



water is life

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

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# *DC Water Resiliency Planning and Climate Change Adaptation in DC*

***NOVEMBER 10, 2016***

***AMERICAN WATER RESOURCES ASSOCIATION***

***NATIONAL CAPITAL REGION SECTION***

***BUILDING RESILIENCE TO FLOODING: LOCAL AND GLOBAL PERSPECTIVES***

**Maureen M. Holman**  
***Sustainability Chief***

**DCWATER.COM**

DC Water Resiliency Planning and Climate Change Adaptation in DC

# Background and Existing Conditions

SEARCH

The New York Times

13 of



Mars Is Pretty Clean. Her Job at NASA Is to Keep It That Way.

MARS INHABITED, SAYS PROF. LOWELL

Life on Mars? You Read It Here First.



George Mueller, Engineer Who Helped Put Man on...

PAID POST: CAPITAL ONE  
Why Small Business Has Boomed Since the Great Recession

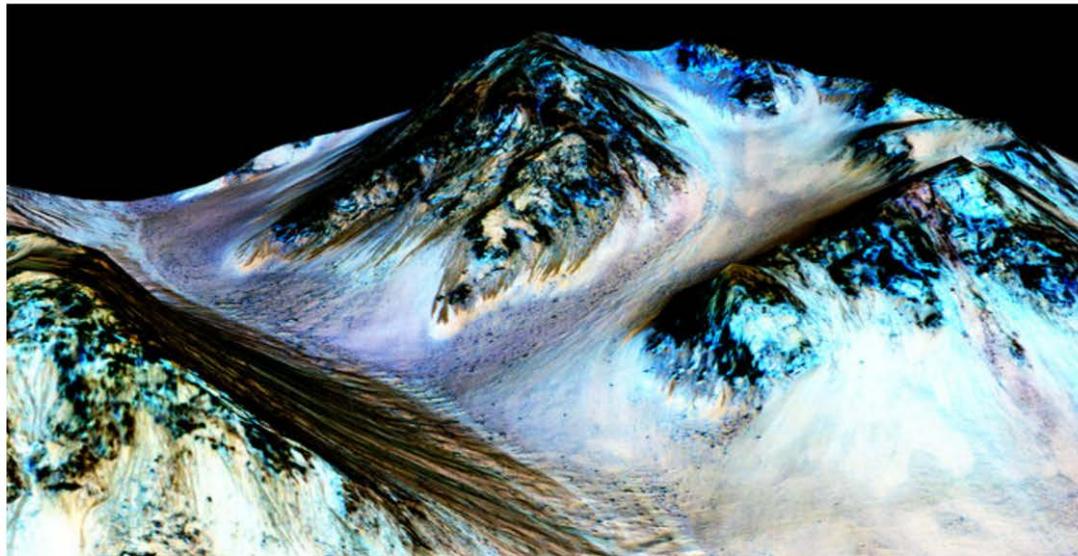


SPACE & COSMOS

553 C

# Mars Shows Signs of Having Flowing Water, Possible Niches for Life, NASA Says

By KENNETH CHANG SEPT. 28, 2015



Scientists say these dark, narrow, downhill streaks are evidence of flowing water on Mars. Jet Propulsion Laboratory/University of Arizona, via NASA.

U.S.

# Flooding Cripples South Carolina Where Some Areas See Over a Foot of Rain

By RICHARD FAUSSET and ALAN BLINDER OCT. 4, 2015

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NORTH CHARLESTON, S.C. — Flooding from days of relentless, saturating rains paralyzed much of South Carolina on Sunday, as vehicles were submerged, dams were pushed to their limits, electricity was cut off to thousands and emergency officials staged hundreds of swift-water rescues.

Officials attributed at least five deaths in South Carolina to the flooding.

The menacing weather, an agonizingly powerful blend of a low-pressure system and some of the moisture from Hurricane Joaquin as it spun over the



A swamped vehicle in Columbia, S.C., on Sunday. South Carolina was hit worst, though the weather also led to emergency declarations in other states along the Eastern Seaboard. Sean Rayford/Getty Images

Unlike any other commodity provided by a public or private utility - power, gas, cable, phone, etc. - water is necessary to ensure survival of all living things on the planet. The provision of clean drinking water and removal/treatment of wastewater is absolutely critical to human survival, and the consequences of even the most brief service disruption can be disastrous for individuals and/or communities.





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Background and Existing Conditions

