PennVEST
Tree Planting and Tree Trenches

PROJECT DESCRIPTION

More than 8,000 trees were planted in Philadelphia and the surrounding counties, with economic stimulus funding awarded by the Pennsylvania Infrastructure Investment Authority (PennVest).

As "green infrastructure" projects, the trees are intended to help alleviate flooding, manage stormwater, protect sources of drinking water, reduce the urban "heat island" effect, and improve air quality. The trees will also improve the quality of life in area neighborhoods, increase residential property values, and boost the economic health of commercial districts.

The trees were planted in three types of locations:

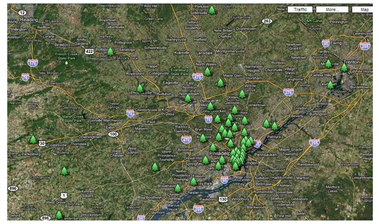
- Riparian buffers
- Parks and open space
- Public streets

More than 60 of the street trees are being planted at five locations in Philadelphia in stormwater-managing tree pits and continuous tree trenches, which include pervious pavers to allow rain from the sidewalk to infiltrate the pits and trenches.

TREES PLANTED

Watersheds	5,850	trees at 5 riparian sites
Regional	930	trees at 13 SEPA locations
Philadelphia	1,000	street trees in several neighborhoods
	200	trees at 10 parks
	60	stormwater trees at 5 sites
TOTAL	**8,000**	

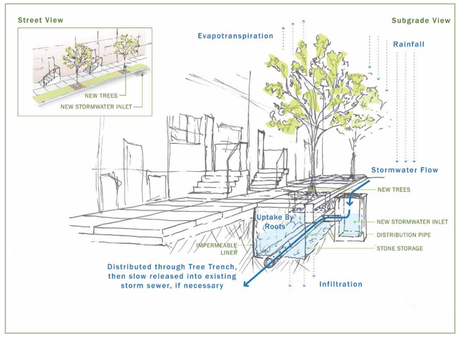
TREE PLANTING LOCATIONS



STORMWATER TREE TRENCHES

PHS

Norris Street Stormwater Tree Trenches, Philadelphia



Northeast Tree Tenders, Philadelphia

PHS

Norristown, Montgomery County

PHS

Laurels Preserve, Unionville, Chester County

PHS PLANTING SEEDS. GROWING LIVES.

Philadelphia PWD Water Department

PENNVEST PENNSYLVANIA INFRASTRUCTURE INVESTMENT AUTHORITY

Green Stormwater Infrastructure
Triple Bottom Line Benefits

Green City, Clean Waters

Philadelphia PWD Water Department

The Green City, Clean Waters plan details the Philadelphia Water Department's vision for protecting and enhancing our watersheds by managing stormwater with innovative green infrastructure, maximizing economic, social, and environmental benefits to Philadelphia and creating a green legacy for future generations.

GREEN STORMWATER INFRASTRUCTURE

Integrating green stormwater infrastructure into a highly developed area like Philadelphia requires a decentralized and creative approach to planning and design. To achieve our vision, PWD is continously exploring ways to implement green stormwater infrastructure thorugh our land-based green programs.

Our definition of green stormwater infrastructure includes a range of soil-water-plant systems that intercept stormwater, infiltrate a portion of it into the ground, evaporate a portion of it into the air, and in some cases release a portion of it slowly back into the sewer system. As a result, less stormwater enters the combined sewer system, ultimately reducing CSOs.

TRIPLE BOTTOM LINE BENEFITS

PWD has undertaken a Triple Bottom Line analysis of the environmental, social, and economic benefits of the Green City, Clean Waters plan. This triple bottom line accounting means expanding the traditional financial reporting framework to take into account ecological and social performance so that the total benefits can be evaluated against the financial investment. The figures associated with the following benefits are specific to Philadelphia.

- **Reduced Combined Sewer Overflow events**
  5-8 billion gallons of CSO avoided per year
- **Enhanced Groundwater Recharge**
  Important for maintaining base flow rates in local rivers and streams
- **Additional habitat and recreation space**
  Increase of over 1 million recreational user-days/year
- **Increased carbon sequestration**
  1.5 billion pounds of carbon dioxide emissions avoided or absorbed
- **Improved air quality:** on average leading to
  1–2 avoided premature deaths
  20 avoided asthma attacks
  250 fewer missed days of work or school/ year
- **Reduced energy and fuel demands**
  Reduction of approximately 6 million kW-hr of electricity and 8 million kBTU of fuel used per year
- **Mitigation of Urban Heat Island effect**
  Trees and vegetation provide shade and naturally cool areas with a dense concentration of surfaces that absorb heat, such as pavement and buildings
- **Higher property values**
  Increase in property values of 2-5% in greened neighborhoods
- **Creation of jobs**
  About 250 people employed in Green Jobs/year

Lisa Armstrong

Greenfield Elementary School rain garden, Philadelphia

Friends Center green roof, Philadelphia

Columbus Square stormwater planters, Philadelphia

Herron Playground rain garden, Philadelphia

Free Library of Philadelphia green roof, Philadelphia

West Mill Creek stormwater tree trenches, Philadelphia

Saylor Grove stormwater wetland, Philadelphia

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PHS PLANTING SEEDS. GROWING LIVES.

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Green Open Space
Cliveden Park

PARTNERS
Philadelphia Water Department
Pennsylvania Horticultural Society
Friends of Cliveden Park
PA Department of Environmental Protection

PROJECT DESCRIPTION

Cliveden Park is in the Tacony Creek portion of the Tookany/Tacony-Frankford Watershed, in the East Mount Airy neighborhood of Philadelphia. The park occupies a full city block of approximately 6 acres. The entire park area drains to a stormwater inlet located at a low point near the intersection of Johnson Street and Chew Avenue. A small wetland less than a quarter acre in size has formed upstream of the inlet.

A series of swale-like and terraced step pools were installed to filter pollutants from stormwater, help stormwater infiltrate, enable evapotranspiration to occur, and slow down stormwater before it drains to the existing wetland. In addition, stormwater from adjacent streets (Cliveden & Johnson Streets) was redirected into Cliveden Park to be managed. The stormwater improvements at Cliveden Park enhance the existing wetland in the park, and provide an amenity for the park community.

LOCATION

Bound by Cliveden St., Chew Ave., Johnson St, and Musgrave St.
Philadelphia, PA 19119

Tookany/Tacony-Frankford Watershed

PHS

Cliveden Park step pools during dry conditions

PHS

Cliveden Park swale during a rain storm

PHS

Cliveden Park step pools during a rain storm

Green Open Space
Liberty Lands Park

PARTNERS
Philadelphia Water Department
Pennsylvania Horticultural Society
Northern Liberties Neighborhood Association
PA Department of Environmental Protection

PROJECT DESCRIPTION

Liberty Lands Park is located in the Delaware Direct Watershed in the Northern Liberties neighborhood. The Philadelphia Water Department funded the development of a master plan for Liberty Lands Park that provides stormwater management while addressing community objectives for the park.

Stormwater runoff from the adjacent street and the park were directed into a rain garden which backs a performance stage. The stormwater filters through the rain garden, then flows into cisterns underneath the park.

The benefits of this project include the reduction of stormwater runoff to the combined sewer system in a neighborhood that suffers from flooding and basement back-ups. The project also provides an enhancement to an already active green open space which serves as a significant community amenity.

LOCATION

3rd and Wildey St.
Philadelphia, PA 19123

Delaware Direct Watershed

Liberty Lands Park rain garden backed by stage

Liberty Lands Park performance stage

Music event at Liberty Lands Park