## REDUCING COMBINED SEWER OVERFLOWS TO THE DISTRICT'S WATERWAYS

Under the terms of a 2005 legal agreement between DC Water, the District of Columbia, the US Department of Justice, and the US Environmental Protection Agency, DC Water is implementing the $2.6 billion DC Clean Rivers Project. The first phase of the project is underway and involves constructing a massive underground tunnel system to control combined sewer overflows (CSOs) to the Anacostia River. Since 2011, DC Water has explored the use of green infrastructure as a tool to reduce CSOs to the Potomac River and Rock Creek.

DC Water and the parties to the 2005 legal settlement are announcing a plan to allow for large-scale green infrastructure installations and other modifications to the DC Clean Rivers Project impacting the Potomac River and Rock Creek.

EXISTING PLAN

UPDATED PLAN

CSO 049: Manage volume equal to 1.2" of rain falling on 365 impervious acres

CSOs 027, 028, 029: Manage volume equal to 1.2" of rain falling on 133 impervious acres

CSOs 025, 026: Separate sewers

CSOs 020–024: Control using Potomac tunnel

LEGEND

Rock Creek and Potomac drainage areas

Rock Creek and Potomac drainage areas with Green Infrastructure and targeted sewer separation

Drainage areas with sewer separation

Potomac River Tunnel

Anacostia River Tunnel System

CSO outfalls (associated with updated plan)

Blue Plains Advanced Wastewater Treatment Plant

BENEFITS OF THE UPDATED PLAN

SOONER
Unlike a massive underground tunnel system, green infrastructure provides water quality benefits as soon as installation begins. The green infrastructure and other improvements will allow the District to enjoy water quality and other environmental and social benefits as early as 2017.

BETTER
Green infrastructure offers environmental, social, and economic benefits that would not be realized under the existing plan.

STRONGER
DC Water's proposed schedule for green infrastructure implementation and construction of the redesigned Potomac River Tunnel helps reduce the impact of construction on neighborhoods and allows sufficient time for required construction approvals. The revised schedule will help protect our ratepayers responsible for financing the $2.6 billion project.

GREEN INFRASTRUCTURE

ALICE DEAL MIDDLE SCHOOL

During the spring of 2014, DC Water and Alice Deal Middle School began collaboration on expanding STEM opportunities to students through experiential learning using the green infrastructure at DC Water's Fort Reno Reservoir site as a real-world example. The proximity of Alice Deal to Fort Reno Reservoir provides an opportunity to bring the classroom outdoors into a learning/living laboratory and introduce students to a future career in engineering and other technical fields.

▲ *DC Water collaborated with Alice Deal Middle School to host a Green Infrastructure Design Challenge. Here, students proudly display their petri dish green infrastructure project. (2014)*

GEORGETOWN UNIVERSITY

▲ *Georgetown University students develop green infrastructure plans for the campus within CSO 028 subshed.*

For the 2015 EPA Campus Rainworks Challenge, DC Water and Georgetown University students, faculty, and staff worked together to develop GI concept plans for areas around Lauinger Library on Georgetown's campus. The GI designs showcased options to creatively capture stormwater and develop underutilized campus space, including a bioretention outdoor classroom, a green roof above the library entrance, and permeable pavement in parking areas. In addition to mitigating combined sewer overflows (CSOs), all GI was designed to provide educational opportunities and increased awareness for students and visitors about stormwater, CSOs, and their impacts on the District's waterways. The team's submission went on to receive an honorable mention for the national competition!

WASHINGTON LATIN + PAUL PUBLIC CHARTER SCHOOLS

DC Water has also engaged with administration and teachers at two schools in Rock Creek to develop green infrastructure designs for their campuses: Washington Latin Public Charter School and Paul Public Charter School. The green infrastructure will create opportunities to support stem curriculum through elements such as:

* *Downspout disconnection into rain barrels to support school gardens and apiaries;*
* *Swales and bioretention to reveal stormwater management action; and*
* *Interpretive signage to support student education and community outreach.*

