District of Columbia Water and Sewer Authority
George S. Hawkins, General Manager

Briefing on:

**DC Clean Rivers Project**
**Green Infrastructure Program**

Briefing for:

**American Institute of Certified Planners Symposium:**
**Green Stormwater Infrastructure**

October 28, 2015
Agenda

- Background
- DC Clean Rivers Project
  - Overview
  - Consent Decree Modification Process
- Green Infrastructure Implementation
- Drivers for Long-term Success
- Questions
Background: Why Stormwater is a Problem in DC and Other Cities

Natural Environment:
0% Impervious Surface

Built Environment:
75-100% Impervious Surface
Background: Sewer Systems in DC

<table>
<thead>
<tr>
<th>Combined Sewer System</th>
<th>Sunny Day</th>
<th>Rainy Day*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downspout</td>
<td>Storm drain</td>
<td>Outfall pipe</td>
</tr>
<tr>
<td>Sewage from domestic, commercial, and industrial sources</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flows to Blue Plains</td>
<td>Dam</td>
<td>Combined sewage and stormwater</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Separate Sewer System</th>
<th>Sunny Day</th>
<th>Rainy Day*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downspout</td>
<td>Storm drain</td>
<td>Outfall pipe</td>
</tr>
<tr>
<td>Separate storm sewer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flows to Blue Plains</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Discharge occurs when pipe's capacity is exceeded

1 pipe Combined Sewer Overflow = CSO
2 pipes
Background: Where are Combined Sewers Located?

- 1/3 area is combined (12,478 acres)
- 47 Active CSO outfalls
  - 13 to Anacostia
  - 10 to Potomac
  - 24 to Rock Creek
- Three receiving waters
  - Anacostia River
  - Potomac River
  - Rock Creek
DC CLEAN RIVERS
PROJECT OVERVIEW

Tunnel Construction at DC Water

Green Roof Installation at East Side Pumping Station
DC Clean Rivers Project: Magnitude of the Problem, DC Water’s Solution

Anacostia River Potomac River Rock Creek Total System
CSO Overflow (mg/avg year)

<table>
<thead>
<tr>
<th>Year</th>
<th>Anacostia River</th>
<th>Potomac River</th>
<th>Rock Creek</th>
<th>Total System</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>2142</td>
<td>1063</td>
<td>49</td>
<td>3254</td>
</tr>
<tr>
<td>2013</td>
<td>1282</td>
<td>638</td>
<td>43</td>
<td>1963</td>
</tr>
</tbody>
</table>

96% Reduction
DC Clean Rivers Project: Long Term Control Plan Timeline

1998 - LTCP Started
2002 - Final LTCP
2003 - LTCP Meets WQOS (EPA/DOJ)
2005 - Consent Decree Signed
2007 - New Nitrogen limits require changing LTCP
2011 - DC Water evaluates GI for Potomac and Rock Creek

May 20, 2015 – EPA/DOJ lodge Consent Decree Modification in District Court

Public Participation

DC Clean Rivers Project
DC Clean Rivers Project: Progress on Tunnels

DC Clean Rivers Project has let more than **$1.2 Billion** in Construction & Engineering Contracts
# DC Water Bill: Typical Residential Customer

<table>
<thead>
<tr>
<th>Description</th>
<th>Current $ (FY2015)</th>
<th>FY 2016 $ Uniform</th>
<th>FY 2016 $ Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Water and Sewer Retail Rates</td>
<td>57.67</td>
<td>61.41</td>
<td>59.12</td>
</tr>
<tr>
<td>DC Water Clean Rivers IAC</td>
<td>16.75</td>
<td>20.30</td>
<td>20.30</td>
</tr>
<tr>
<td>DC Water Customer Metering Fee</td>
<td>3.86</td>
<td>3.86</td>
<td>3.86</td>
</tr>
<tr>
<td>DC Water Infrastructure Fee</td>
<td>-</td>
<td>6.30</td>
<td>6.30</td>
</tr>
<tr>
<td><strong>Subtotal: DC Water Rates &amp; Charges</strong></td>
<td><strong>78.28</strong></td>
<td><strong>91.87</strong></td>
<td><strong>89.58</strong></td>
</tr>
<tr>
<td>Increase / Decrease</td>
<td></td>
<td>13.59</td>
<td>11.30</td>
</tr>
<tr>
<td>District of Columbia PILOT</td>
<td>3.08</td>
<td>3.14</td>
<td>3.14</td>
</tr>
<tr>
<td>District of Columbia Right-of-Way Fee</td>
<td>1.14</td>
<td>1.14</td>
<td>1.14</td>
</tr>
<tr>
<td>District of Columbia Stormwater Fee</td>
<td>2.67</td>
<td>2.67</td>
<td>2.67</td>
</tr>
<tr>
<td><strong>Subtotal District of Columbia Charges</strong></td>
<td><strong>6.89</strong></td>
<td><strong>6.95</strong></td>
<td><strong>6.95</strong></td>
</tr>
<tr>
<td><strong>Total Amount Appearing on DC Water Bill</strong></td>
<td><strong>85.17</strong></td>
<td><strong>98.82</strong></td>
<td><strong>96.53</strong></td>
</tr>
<tr>
<td>Increase / Decrease Over Prior Year</td>
<td></td>
<td>13.65</td>
<td>11.36</td>
</tr>
<tr>
<td><strong>Percent Increase in Total Bill</strong></td>
<td></td>
<td><strong>16.03%</strong></td>
<td><strong>13.34%</strong></td>
</tr>
</tbody>
</table>