**1936 Chevy**



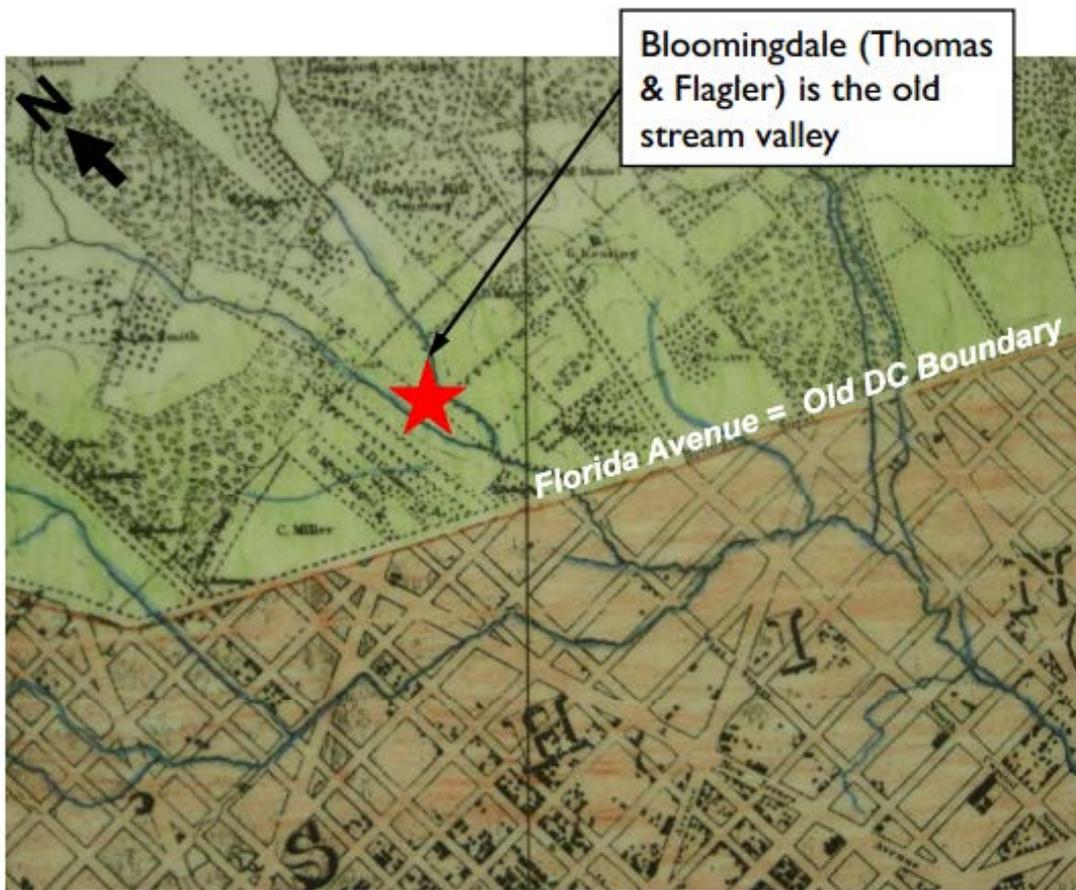
# AGING INFRASTRUCTURE

MEDIAN AGE OF WATER MAINS IS 79 YEARS OLD

Half installed **before 1936**

Oldest date back to the Civil War

# Water will go where it naturally wants to...



1860s Map of DC

Bloomington (Thomas & Flagler) is the old stream valley

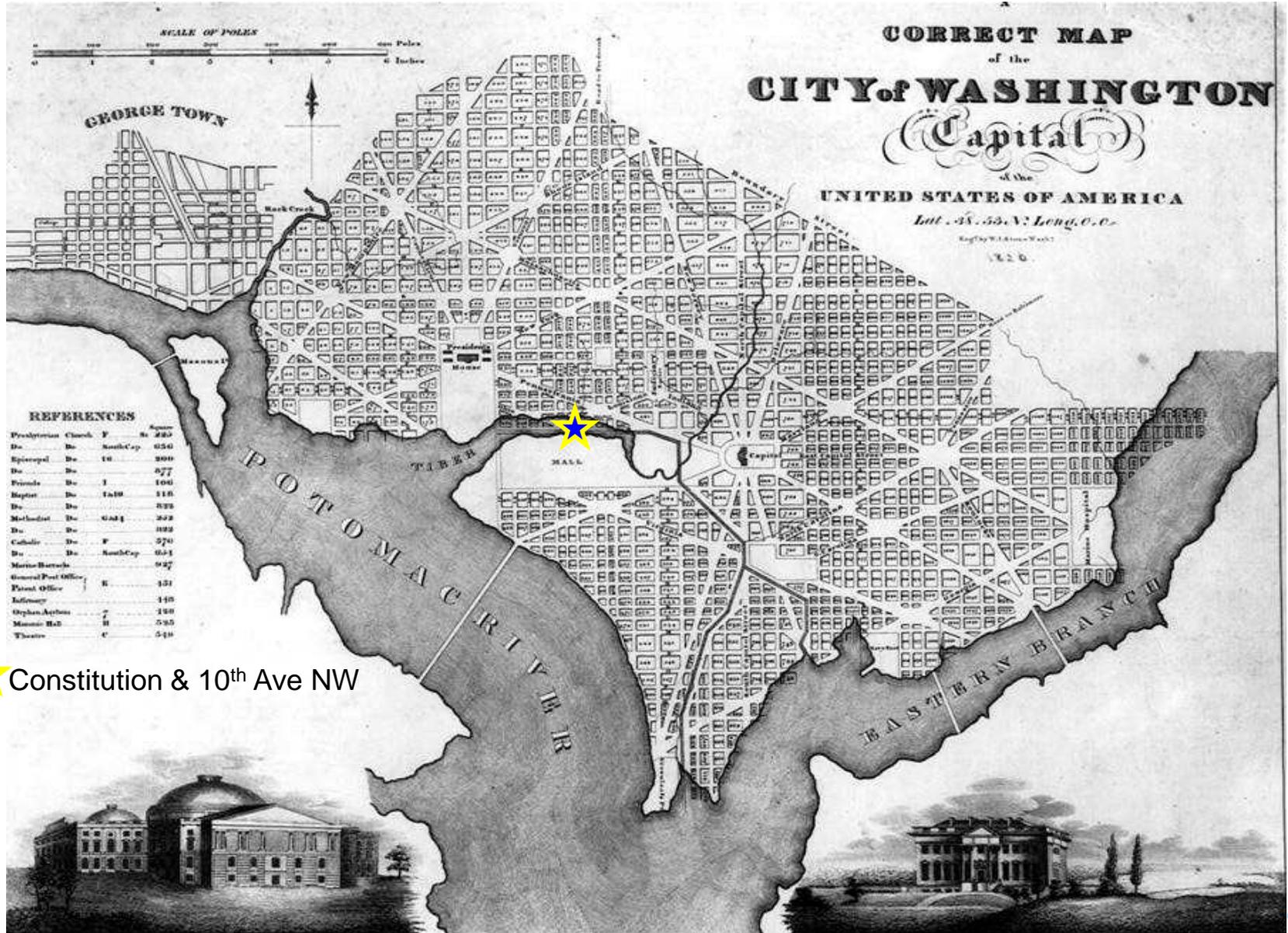


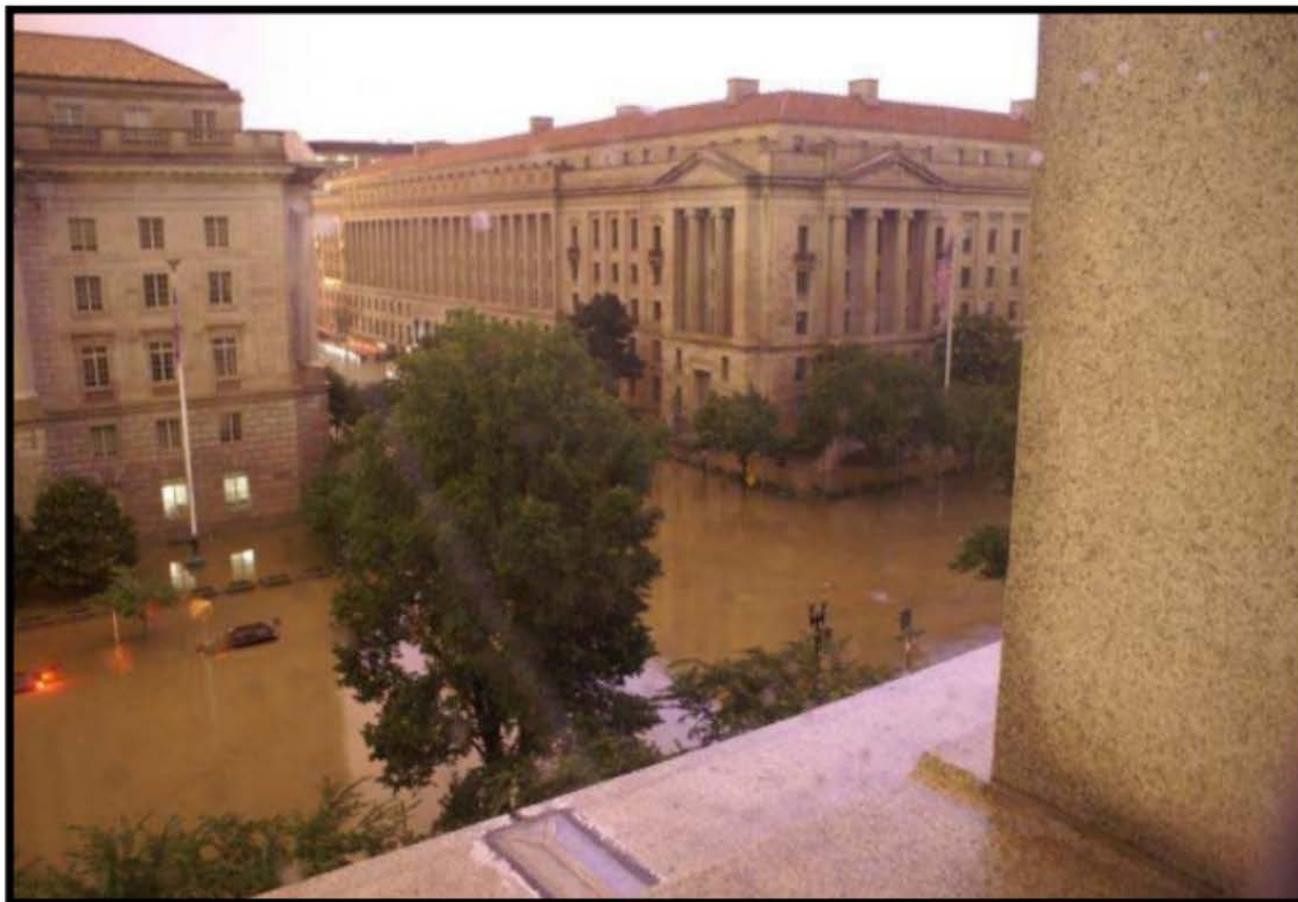
The Bloomingdale and LeDroit Park neighborhoods were developed at the turn of the last century when sewage systems were in their infancy.



