GREEN CITY, CLEAN WATERS

Green Infrastructure - The Philadelphia Story

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President, American Society of Landscape Architects

THE COST OF GREEN INFRASTRUCTURE:
CHEAPER THAN WE THOUGHT
Philadelphia, PA

Population: 1,526,000 (2010)

Land Area: 135 sq. mi.

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

Annual Rainfall: 42 inches

Persons Below Poverty Level: 23.8% (2008)

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THE COST OF GREEN INFRASTRUCTURE: CHEAPER THAN WE THOUGHT
TYPES OF SEWERS IN PHILADELPHIA

60% of Philadelphia

Combined Sewer

Dry Weather

Downspout

Storm drain

Sewage and stormwater

Dam

Outfall pipe to creek

Sewer to Water Treatment Plant

40% of Philadelphia

Separate Sewer

Dry Weather

Downspout

Storm drain

Stormwater

Sewage

Outfall pipe to creek

Sewer to Water Treatment Plant

THE COST OF GREEN INFRASTRUCTURE:
CHEAPER THAN WE THOUGHT
**TYPES OF SEWERS IN PHILADELPHIA**

**Combined Sewer**
- **Wet Weather**
  - Downspout
  - Storm drain
  - Dam
  - Outfall pipe to creek
  - Sewage and stormwater
  - Sewer to Water Treatment Plant

**Separate Sewer**
- **Wet Weather**
  - Downspout
  - Storm drain
  - Stormwater
  - Outfall pipe to creek
  - Sewage
  - Sewer to Water Treatment Plant

60% of Philadelphia

40% of Philadelphia

THE COST OF GREEN INFRASTRUCTURE: CHEAPER THAN WE THOUGHT

AMERICAN SOCIETY OF LANDSCAPE ARCHITECTS
Choosing the Right Investment with Limited Funding

THE COST OF GREEN INFRASTRUCTURE:
CHEAPER THAN WE THOUGHT

AMERICAN SOCIETY OF LANDSCAPE ARCHITECTS
TRIPLE BOTTOM LINE BENEFITS

Economic/Environmental/Social

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

**Social Benefits**
- Recreation
- Aesthetics
- Public Health
- Equity

**Economic Benefits**
- Property Values
- Job Creation
- City Competitiveness

THE COST OF GREEN INFRASTRUCTURE: CHEAPER THAN WE THOUGHT
AN UNCONVENTIONAL PATH
Rationale for the Green Infrastructure Approach

THE COST OF GREEN INFRASTRUCTURE: CHEAPER THAN WE THOUGHT
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

THE COST OF GREEN INFRASTRUCTURE: CHEAPER THAN WE THOUGHT
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

THE COST OF GREEN INFRASTRUCTURE: CHEAPER THAN WE THOUGHT
GREEN CITY, CLEAN WATERS

Green Stormwater Infrastructure

$800 million

Wet Weather Treatment Plant Upgrades

$200 million

Adaptive Management

$200 million

THE COST OF GREEN INFRASTRUCTURE:
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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.

\[ GA = IC \times Wd \]

Impervious cover \hspace{1cm} Water Depth
# Green Stormwater Goals

25-Year Implementation of Green City, Clean Waters

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<th>Year</th>
<th>Greened Acres</th>
<th>Square Miles</th>
<th>% Impervious cover removed</th>
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<tr>
<td>5</td>
<td>750</td>
<td>1</td>
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<td>10</td>
<td>23%</td>
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<td>25</td>
<td>9,600</td>
<td>15</td>
<td>34%</td>
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THE COST OF GREEN INFRASTRUCTURE: CHEAPER THAN WE THOUGHT
9,600 IMPERVIOUS ACRES CONVERTED TO ‘GREENED ACRES’

- **PWD Initiated**: invest in creating green stormwater infrastructure
- **Public Works**: standardize green infrastructure for all city projects
- **Private**: apply strong stormwater regulations for development; new stormwater billing structure rewards LID practices

THE COST OF GREEN INFRASTRUCTURE: CHEAPER THAN WE THOUGHT
PUBLIC WORKS: GREEN STREETS DESIGN MANUAL

• Collaboration between:
  – Mayor’s Office of Transportation & Utilities
  – Philadelphia Water Dept
  – Streets Dept
• Development of standards and specifications for green street components
• Allows Green Stormwater Infrastructure to follow Streets and Sewer work

THE COST OF GREEN INFRASTRUCTURE: CHEAPER THAN WE THOUGHT
PRIVATE GSI: PARCEL-BASED STORMWATER BILLING

Financial Incentive for Better Stormwater Management

- Shift from a meter-based charge for stormwater to a parcel-based stormwater charge
- Credit system available for managing stormwater
- Top 500 impacted parcels in the combined sewer area make up 12.3% of total impervious area

THE COST OF GREEN INFRASTRUCTURE: CHEAPER THAN WE THOUGHT
STORMWATER MANAGEMENT INCENTIVE PROGRAM

• Stormwater Credit program – to award a mix of grant and loan
  – modeled after the successful New York City Green Infrastructure Grant Program.

• To qualify, projects must cost effectively capture and retain the first one inch of rainfall or greater on the property

• Projects will be ranked higher during the review and selection process based on:
  – feasibility,
  – visibility, and
  – the ability of the project to manage public runoff in addition to on-site runoff.

• Grantees will receive the credits as long as they maintain the SMPs in good working condition.

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THE COST OF GREEN INFRASTRUCTURE: CHEAPER THAN WE THOUGHT
Green Public Facilities
Columbus Square

THE COST OF GREEN INFRASTRUCTURE: CHEAPER THAN WE THOUGHT
THE COST OF GREEN INFRASTRUCTURE: CHEAPER THAN WE THOUGHT
Green Schools

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Project Partners: Kensington Creative + Performing Arts High School, Philadelphia Water Department, Department of Parks and Recreation, Philadelphia Streets Department, Pennsylvania Horticultural Society, New Kensington CDC, Mural Arts, SEPTA

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THE COST OF GREEN INFRASTRUCTURE: CHEAPER THAN WE THOUGHT
Green Homes / Green Public Open Space
Ingersoll Homes & Park

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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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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

THE COST OF GREEN INFRASTRUCTURE: CHEAPER THAN WE THOUGHT
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.

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.
ASLA Green Infrastructure Case Studies

- Water & Stormwater Management

The Green Infrastructure for Clean Water Act
(H.R. 2030, S. 1115)

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

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

THE COST OF GREEN INFRASTRUCTURE: CHEAPER THAN WE THOUGHT
ASLA Headquarters Award-Winning Green Roof

Washington, DC