CISTERNS VEGETABLE GARDEN AREA COBBLE STREAMBED/ STORMWATER CONVEYANCE BIORETENTION AREA PEDESTRIAN PLAZA
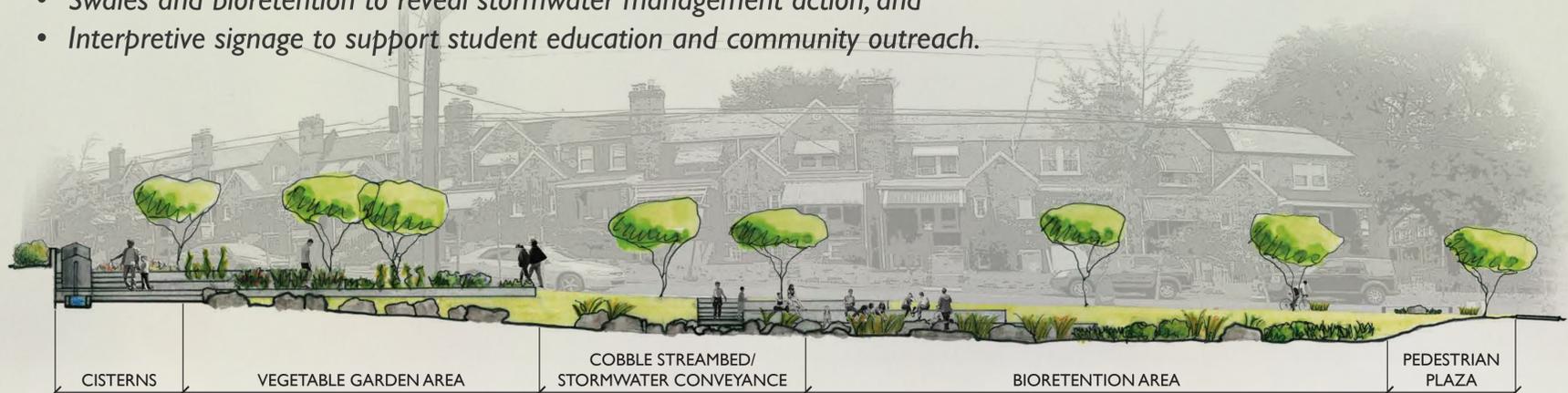
▲ *A rendered section shows key components of the Washington Latin Public Charter School green infrastructure site.*

GREEN INFRASTRUCTURE

GREEN INFRASTRUCTURE DESIGN CHALLENGE

Beginning in 2013, DC Water hosted a two-phase Green Infrastructure Challenge to drive innovation and performance in green infrastructure design. The goals of the GI Challenge were to:

- *Advance innovative technologies;*
- *Capture stormwater runoff volume;*
- *Demonstrate cost-effective solutions;*
- *Propose practical and implementable solutions that can be constructed; and*
- *Retrofit the urban environment.*

▲ Locations of implementation from the Green Infrastructure Challenge proposal.