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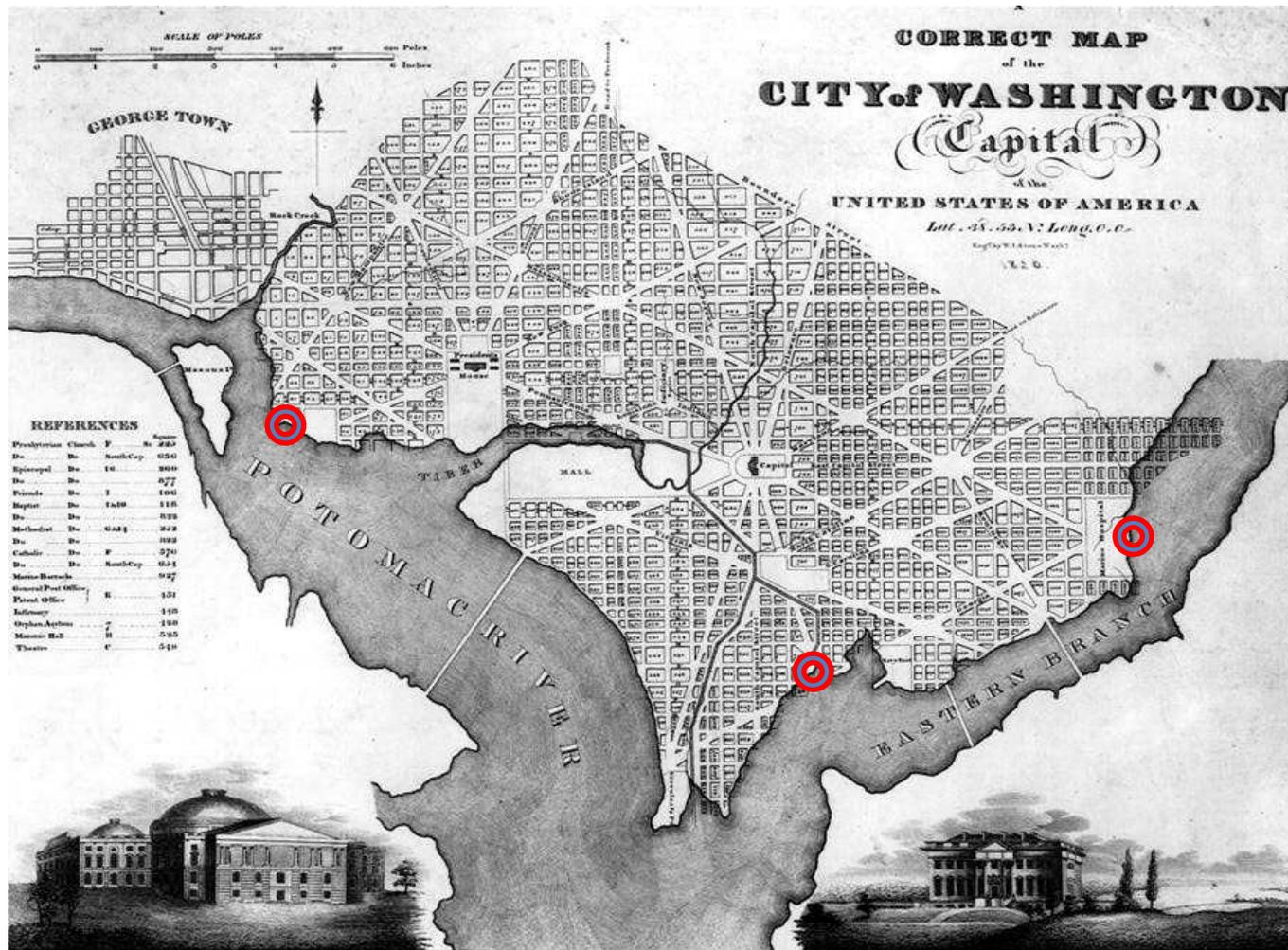
# Background and Existing Conditions





**Location: Constitution Ave. & 10<sup>th</sup> Street NW  
(Showing Internal Revenue Service's Building and Department of Justice Building) Source: GSA**

DC Water's core mission require us to be located and operational in areas vulnerable to flooding



- historical development of sewer systems
- water flows dictated by topography and gravity

**WE CAN'T MOVE!**



**Historic Main Sewerage Pumping Station  
has been in operation since its  
completion in 1907**



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blue horizon 2020 strategic plan  
**dc framework**

revised 2015

## vision values mission

**vision:** To be a world-class water utility.

**values:** **respectful** –Serve with a positive attitude, courtesy, and respect that engender collaboration and trust. **ethical** –Maintain high ethical standards, accountability, and honesty as we advance the greater good. **vigilant** –Attend to public health, the environment, quality, efficiency, and sustainability of our enterprise.

**accountable** –Address challenges promptly, implement effective solutions, and provide excellent service as a committed team.

**mission:** exceed expectations by providing high quality water services in a safe, environmentally friendly, and efficient manner.

## focus areas

**leadership** DC Water will advocate and lead local, regional, and national collaborations, while internally developing the workforce of the future.

**value** DC Water will be recognized for the value it delivers by protecting public health and the environment, supporting community sustainability, and providing for economic vitality.

**innovation** DC Water will achieve international prominence in development and adoption of science, technology and processes in support of a culture of innovation.



**goal 9:** Enhance Operating Excellence Through Innovation, Sustainability, and Adoption of Best Practices

**objectives**

1. Develop, Measure and evaluate specific indices of efficiency
2. Achieve top quartile asset management performance against benchmarks
3. Increase adoption of sustainability processes and programs
4. Increase adoption of innovative processes and programs
5. Leverage innovation to develop alternative revenue sources

**Established Initiatives Under Goal 9:**

- DC Water will demonstrate a **20% target reduction** in Greenhouse Gas (GHG) emissions from 2008 baseline
- Utilize innovative technologies to increase DC Water's use of green energy (off-grid, onsite, no fossil fuels) to **25 percent of load**

**DC Water is a member of, among others:**

- DC (DOEE & OP) Sustainable DC Plan
- MWCOG Climate, Energy and Environment Policy Committee
- DC (DOEE) Climate Adaptation Advisory Group
- Washington, DC Silver Jackets Interagency Team

**DC Water has participated in and presented at:**

- Flood Resilience Workshops hosted by the Center for Clean Air Policy (CCAP), DOEE, OP and HSEMA
- USEPA/DOEE/Cadmus Group Meeting on Assessing Urban Resilience in DC
- Building a Climate Resilient National Capital Region Working Group, hosted by GSA, NASA, Smithsonian, and other federal entities.
- NCPC Monumental Core Climate Adaptation Working Group
- Georgetown Climate Center's (GCC) Workshop on Opportunities to Support State and Local Adaptation through Existing Federal Programs with reps from USEPA, NYC DEP, and CH2MHill
- National Association of Regulatory Utility Commissioners (NARUC) Winter Meetings, Committee on Energy Resources & the Environment Panel
- GMU Center for Infrastructure Protection and Homeland Security / GMU School of Business Joint Executive MBA Program, Critical Infrastructure track