* Assumes 6.69 Ccf consumption, 1 ERU and 5/8” meter

Discount Application Available at: [http://ddoe.dc.gov/riversmartrewards](http://ddoe.dc.gov/riversmartrewards)
MOVING TOWARD GREEN...
CONSENT DECREE
MODIFICATION PROCESS
DC Clean Rivers Project: What is Green Infrastructure (GI)?

- Bioretention and Rain Gardens
- Permeable Pavement
- Rain Barrels and Cisterns
- Vegetated Swales
- Native Landscaping
- Green Roofs

Evaporation
Precipitation
Evaporation & Transpiration
Depression storage
Overland flow
Stream flow
Infiltration
Filtration
### DC Clean Rivers Project:
**Green Infrastructure for CSO Control is a Proven Technology**

<table>
<thead>
<tr>
<th>City</th>
<th>LTCP Time Frame (years)</th>
<th>Consent Decree w/ Green?</th>
<th>Annual Overflow Volume (Million Gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Before LTCP</td>
</tr>
<tr>
<td>Kansas City (WSD)</td>
<td>25</td>
<td>Yes; 2010</td>
<td>6,400</td>
</tr>
<tr>
<td>Cleveland (NEORSD)</td>
<td>25</td>
<td>Yes; 2010</td>
<td>4,500</td>
</tr>
<tr>
<td>New York (DEP)</td>
<td>25</td>
<td>State approved; 2012</td>
<td>30,000</td>
</tr>
<tr>
<td>Philadelphia (PWD)</td>
<td>25</td>
<td>State approved (State – 2011) (EPA Admin order – 2012)</td>
<td>10,307 to 15,873</td>
</tr>
</tbody>
</table>

Other cities with Consent Decrees that include Green Infrastructure:
- Atlanta
- St. Louis
- Louisville
- Cincinnati
- Onondaga County (Syracuse)
- NY
DC Clean Rivers Project:
Environmental, Social and Economic GI Benefits

**Environmental**
- Reduce runoff
- Improve air quality
- Reduce summer temperatures
- Reduce energy usage
- Offset climate change
- Habitat improvement

**Social**
- Enhance aesthetics
- Improve livability through green space
- Reduce scope and duration of disruption during construction

**Economic**
- Create green jobs
- Enhance property values
- Improve quality of life
DC Water has invested more than $14 M in GI

- Planted more than 5500 trees via UFA, rain garden at Irving & North Capitol St. ($1.7 M)
- Green Roofs, Pervious Pavement, and Bioretention at Three DC Water Facilities ($>3.5 M)
- Funded RiverSmart Washington Demonstration Project ($1 M)
- GI Challenge, LTCP Modification, and Early Action Projects ($>4 M)
- Irving Street Bioretention ($>2.75 M)
DC Clean Rivers Project: Updated Plan

- DC Clean Rivers Project: $2.6 Billion
- Nitrogen Removal: $950 Million
- Total > $3.5 Billion
- 25 yr implementation (2005 – 2030)
- 96% reduction in CSOs & flood relief in Northeast Boundary
- Approx 1 million lbs/yr nitrogen reduction predicted
DC Clean Rivers Project: Examples of Green Infrastructure in Cities

- Bioretention along Streets
- Permeable Pavement along Streets and in Alleys

Other potential GI could include: Rain barrels, Cisterns, Green Roofs, etc.
## Predicted CSO Reduction = Equivalent to Existing

<table>
<thead>
<tr>
<th>Receiving Water</th>
<th>Parameter</th>
<th>Before LTCP</th>
<th>LTCP</th>
<th>Recom. Plan$^{2,3}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rock Creek’s Piney Branch CSO</td>
<td>No. Overflows (#/average year)</td>
<td>25</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Overflow Volume (million gallons/average year)</td>
<td>39.73</td>
<td>1.41</td>
<td>0.6</td>
</tr>
<tr>
<td></td>
<td>% Reduction from Before LTCP</td>
<td>--</td>
<td>96%</td>
<td>&gt;96%</td>
</tr>
<tr>
<td>Potomac River</td>
<td>No. Overflows (#/average year)</td>
<td>74</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Overflow Volume (million gallons/average year)</td>
<td>953</td>
<td>79</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>% Reduction from Before LTCP</td>
<td>--</td>
<td>92%</td>
<td>≥92%</td>
</tr>
</tbody>
</table>