In the first phase, seven design teams were selected as winners based on their concepts and designs. DC Water is currently in the second phase, where two of the designs have been funded for further design and construction: two triangle parks on Kansas Avenue NW, and the 100 block of Kennedy Street NW. Overall, DC Water has awarded over $1 million for both phases with the goal of driving innovation and performance for future design and construction of green infrastructure under DC Water's updated plan.
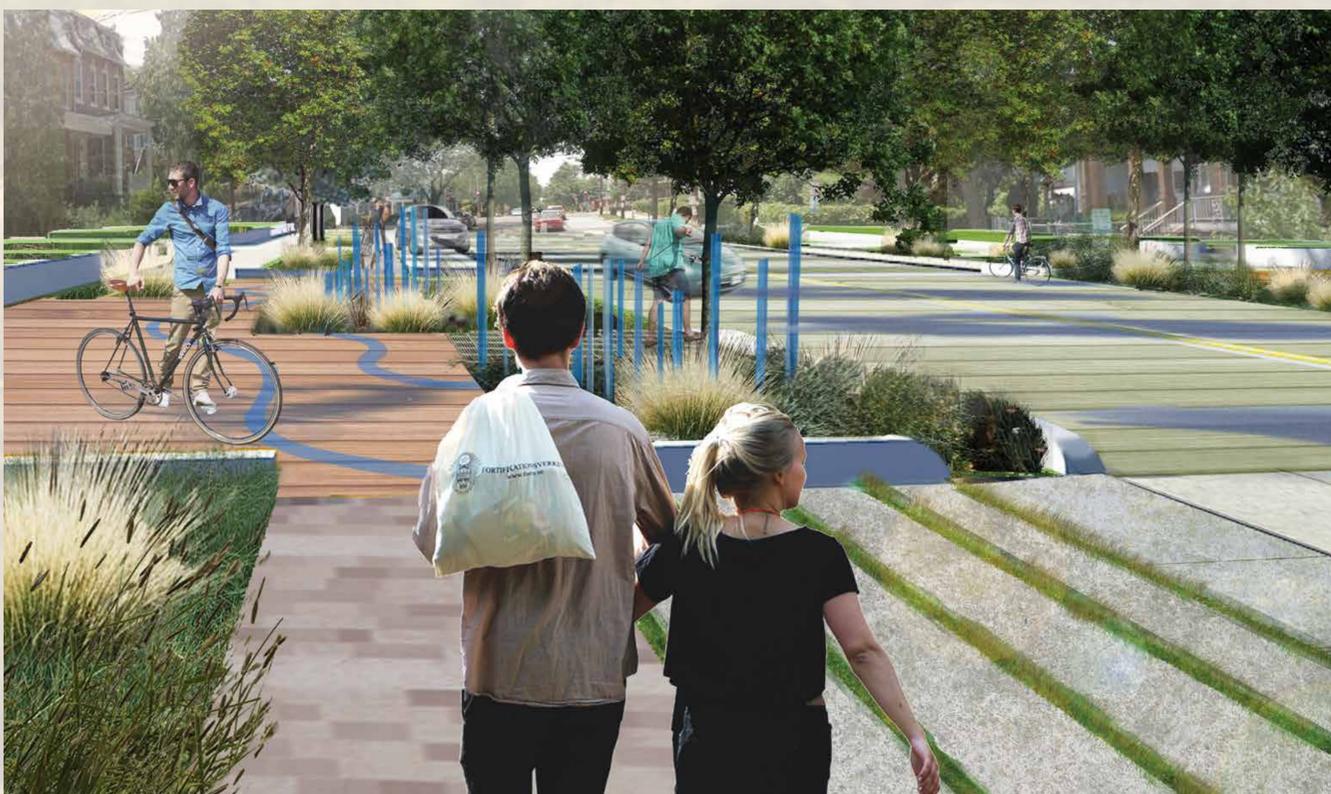
◄ *Rendering of Team Nitsch Engineering's green infrastructure Phase 1 winning design.*

GREEN INFRASTRUCTURE

DC WATER AND DISTRICT OF COLUMBIA
GREEN JOBS MEMORANDUM OF AGREEMENT

DC Water and the District of Columbia are announcing an agreement to help support local job creation associated with DC Water's green infrastructure implementation. The agreement will create an ambitious local jobs program that includes training and certification opportunities for District residents interested in green infrastructure construction and maintenance jobs. DC Water has established a goal to have 51% of new jobs created by the Green Infrastructure Project filled by District residents. DC Water will also engage professional service firms and contractors based in the District to perform work associated with green infrastructure.

PILOT "GROWING FUTURES" PROGRAM

In 2014, DC Water hosted a pilot green roof maintenance training program to provide opportunities for young adults to work in green infrastructure. The training program was comprised of traditional classroom training followed by field-based, hands-on training and covered all aspects of maintenance, including: safety and fall protection; tool usage; plant identification; planting and weeding; operation of irrigation systems; pest and invasive species controls; and repairing roof damage. The first cohort was trained in the early summer 2014. Eight trainees successfully completed the program with several heading off to new jobs directly related to the training program.

DC Water provided program funding, safety training, and access to the Fort Reno Reservoir Green Roof as a training site.

BENEFITS OF THIS TRAINING PROGRAM

- Providing real-world training for local residents in a high-growth industry;
- Establishing a model for broad-based green infrastructure maintenance training and standards to support future job creation; and
- Supporting local demand for skilled "green" workforce.

"Growing Futures" graduates at the Fort Reno green roof ribbon cutting ceremony.