DC Water Resiliency Planning and Climate Change Adaptation in DC

# What is happening in DC and beyond?

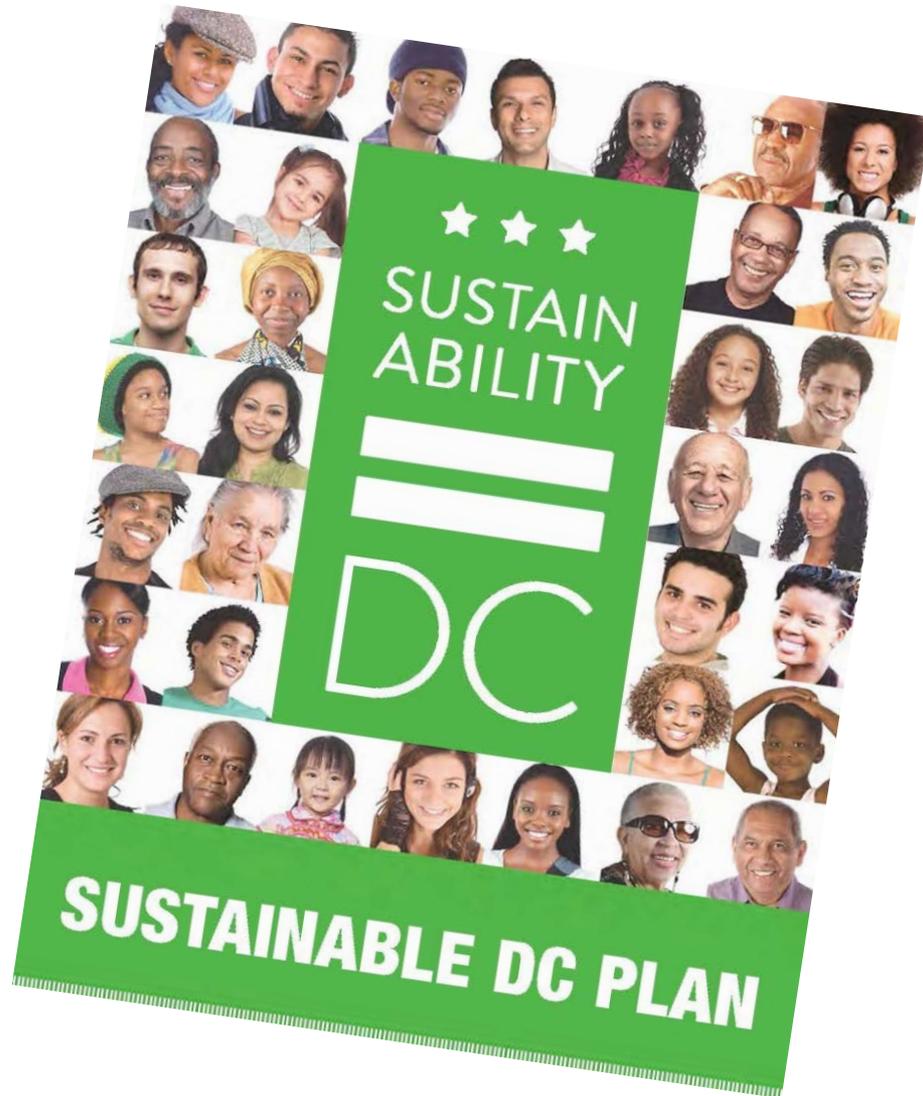


## Sustainable DC Vision

**CLIMATE:** Our Goal for 2032... Reduce citywide greenhouse gas emissions by 50% (and 80% by 2050) while adapting to the hazards of climate change.

**ENERGY:** Our Goal for 2032... Achieve zero waste by producing less waste in the first place and capturing value from everything else through reuse, recycling, composting and energy production.

**WATER:** Make 100% of District waterways fishable and swimmable; Use 75% of our landscape to filter or capture rainwater for reuse





***National Capital Region Climate Change Report***, which was voluntarily adopted by the COG Board of Directors in November 2008, proposes significant greenhouse gas reduction goals for the region.

- The report's short-term goal is for a reduction of regional greenhouse gas emissions that is 10 percent under a business as usual scenario by 2012,
- The mid-term goal is for a reduction of 20 percent below the 2005 levels by 2020, and
- the long-term goal is for a reduction of 80 percent below the 2005 levels by 2050.



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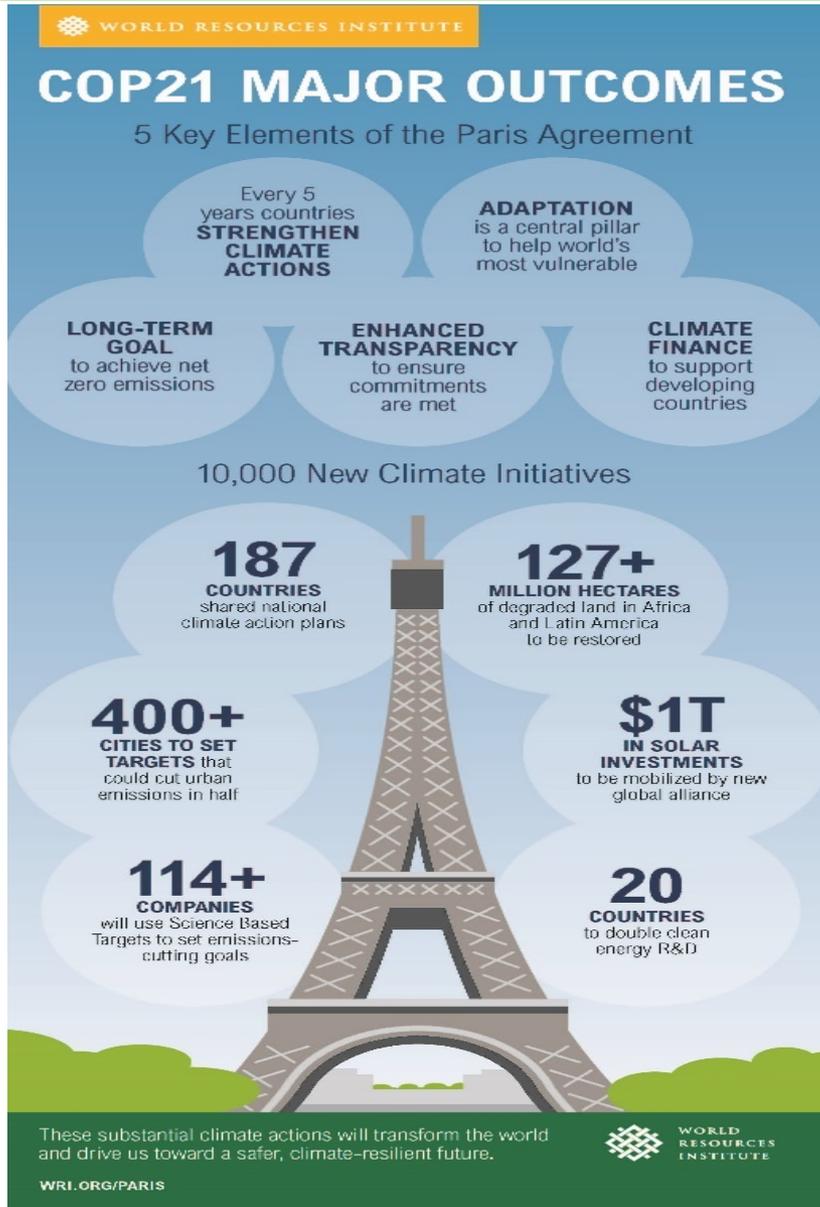
## What is happening in DC and beyond?

In 2013, the President established the State, Local, and Tribal Leaders Task Force on Climate Preparedness and Resilience to provide his Administration with recommendations on how the Federal Government can respond to the needs of communities nationwide. As part of the Federal government's commitment to lead by example in curbing the greenhouse gas (GHG) emissions that are driving climate change, on February 19, 2015, President Obama signed Executive Order (EO) 13693. The EO will **cut Federal GHG emissions**



**40 percent over the next decade from 2008 levels** – Specifically, the Executive Order directs Federal agencies to:

- Ensure 25 percent of their total energy (electric and thermal) consumption is from clean energy sources by 2025.
- Reduce energy use in Federal buildings by 2.5 percent per year between 2015 and 2025.
- Reduce per-mile GHG emissions from Federal fleets by 30 percent from 2014 levels by 2025, and increase the percentage of zero emission and plug in hybrid vehicles in Federal fleets.
- Reduce water intensity in Federal buildings by 2 percent per year through 2025.



At the UN Climate Conference in Paris, known as COP21, 196 countries joined together in the Paris Agreement, a universal pact that sets the world on a course to a zero-carbon, resilient, prosperous and fair future. The Paris Agreement sets landmark goals for taking action on climate change, aiming to keep temperature rise to well below 2 degrees C (3.6 degrees F) and to pursue efforts to keep it to limit temperature increase to 1.5 degrees C (2.7 degrees F).

DC Water Resiliency Planning and Climate Change Adaptation in DC

# **Sustainability versus Resiliency... a BLUEPRINT for the Future**



Resiliency often gets lumped into the same bucket as sustainability even though they are different in key ways, especially when it comes to natural hazards.

**Sustainability** focuses on the balance between the environment, social community, and financial viability - and strives to be restorative and find harmony with nature when possible

**Resiliency** accepts that the balance sought in sustainability regimes can result in undesirable outcomes for humans and critical systems, and focuses on ways to mitigate and adapt to hazards to ensure survival.