**Notes:**

1. Results shown for “Before LTCP” are without Phase 1 Controls in place (no Swirl, Inflatable Dams or Pumping Station rehabilitations)
2. The model predictions do not change the level of CSO control determined to be adequate to meet water quality standards which was included by DC Water in its LTCP, and subsequently approved by EPA and DDOE
3. Recommended Plan assumes full implementation of GI
GREEN INFRASTRUCTURE IMPLEMENTATION
NEXT STEPS
Green Infrastructure Implementation: Selection Criteria for First GI Projects

- Consent Decree Requires:
  - Rock Creek: Manage volume for 1.2” storm on 365 acres in five projects
  - Potomac River: Manage volume for 1.2” storm on 133 acres in three projects

- Identification of first project areas have been defined based on:
  - Maximized Volume Capture
  - Minimized Cost
  - Feasibility of Design and Construction
  - Compatibility with neighborhood needs and aesthetics
  - Synergy with DC Agencies (DDOT, DOEE)
  - Maximizing Triple Bottom Line Benefits
  - Pre- and Post- Construction Monitoring
  - Facilitation of Maintenance
Project Area:
- 42nd Place NW to Wisconsin Ave NW and Fulton Street NW to U Street NW
- 37th Street NW to 31st Street NW and R Street NW to Canal Road NW

Requirement:
- Manage 1.2" of stormwater runoff from 44 impervious acres

Siting Criteria Includes:
- Maximize stormwater management volume at lowest cost
- Maximizing triple bottom line benefits
- Minimizing utility relocation
- Minimizing parking impacts
- Minimizing impact to trees and existing infrastructure
- Minimizing impacts to cultural and historic resources (i.e. cobblestone streets, etc.)
Green Infrastructure Implementation: Rock Creek Project A

**Project Area:**
- 3rd Place NW to First Street NE and Oglethorpe Street NW to Gallatin Street NW

**Requirement:**
- Manage 1.2" of stormwater runoff from 20 impervious acres

**Siting Criteria Includes:**
- Maximize stormwater management volume at lowest cost
- Maximizing triple bottom line benefits
- Minimizing utility relocation
- Minimizing parking impacts
- Minimizing impact to trees and existing infrastructure
- Creating links with other green project opportunities
Green Infrastructure Implementation: Rock Creek and Potomac River Project A Schedules

- Rock Creek Project A:
  - **RFP Development:** 2015 – mid 2016
  - **Procurement:** mid 2016 – early 2017
  - **Design-Build:** early 2017 - 2019
  - **Monitoring:** 2019 – 2020

- Potomac River Project A:
  - **RFP Development:** 2015 - late 2016
  - **Procurement:** late 2016 – mid 2017
  - **Design-Build:** mid 2017 - 2019
  - **Monitoring:** 2019 - 2020

Complete Schedule Available at: dcwater.com/green (‘Resources’ Section)
Green Infrastructure Implementation: Coordination with Agencies & Organizations

Examples:

- District Department of Transportation (DDOT)
  - Infrastructure coordination and synergies

- Department of Energy and the Environment (DOEE)
  - Environmental protection

- District of Columbia Historical Preservation Office (DC SHPO)
  - Historic and archeologic sites identification

- U.S. Commission of Fine Arts (CFA)
  - Preserving the character of the District

- Old Georgetown Board (OGB)
  - Preserving the character of Georgetown
DRIVERS FOR LONG-TERM SUCCESS BEYOND VOLUME...
Drivers for Long-term Success: Adaptive Management and Innovation

- Adaptive Management approach built in to program schedule to:
  - Allow for lessons learned to be incorporated from subsequent projects
  - Gain cost and performance efficiencies over time
  - Facilitate maintenance
  - Incorporate new and innovative technologies

- One innovation example - GI Challenge:
  - Advance innovative technologies
  - Demonstrate cost effective solutions
  - Propose practical and implementable solutions that can be constructed

For additional information visit: http://www.dcwater.com/greenchallenge
Drivers for Long-term Success: DC Water Maintenance Program Goals

- Green Infrastructure is maintained and managed just as gray infrastructure assets

- DCCR’s Green Infrastructure Maintenance Program goals:
  - Function
    - Ensure GI function to meet performance requirements.
  - Safety
    - Ensure public and maintenance crew safety.
  - Aesthetics
    - Ensure GI maintains the original project aesthetic goal.
Drivers for Long-term Success: Opportunity for Local, Green Jobs

- Green Jobs Memorandum of Agreement
  - District of Columbia and DC Water
- Overall Goal
  - 51% of new jobs created by contracts or procurements entered into by DC Water with third parties to implement GI required by modified decree are filled by District residents
  - Applies to professional services, construction, inspection and maintenance activities

MOA Available at: dcwater.com/green (‘Resources’ Section)
Drivers for Long-term Success: Green Infrastructure Public Outreach and Partnerships

- DCCR GI Program engages with local environmental groups, DC Agencies and the community throughout all phases of a project:
  - Planning, Design, Construction, Monitoring and Maintenance

- Goals of the outreach include:
  - Information Sharing, Education/Raise Awareness, Participation/Call to Action, Partnership Building, Collaboration, etc.

- Highlighted partnerships include:
  - Universities, District Agencies, Community-Based Organizations, Local Schools
Questions?

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PARK(ing) Day, 2014