

# THE CSO LONG TERM CONTROL PLAN *UPDATE*

**GREEN CITIES**  
**CLEAN WATERS**

## Clean Water Benefits and the Balanced Approach The City of Philadelphia



### INTRODUCTION

*The Philadelphia Water Department (PWD) wants to transform Philadelphia's urban landscape into a vibrant, green community where people want to live and work. By merging the vision of a "green city" with "clean water" we can benefit not only our watershed environment, but the region's economic health, quality of life and sustainability.*

*The PWD is well suited to the development and implementation of a watershed approach to Combined Sewer Overflow (CSO) control. The PWD owns and operates the City's sanitary sewers, storm sewers, combined sewers and wastewater treatment plants. In cooperation with the Philadelphia City Planning Commission, the PWD regulates stormwater management during the construction and post-construction phases of most development and redevelopment projects.*

*In 2007, the PWD began to reevaluate its CSO Long Term Control Plan (LTCP) and capital improvements program to integrate additional projects that reduce CSO frequency and volume. The CSO Long Term Control Plan Update (LTCPU) involves the development of additional management alternatives to ensure capture and treatment of sanitary sewer system flows and the reduction of discharges from CSOs, building on the experience and progress gained from the implementation of our original CSO LTCP.*

### Benefits of Clean Water

The resources, amenities and socioeconomic impacts that result from the watershed management approach are endless. A "Green Cities - Clean Water" strategy will stimulate tourism, recreation, and riverfront development, along with the resulting economic benefits and jobs. Cleaner rivers create increased civic pride in the riverfront area, higher property values, and greater potential for valuable riverfront projects.

The definitions of words with an asterisk\* can be found in the glossary at the end of this publication.



An exciting day of fishing at the annual Philly Fun Fishing Fest!

Paddlers take to their boats for the Schuylkill Regatta.



*For more information, please visit us at [www.phillyriverinfo.org](http://www.phillyriverinfo.org)*

## **CSO Long Term Control Plan Update (CSO LTCPU)**

Philadelphia's CSO LTCPU seeks to achieve the regulatory requirements of the National CSO Control Policy through a comprehensive watershed-based approach. The Long Term Control Planning Guidance set forth by the U.S. EPA supports the implementation of a comprehensive watershed management approach and recognizes that the major advantage in using such an approach is that it identifies multiple solutions (land-water-infrastructure based) that are cost effective measures which result in site specific improvements to problems caused by the impacts of CSO and non-CSO sources of pollution on water quality.

*The CSO Long Term Control  
Plan Update  
Falls under the  
"Green Cities - Clean Waters"  
Program.*

## **The National CSO Control Policy**

The National CSO Control Policy requires that the CSO LTCPU consist of the following nine elements:

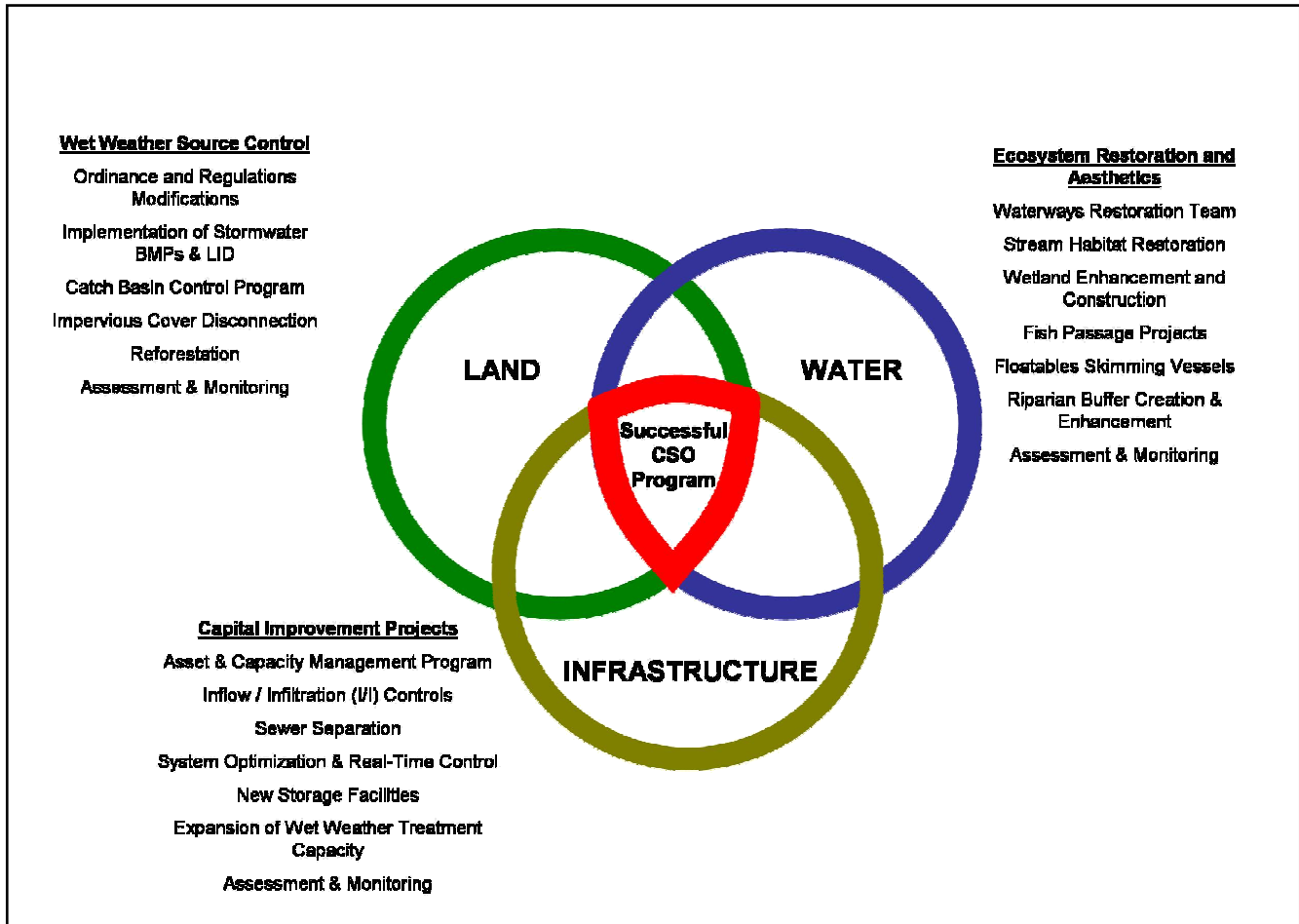
- Characterization, monitoring, and modeling of the combined sewer system as the basis for selection and design of effective CSO controls
- A public participation process that actively involves the affected public in the decision-making to select long-term CSO controls
- Consideration of sensitive areas as the highest priority for controlling overflows
- Operational plan revisions to include agreed-upon long-term CSO controls

- Evaluation of alternatives that will enable the permittee, in consultation with the National Pollutant Discharge Elimination System (NPDES)\* permitting authority, Water Quality Standards (WQS)\* authority, and the public, to select CSO controls that will meet the Clean Water Act (CWA)\* requirements
- Cost/performance considerations to demonstrate the relationships among a comprehensive set of reasonable control strategies
- Maximization of treatment at the existing wastewater treatment plant for wet weather flows
- An implementation schedule for CSO controls
- A post-construction compliance monitoring program adequate to verify compliance with water quality-based CWA requirements and to achieve the effectiveness of CSO controls.

## **A Successful CSO Program: The Balanced "Land-Water Infrastructure" Approach**

The Philadelphia Water Department is committed to a balanced "land-water-infrastructure" approach to achieve its watershed management and CSO control goals. This method includes infrastructure-based approaches where appropriate, but also includes a range of land-based stormwater management techniques and the physical reconstruction of aquatic habitats, where appropriate.

The ultimate goal of PWD's approach is to restore and protect our rivers and streams including the floodplains, riparian buffers, stream channels, streambeds, wildlife, vegetation and other biomarkers that define a



healthy stream ecosystem that have been degraded as a result of urbanization within the City of Philadelphia and in the surrounding counties, while achieving full regulatory compliance in a cost-effective manner. The “Land-Water-Infrastructure” approach is made up of the following three programs, all of which enable the PWD to accomplish its goals under the CSO LTCPU.

### **LAND:**

#### **Wet Weather Source Control**

The Wet Weather Source Control program promotes the use of Low Impact Development (LID)\* and other structural and non-structural controls to reduce CSO volume through evaporation\*, transpiration\*, infiltration\* and detained release\* to the combined sewer system for treatment. The goal of our LID program, unlike past practices, is to keep

stormwater runoff out of our sewer systems. One way that PWD is meeting its goals for this program is through the enactment of our recent stormwater management regulations for new development and redevelopment, established in 2006. These regulations focus on restoring a more natural balance between stormwater runoff and infiltration by requiring the capture of the first one inch of rainfall, reducing pollutant loads through infiltration and/or detention and controlling runoff rates at levels that minimize stream bank erosion. Site designers can ensure the level of stormwater management performance required through the use of a variety of land-based practices that mimic the natural environment, (e.g., redirecting runoff from impervious surfaces\* to green areas, bioretention\*, subsurface storage\* and infiltration, green roofs, swales\*, and tree canopy).