# BLUEPRINT FOR THE FUTURE

***INNOVATION - ADAPTION - MITIGATION - RESILIENCY - SUSTAINABILITY***

Guidance document will embrace the overlap between different initiatives and priorities without duplicating effort... sustainability shares many of the same goals as emergency management/resiliency and innovation

**DC Water will be a World-Class Utility!**

**DC Water will provide excellent Customer Service!**

**DC Water will be an Environmental Steward and Partner!**

These visionary goals, as well as the more detailed objectives of the Blue Horizon 2020 Plan, will be incorporated into our existing activities so as to best prepare DC Water for a changing future.



# BLUEPRINT FOR THE FUTURE

## ***ADAPTION - MITIGATION – SUSTAINABILITY - RESILIENCY - INNOVATION***

DC Water strives to become the ***most resilient utility in the nation*** by ensuring that our operations can continue to serve the people of DC under almost any condition. This will happen through a combination of ***excellent asset management, green, redundant facilities and environmental site design***, coordination with all our stakeholders and response partners in the National Capitol Region (NCR), and ***a focus on the water-energy nexus*** that requires us to think in different ways about how to power our operations and take maximum advantage of the resources we can recycle and recover at Blue Plains.

DC Water must always take into account the ability of the customer base to pay for robust, redundant and resilient systems being recommended – and in many cases will impact the ability of DC Water to implement those necessary systems – which drives us to do more innovative and revenue generating activities.

# BLUEPRINT FOR THE FUTURE

*INNOVATION - ADAPTION - MITIGATION - RESILIENCY - SUSTAINABILITY*

DC Water takes an all-hazards approach to resiliency, developing and implementing strategies to maintain our operations and limit the impact to our customers as much as reasonably possible.

## No Regrets

## Win-Win

- "low-regret" (or "no-regret") options that yield benefits even in absence of climate change and where the costs of the adaptation are relatively low vis-à-vis the benefits of acting;
- "win-win (-win)" options that have the desired result in terms of minimizing climate risks or exploiting potential opportunities but also have other social, environmental or economic benefits.



# BLUEPRINT FOR THE FUTURE

## ***INNOVATION - ADAPTION - MITIGATION - RESILIENCY - SUSTAINABILITY***

### Per Blue Horizon, by 2020:

- DC Water will demonstrate a 20% target reduction in Greenhouse Gas (GHG) emissions from 2008 baseline
- Utilize innovative technologies to increase DC Water's use of green energy (off-grid, onsite, no fossil fuels) to 25 percent of load

### By 2050 (Goals aligned with District's vision)

- DC Water will reduce GHG emissions by 80% from 2008 baseline; targeting a 50% reduction by 2032
- DC Water has reduced reliance on traditional fossil fuels by 75%; targeting a 50% reduction by 2032
- DC Water continues to support making 100% of the District's waterways fishable & swimmable

### By 2080... World-Class, Self-Sustaining and Resilient\*

- DC Water will no longer emit Greenhouse Gases
- DC Water facilities and operation run on 100% on green energy

*\*under normal operating conditions, emergencies may require alternatives*

DC Water Resiliency Planning and Climate Change Adaptation in DC

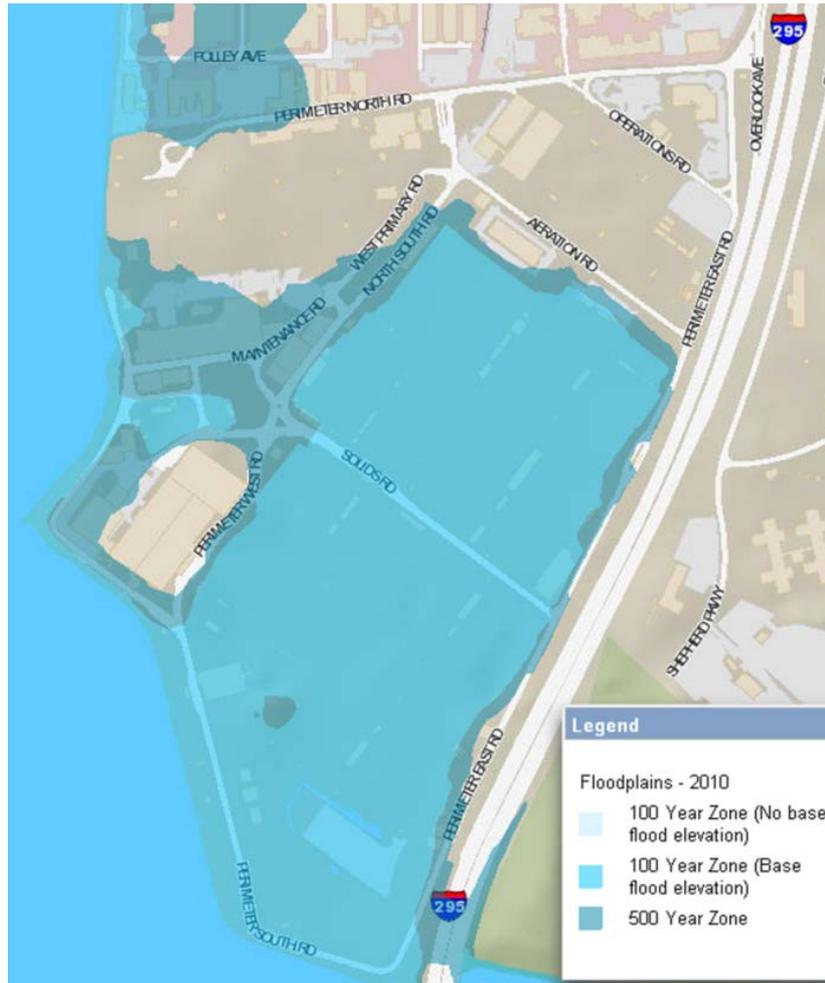
# Adaptation and Mitigation Activities

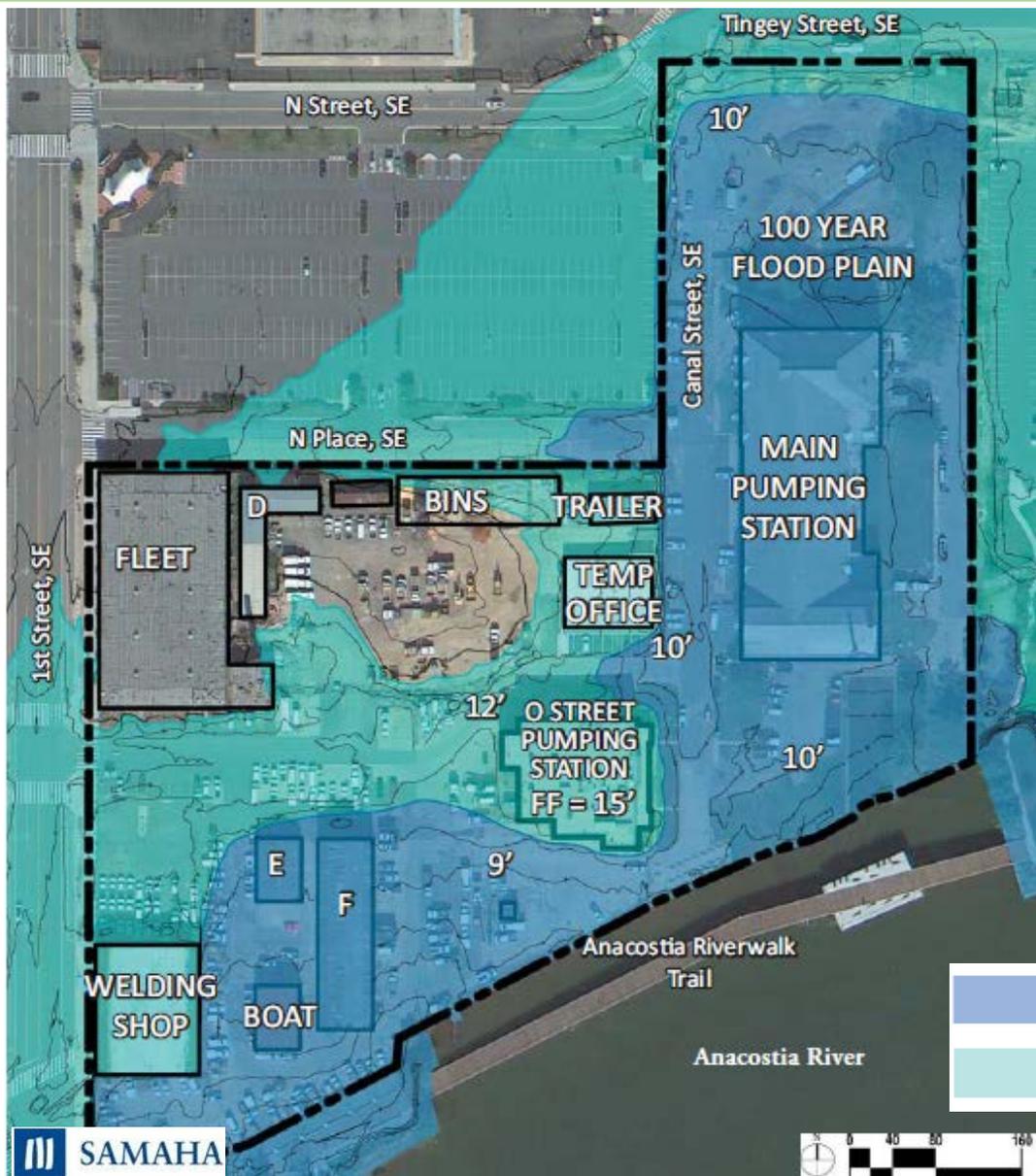
## Isn't it all Critical Infrastructure if water is life?