GREEN INFRASTRUCTURE

PROVIDING EQUIVALENT WATER QUALITY BENEFITS

Since 2011, DC Water has evaluated, modeled, implemented and monitored green infrastructure to develop the updated plan that provides equivalent water quality benefits compared to the existing DC Clean Rivers Project. Over $14.5 million has been invested by DC Water to date, and includes the implementation of green infrastructure projects along Irving Street for flood mitigation to the Bloomingdale and LeDroit Park neighborhoods, and retrofits at DC Water facilities. DC Water will employ an adaptive management approach to green infrastructure implementation to learn from these and subsequent projects to improve green infrastructure performance and efficiency.

RECENTLY COMPLETED GREEN INFRASTRUCTURE BY DC WATER

Irving Street GI
- 14 bioretention cells up to 2,400 sf in size

Anacostia Water Pumping Station
- 1,000 sf of permeable pavement
- 1,500 sf of bioretention

Fort Reno Reservoir
- 42,400 sf green roof
- 8,400 sf of permeable pavement

East Side Pumping Station
- 6,600 sf green roof
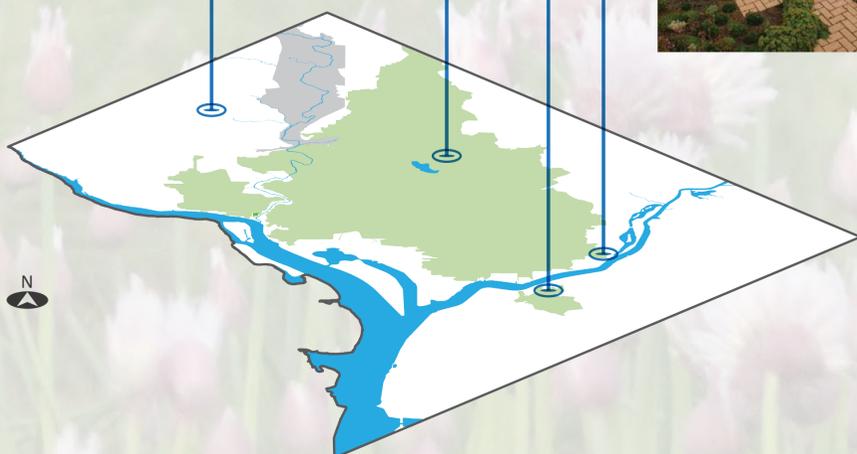
WHAT IS GREEN INFRASTRUCTURE?

Green infrastructure replicates natural processes by capturing, slowing, and cleaning stormwater before it enters the sewer system and provides additional Triple Bottom Line (TBL) benefits to the community such as:

- *Environmental Benefits: Clean air, clean water, and habitat creation for birds and pollinators;*
- *Social Benefits: Enhancing and greening community space; and*
- *Economic Benefits: Local and sustainable job creation and increased property values.*

Examples of GI technologies include bioretention, permeable pavement, green roofs, and rain barrels.

NATURAL ENVIRONMENT (NATURAL GROUND COVER)

40% EVAPORATION
RAINFALL
10% RUNOFF
25% SHALLOW INFILTRATION
25% DEEP INFILTRATION
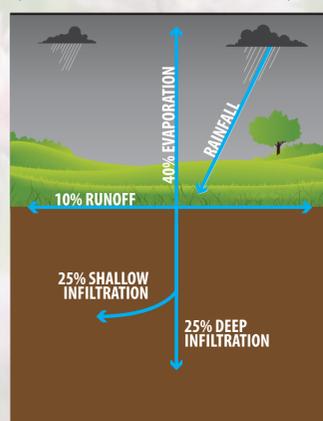
URBAN ENVIRONMENT (75% - 100% IMPERVIOUS COVER)

30% EVAPORATION
RAINFALL
55% RUNOFF
10% SHALLOW INFILTRATION
5% DEEP INFILTRATION
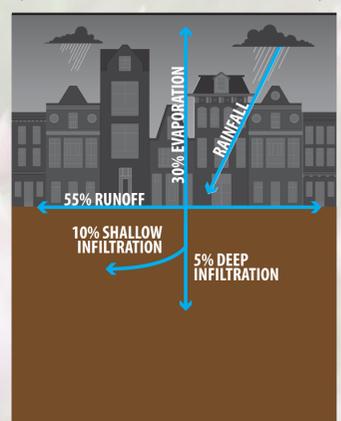
▲ *Green infrastructure is designed to mimic natural hydrology.*

GREEN INFRASTRUCTURE