**Our planned Low Impact Development (LID) programs will include:**

- Large-scale implementation of green, attractive measures to manage stormwater at the source on public land and streets to reduce demands on sewer infrastructure
- Requirements and incentives for green, attractive measures to manage stormwater at the source on private land and streets to reduce demands on sewer infrastructure
- A large-scale street tree program to improve appearance and manage stormwater at the source on City streets
- Incentives to preserve open space for use for stormwater management at the source

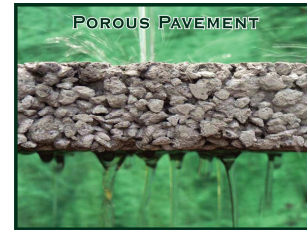
Infiltration garden at Buckman Heights in Portland, Oregon



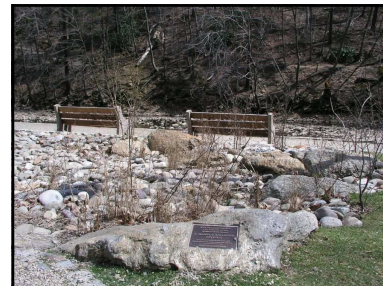
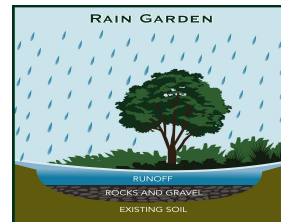
Green roof at The Fencing Academy of Philadelphia



Naturalized stormwater detention basin at Black Rock in Upper Providence Township



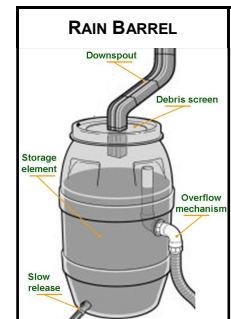
Porous parking lot at Johnson & Johnson Pharmaceutical Research and Development campus



Rain Garden at Wissahickon Creek installed as part of the Valley Green Environmental Restoration program



A rain barrel installed at a Philadelphia residence





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**WATER:**

**Ecosystem Restoration and Aesthetics**

The Ecosystem Restoration and Aesthetics program focuses on projects that contribute to the improvement of the aesthetic and ecological integrity of CSO receiving waters.

Such watershed-based approaches include stream bed and bank stabilization and reconstruction, aquatic habitat creation, plunge pool removal, improvement of fish passage, and floodplain reconnection. Restoring designated uses and ultimately removing streams from the state's list of impaired waters will require the restoration of the functions of a healthy aquatic ecosystem. These functions may be impossible to restore without restoration of the physical channel and the habitat required to support them.

PWD is designing and implementing projects that will restore and/or create stream and wetland habitat through programs that focus on stream habitat restoration, wetland enhancement and construction, fish passage projects and riparian buffer creation and enhancement.

***Cobbys Creek  
at Marshall Road***

**Before**



The creek at Marshall Road suffered from severely eroded banks (*triangle*) and exposed infrastructure (*star*).

**In Progress**



**After**



The natural design of the creek and healthy riparian buffer provides many benefits, including improved habitat for aquatic animals.

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**INFRASTRUCTURE:**

**Capital Improvement Projects**

The Capital Improvement Projects program continues to build CSO capital improvement projects that were planned during the previous CSO permit cycle in addition to new projects to continue to increase the capture and treatment of combined sewage.

These construction projects include traditional storage, conveyance, and treatment measures within the combined sewer collection and treatment system, (e.g., the installation of inflatable dams, underground sewage storage tanks, and storm relief sewers.) Similar in-system construction will continue to be considered along with land-based and water-based measures, and they may be identified as the most cost-effective and feasible solutions in some situations.

However, if used alone, infrastructure-based measures can not address the root causes of impairment in urban streams. For example, the Cobbs Creek and Tookany/Tacony-Frankford Integrated Watershed Management Plans conclude that while some water quality problems exist, the primary causes of impairment in these streams are modified flow patterns and habitat degradation resulting from the urban development of our once natural watersheds. Controlling volume and quality of stormwater runoff is key for restoring the ecosystems of our streams. The Pennsylvania Department of Environmental Protection's (PADEP) integrated impairment listings agree with these findings.