- Water & Sewer Distribution Facilities Planning will be incorporating DOEE climate change and localized data on projected Sea Level Rise into future analysis of critical facilities, have previously used 100 and 500 year FEMA floodplain levels plus 1', 2' and 3' to begin to identify and prioritize facilities with critical assets (mainly electrical) that could be submerged in different wet weather/sea level rise scenarios.
- Vulnerability Assessments and Risk Analysis for Blue Plains, Potomac Interceptor, Pumping & Distribution Systems, Collections Systems and other facilities are to be updated in 2016 – 2017 using the AWWA J100-10 Risk Analysis and Management for Critical Asset Protection (RAMCAP) Standard (commonly called J100). Benefits of this enterprise-wide VA update will be:
  - Integrate the results of multiple Vas
  - Incorporate new assets and changed conditions
  - Prioritize enterprise-wide risks
  - Update mitigation and resiliency strategies

# Blue Plains Wastewater Treatment Plant

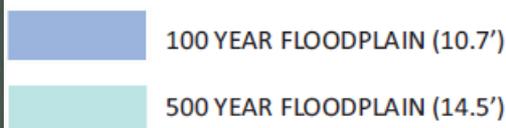
Flood protection strategy consists of constructing a seawall with top elevation of 17.2' protecting against a 500-year flood elevation of 14.2' with 3' of freeboard.





## Historic Main Pumping Station and O Street Pumping Station

The seawall is 10-10.5' in elevation along the Anacostia River. There has been approx. 6" of settling over the years; this entire seawall is currently being evaluated and may be increased or modified.





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# Adaptation and Mitigation Activities



Project Status Update  
January 9, 2015

## Mitigation Grant Funding Status

Grant Number	Project Name	Federal Share (75%)	Local Share (25%)	Total Funding	Status	Action Items
PDMC-PJ-03-DC-2014-001	14 <sup>th</sup> Street Bridge Stormwater Pump Station Hardening	\$1,228,268.25	\$409,422.80	\$1,637,691.05	<ul style="list-style-type: none"> <li>Selected for further review by FEMA</li> <li>Submitted preliminary response to Request for Information (RFI) on 12/24/2014</li> <li>Conducted site visit with FEMA on 11/17/14</li> </ul>	<ul style="list-style-type: none"> <li>Identifying whether additional flood protection work is necessary for scope and follow up RFI Response with Addendum.</li> </ul>
PDMC-PJ-03-DC-2014-002	Main Pump Station Hardening	\$1,273,926.75	\$424,642.25	\$1,698,569.00	<ul style="list-style-type: none"> <li>Selected for further review by FEMA</li> <li>Awaiting Request for Information (RFI) from FEMA</li> <li>Site Visit Conducted 11/17/2014.</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>
PDMC-PL-03-DC-2014-003	District of Columbia Water and Sewer Authority All Hazards Mitigation Plan	\$243,270.75	\$81,090.25	\$324,361.00	<ul style="list-style-type: none"> <li>Will be revised as an addendum to DC HMP and resubmitted for FY15.</li> </ul>	<ul style="list-style-type: none"> <li>None – Waiting for FY14 PDM Funding Opportunity Announcement.</li> </ul>
PDMC-PL-03-DC-2014-004	District of Columbia Water and Sewer Authority Combined Sewer Mitigation Plan	\$250,000.00	\$83,334.00	\$333,334.00	<ul style="list-style-type: none"> <li>Will be revised as an addendum to DC HMP and resubmitted for FY15.</li> </ul>	<ul style="list-style-type: none"> <li>None – Waiting for FY14 PDM Funding Opportunity Announcement.</li> </ul>
HMGP-DR-4036-002	DCWASA Generator and Transfer Installation	\$41,812.50	\$13,937.50	\$55,750.00	<ul style="list-style-type: none"> <li>Funding allocated to DC Water. Additional information requested by FEMA prior to award.</li> <li>RFI received July 26, 2013. Developing RFI Response</li> </ul>	<ul style="list-style-type: none"> <li>Develop a RFI response. Include the following: detailed budget, refined scope of work, maintenance agreement, photos, and benefit cost analysis (BCA).</li> </ul>
HMGP-DR-4036-005	DCWASA Installation of 7 Generators	Not Provided			<ul style="list-style-type: none"> <li>RFI received July 26, 2013. Developing RFI Response.</li> </ul>	<ul style="list-style-type: none"> <li>Need to schedule a call with Donte to discuss next steps.</li> <li>Develop a RFI response. Include the following: detailed budget, refined scope of work, maintenance agreement, photos, and BCA.</li> </ul>
HMGP-DR-4073-003	District of Columbia Water and Sewer Authority Request for Six (6) Portable Generators	Not Provided			<ul style="list-style-type: none"> <li>Funding allocated to DC Water. Additional information requested by FEMA prior to award.</li> <li>RFI received July 26, 2013. Developing RFI Response</li> </ul>	<ul style="list-style-type: none"> <li>Need to schedule a call with Donte to discuss next steps.</li> <li>Conduct BCA and submit BCA report with supporting documentation.</li> <li>Develop a generator logistics/refueling plan.</li> </ul>
HMGP-4044-003	DC Water Portable Generator Project (Potomac and Main & O Pump Stations)	\$877,302.00	\$305,512	\$1,182,814	<ul style="list-style-type: none"> <li>Application submitted to DC HSEMA on 11/14/2014.</li> <li>Project Awarded on 12/23/2014</li> </ul>	<ul style="list-style-type: none"> <li>Review subgrant agreement to ensure consistency with the scope, schedule, and budget in the application and award letter.</li> <li>Schedule Project Kick-Off Meeting</li> </ul>

PDM= Pre-Disaster Mitigation Grants  
HMGP = Hazard Mitigation Grant Program



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Adaptation and Mitigation Activities

# DC Water is the largest electricity user in DC

### NUTRIENTS and CARBON RECYCLING

**FARMING**



Provides carbon and nutrients valued at \$300.00 per acre.

**SILVICULTURE**



Increases yield and improves understorey.

**RECLAMATION**



Restoring lands to their natural state and providing wildlife habitats.

**URBAN RESTORATION**



Grow trees and reduce runoff.



BLUE PLAINS ADVANCED WASTEWATER TREATMENT PLANT:  
**A RESOURCE RECOVERY FACILITY**

water • nutrients • carbon • energy



[dcwater.com/biosolids](http://dcwater.com/biosolids)

### GREEN ENERGY BIORENEWABLES

POWER FROM THE PEOPLE



**THERMAL HYDROLYSIS PROCESS (THP) AND DIGESTION FACILITY**



DC Water will be the first in North America to use thermal hydrolysis for wastewater treatment. When completed, this facility will be the largest plant of its kind in the world.

