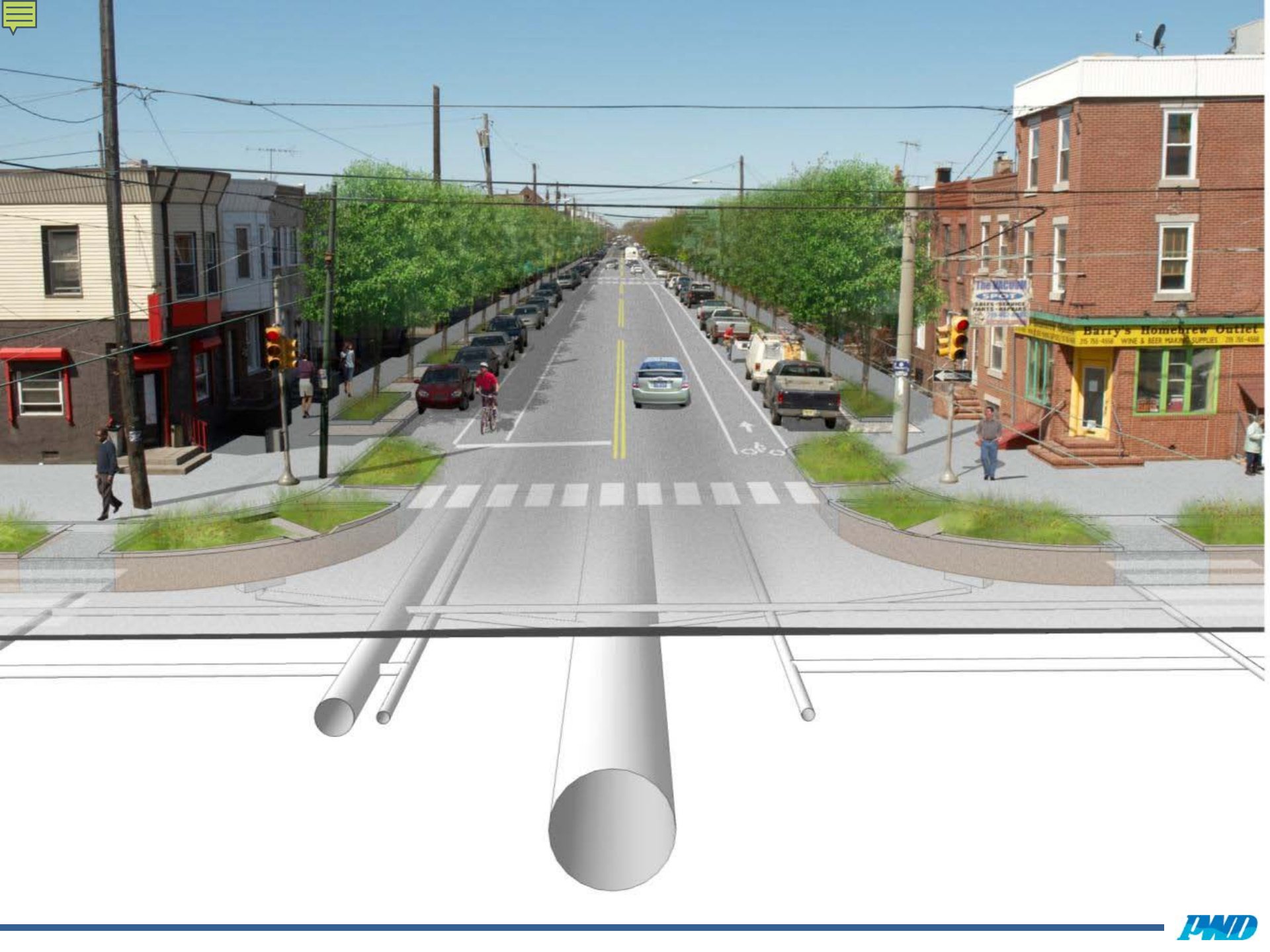
http://www.phila.gov/water/swmap

Business Privilege Tax Credit

Passed in 2007, the credit is available to applicants that provide a green roof covering for at least 50% of the buildings rooftop or 75% of eligible rooftop space and will maintain the green roof for a period of five years after the date of its completion.

The applicant may claim a credit against the Business Privilege Tax ofr 25% of all costs actually incurred to construct the green roof, provided that the total credit does not exceed $100,000.


Barry's Homebrew Outlet


Barry's Homebrew Outlet

Green Streets

The ability to greening streets is a great opportunity for Philadelphia to meet stormwater management goals because they are in the public right of way.

PWD already conducts 22 miles of street projects per year, so adding green infrastructure to already planned projects can help keep costs down

In addition to full street greening, PWD is also diverting street runoff into parks and other public projects

Green Streets Implementation

Green Street progress to date:

Construction complete :
35 blocks

Currently in construction :
185 blocks

Currently in design :
165 blocks

Current barriers to implementation are mostly due to engineering feasibility issues such as:

- Street slope
- Cost of repavement
- ADA accessibility

In addition, PWD needs to improve collaborations with city agencies, utilities and private partners to improve time and cost efficiences

Green Streets Manual

PWD is now seeking collaboration with the Philadelphia Streets Department on the miles of street projects they work on annually

The Green Street Design Manual will be available in draft form in June, 2013. The manual is being jointly vetted by PWD, Streets Department, and the Mayor's Office of Transportation and Utilities

The manual provides designs and standards for green stormwater infrastructure applications within the right of way as well as guidance for the most appropriate ways to apply these standards. It LAO Dormalizes the process whereby a green street design can be approved by both Streets Dept and PWD and ultimately dedicated to PWD when construction is complete

The complete manual will assist any entity working within the right of way, private or public, to successfully design and construct a "green street"

Process has resulted in a list of "next steps" that would lead to increased implementation and/or enforcement of the strategies developed in the manual

GREEN CITY, CLEAN WATERS

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