Infrastructure-based measures are typically focused on removing loads of specific pollutants in our piping systems rather than restoring natural flow conditions and habitat. Controlling stormwater runoff (before it enters the sewer system) through rain gardens, tree infiltration trenches, bioswales\* and other land-based practices that recreate the natural environment, is essential for achieving healthy streams. It is for this reason that PWD's strategies include a well defined evaluation of infrastructure solutions combined with LID.



From a story in the Philadelphia Inquirer's "Today" Magazine. January 29, 1961. Research credit Adam Levine.

Additional examples of our capital improvements program include the Real Time Control Center, Water Pollution Control Plant (WPCP) Wet Weather Treatment Maximization, In-Line System Storage Projects, an Asset & Capacity Management Program, Inflow/Infiltration (I/I) Controls, Sewer Separation, and New Storage Facilities.

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### **Additional Watershed Projects**

The PWD integrated and adaptive approach has the added benefit of meeting other stakeholder water resources needs more universally. These programs and projects include: River Conservation Plans, the Watershed Information Center, Integrated Water Use Status Networks, Interpretive Signage, Interpretive Centers, Basin-Specific Stormwater Management Plans (Act 167\*) and Sewage Facility Planning. For more information on the CSO LTCP, please visit: <http://www.phillyriverinfo.org>



The encapsulation of Mills Creek in 1883. Research credit Adam Levine.

## ***Glossary\****

### **Act 167**

The Pennsylvania Stormwater Act 167 of 1978 says that each county must prepare a stormwater management plan for each of its designated watersheds in consultation with the municipalities located within the boundaries of the watershed.

### **Bioretention**

A vegetated depression located on the site that is designed to collect, store and infiltrate runoff. Typically includes a mix of amended soils and vegetation.

### **Detention System**

Temporary storage of stormwater to control the rate of release, allow for infiltration and provide treatment.

### **Evaporation**

A change of liquid to vapor form.

### **Impermeable**

Not easily penetrated. The property of a material or soil that does not allow, or allows only with great difficulty, the movement or passage of water.

### **Impervious Surface**

Those surfaces in the landscape that can not infiltrate rainfall, such as rooftops, pavement, sidewalks, driveways and compacted earth. Lawns with underlying soils compacted by heavy machinery are considered impervious.

### **Infiltration**

The penetration of water through the ground surface into sub-surface soil or the penetration of water from the soil allowing for the recharge of our groundwater table and the baseflow of streams.

### **Low Impact Development (LID)**

A design strategy with the goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques that mimic the natural environment.

### **National Pollutant Discharge Elimination System (NPDES)**

A provision of the Clean Water Act which prohibits discharge of pollutants into waters of the United States unless a special permit is issued by EPA, a state, or, where delegated, a tribal government on an Indian reservation.

### **Pervious or Permeable Surfaces**

Soil or other material that allows infiltration or passage of water or other liquids.

### **Subsurface Storage**

Retaining or detaining water underground. Stored water can be released at a later time into natural waterways to reduce peak storm flows, or allowed to slowly infiltrate to recharge groundwater.

### **Swale / Bioswale**

Open, vegetated drainage channel designed to detain, treat and/or infiltrate stormwater.

### **Transpiration**

The process by which water vapor is lost to the atmosphere from living plants.

### **Water Quality Standards (WQS)**

State-adopted and EPA-approved ambient standards for water bodies. The standards prescribe the use of the water body and establish the water quality criteria that must be met to protect designated uses.



## **Clean Water Act (CWA)**

### *Introduction to the Clean Water Act as given by the EPA*

The Clean Water Act (CWA) is the cornerstone of surface water quality protection in the United States. (The Act does not deal directly with ground water nor with water quantity issues.) The statute employs a variety of regulatory and nonregulatory tools to sharply reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water."

For many years following the passage of CWA in 1972, EPA, states, and Indian tribes focused mainly on the chemical aspects of the "integrity" goal. During the last decade, however, more attention has been given to physical and biological integrity. Also, in the early decades of the Act's implementation,

efforts focused on regulating discharges from traditional "point source" facilities, such as municipal sewage plants and industrial facilities, with little attention paid to runoff from streets, construction sites, farms, and other "wet-weather" sources.

Starting in the late 1980s, efforts to address polluted runoff have increased significantly. For "nonpoint" runoff, voluntary programs, including cost-sharing with landowners are the key tool. For "wet weather point sources" like urban storm sewer systems and construction sites, a regulatory approach is being employed.

Evolution of CWA programs over the last decade has also included something of a shift from a program-by-program, source-by-source, pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach equal emphasis is placed on protecting healthy waters and restoring impaired ones. A full array of issues are addressed, not just those subject to CWA regulatory authority. Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining state water quality and other environmental goals is another hallmark of this approach.