**GREEN BENEFITS:**

- Produce combined heat and power, generating 13 MW of electricity
- Save DC Water \$10 million annually cutting grid demand by a third (DC Water is the largest consumer of electricity in the District)
- Reduce carbon emissions by approximately 50,000 metric tons of CO<sub>2</sub>e per year.
- Reduce trucking by 1.7 million miles per year.
- Save \$10 million in biosolids trucking costs
- Produce Class A biosolids to grow trees, sequester carbon and reduce runoff.



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Adaptation and Mitigation Activities



dc

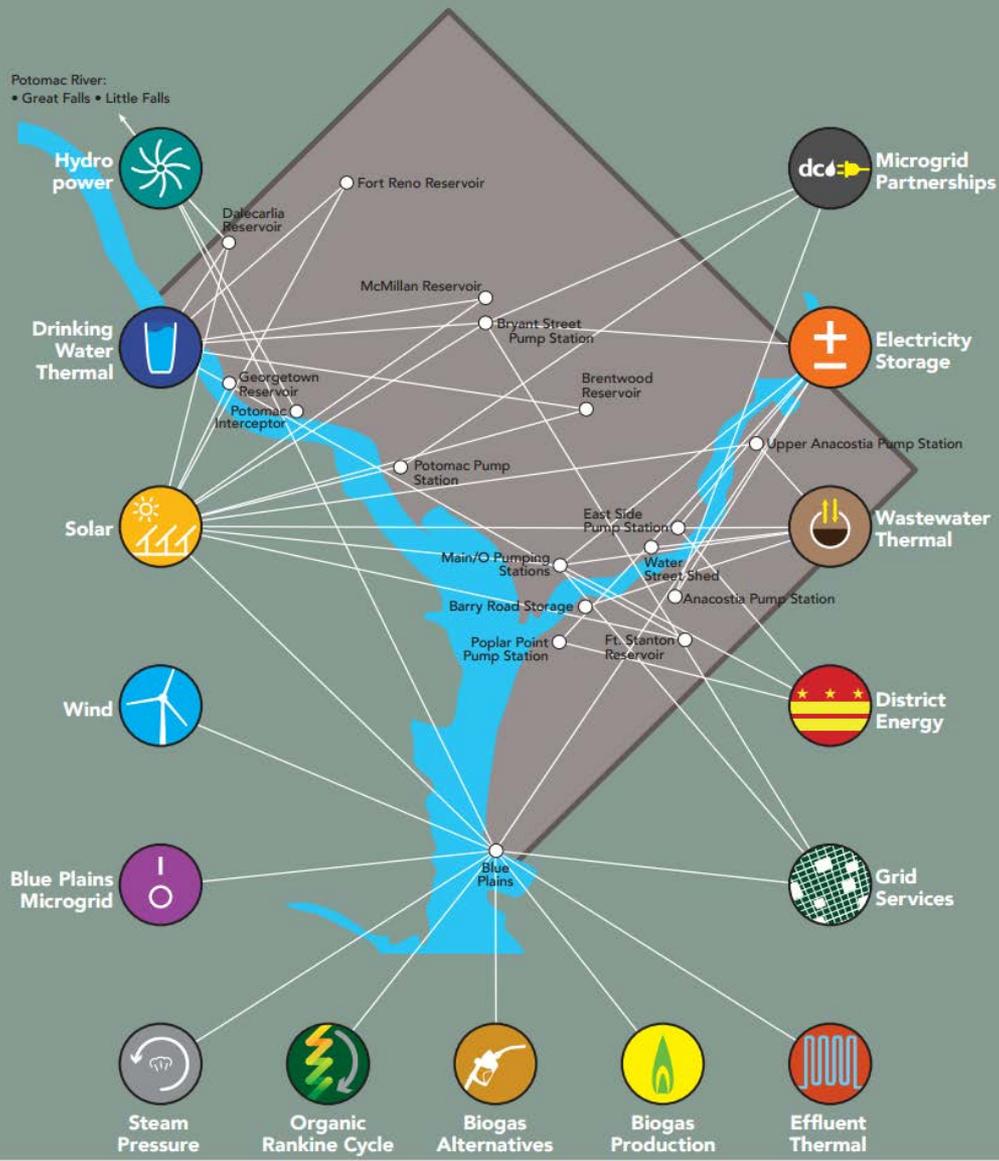
# CAMBI THERMAL HYDROLYSIS ANAEROBIC DIGESTERS



# dc ENERGIZED

## DC Water's Energy Opportunities

DC Water has identified opportunities to add renewable generating capacity, enhance energy resiliency, and reduce carbon emissions in the District. This map highlights potential locations.

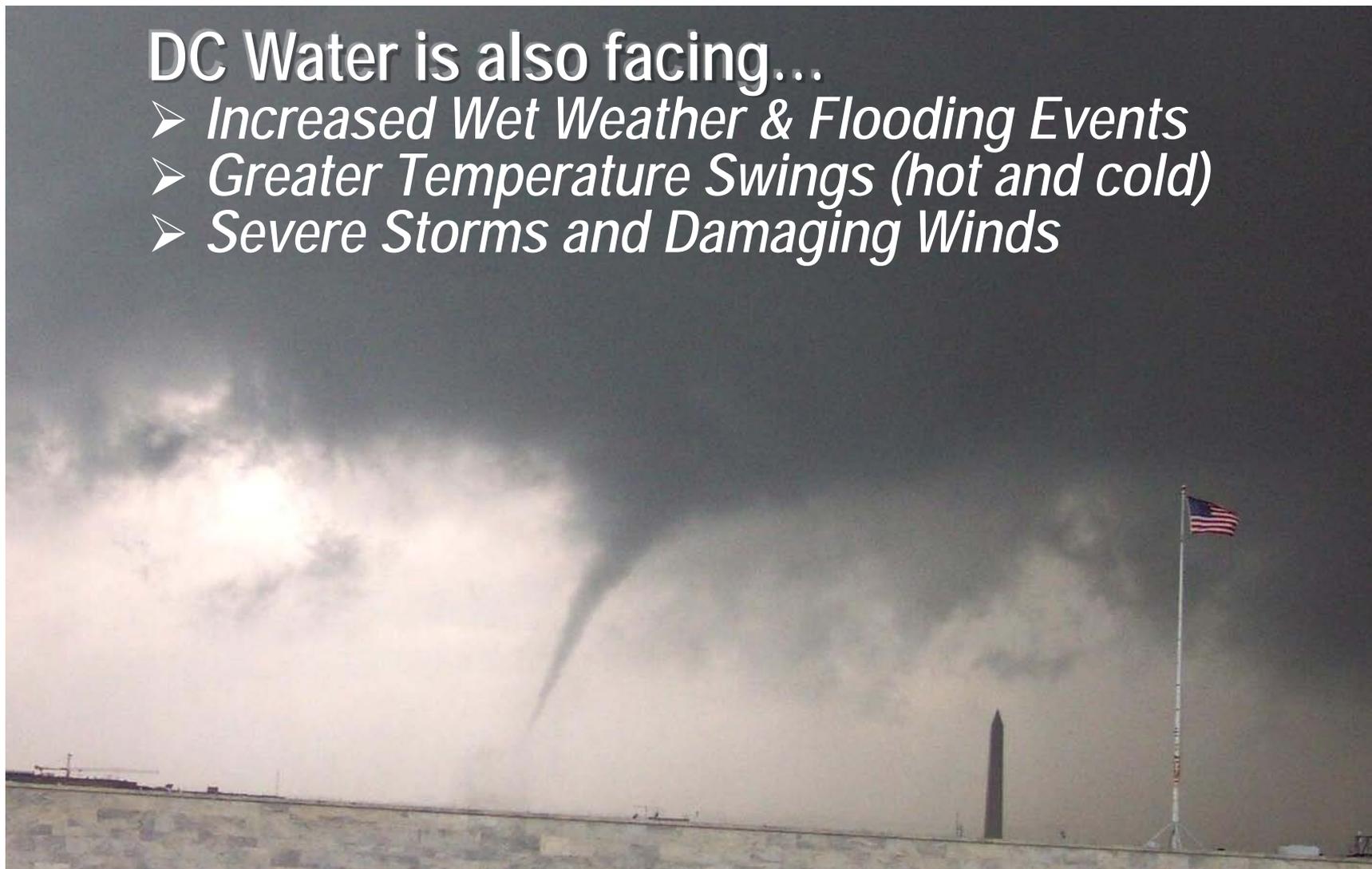


DC Water Resiliency Planning and Climate Change Adaptation in DC

# Operational Preparedness and Resiliency

## DC Water is also facing...

- *Increased Wet Weather & Flooding Events*
- *Greater Temperature Swings (hot and cold)*
- *Severe Storms and Damaging Winds*





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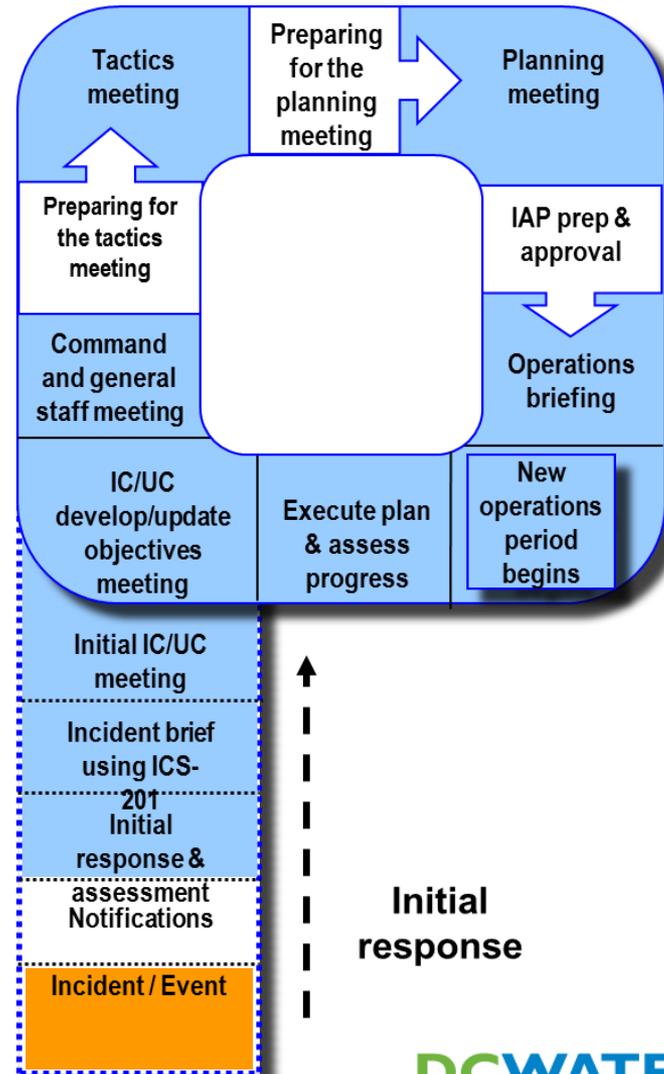
## Operational Preparedness & Resiliency

- DC Water Flood Response Plan being completed for all facilities and operations
- Specialized deployment plans for areas with critical facilities or known flooding challenges
- DC Water supports the update of the District Flood Response Plan and is a member of the DC Silver Jackets team
- Mandatory ICS training for all managers and supervisors (Including senior staff)



## Before an Extreme Weather Event...

- Distributed all pre-planning and response documents to Managers and supervisors
- Started using and distributing Incident Command System documents
- Activated the DC Water Incident Management Team
- Commenced and ended the response with the planning P



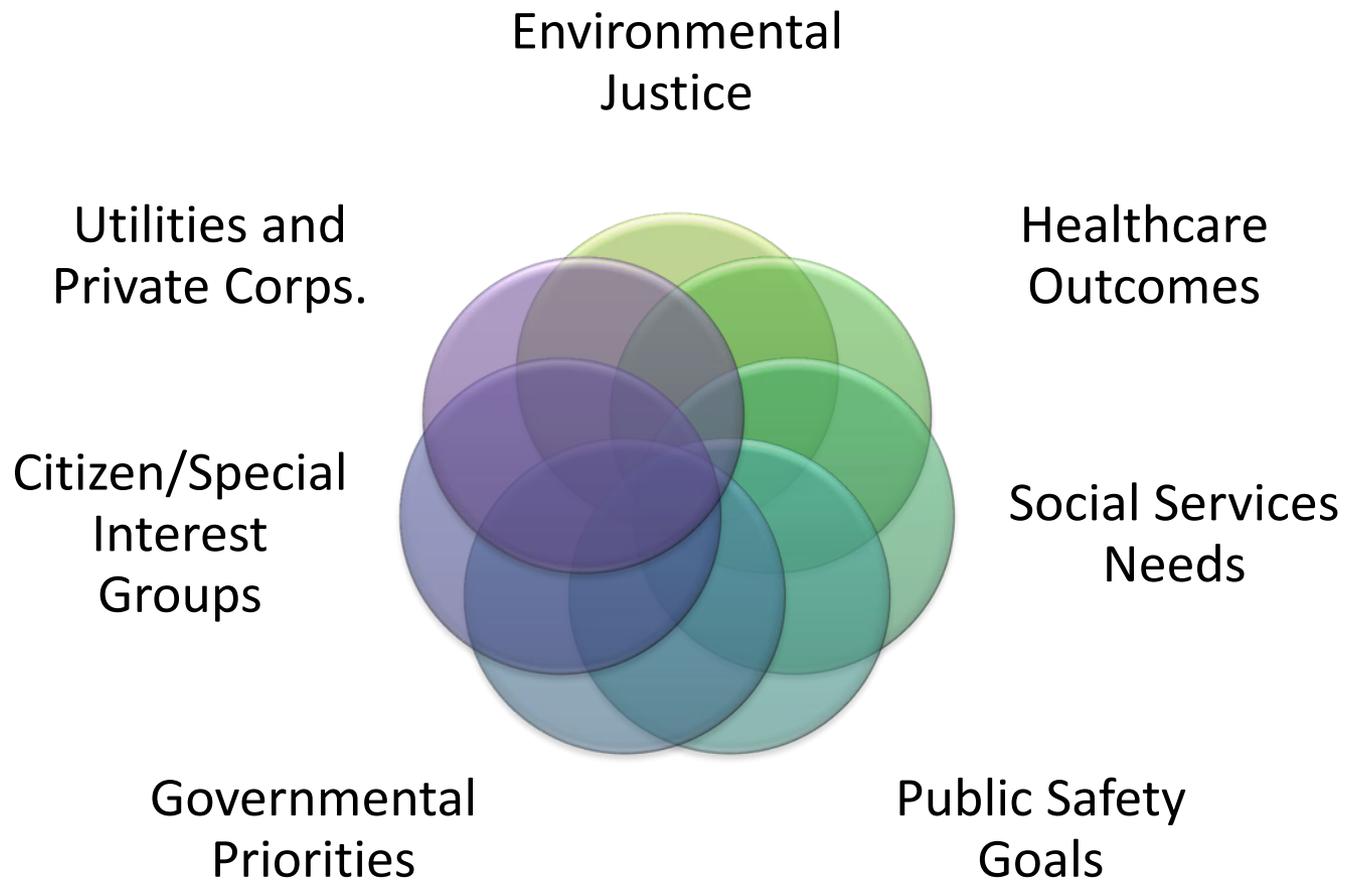
## Challenges and Lessons Learned...

- Need better flood and tide data to make accurate preventative predications (Not a criticism of NWS)
- Clarity of what would roles be during the response
- **Maintaining the rage...**
- Supporting Departments need to be included early in the planning process
- Activating the IMT early helped during the response
- Communicating up, down, in, and out
- Improved logistics and food support for our workers and support teams



# Managing Expectations in the Community

multiple priorities and stakeholders – communication is key!



DC Water Resiliency Planning and Climate Change Adaptation in DC

## Q & A

*for more information please contact:  
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[maureen.holman@dcwater.com](mailto:maureen.holman@dcwater.com)*