



DC Water's Strategy to Improve Water Supply Resilience

### **Problem Statement:**

*The District of Columbia's water supply is immediately vulnerable to any disruption of the Potomac River or the only wholesaler, the Washington Aqueduct, which would result in a national security emergency and massive economic impact to the region.*

### **Solution Portfolio:**

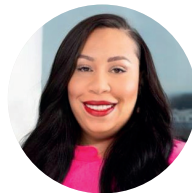
*The Pure Water DC program addresses a part of the regional need for water supply resilience through a portfolio of solutions. We will safeguard our first source, optimize our distribution system, add local storage, align with regional emergency storage efforts, and explore water reuse from Blue Plains as a drought proof and cost-effective option for the regional benefit.*

# Foreword



**MR. DAVID L. GADIS**

Chief Executive Officer  
and General Manager  
*DC Water*



**DR. UNIQUE N. MORRIS-HUGHES**

Board Chair  
*DC Water*

DC Water is pleased to launch **Pure Water DC** to mitigate our water supply vulnerability of reliance on a single source. This report lays out the strategy for Pure Water DC with a bold vision for regional water supply resilience.

DC Water provides retail potable water service to more than 700,000 residents and 27 million annual visitors in the District of Columbia, including services to the nation's most iconic landmarks and critical facilities. We also operate Blue Plains, the largest advanced wastewater facility in the world, and see opportunities for innovation using existing assets.

No single solution will fully address the needs of the whole region. A portfolio of solutions is needed. We have been intentional about aligning with the regional efforts by the US Army Corps of Engineers to advance the feasibility of long-term quarry storage and water reuse. We suspect water reuse will emerge as a drought-proof and cost-effective solution for DC and the region. Pure Water DC will accelerate the exploration of this option.

We have already initiated plans to build a Pure Water DC Discovery Center at Blue Plains. This facility will pilot technologies to create purified drinking water, conduct research to engage regulators, and educate the public, especially young people, through interactive exhibits about the importance of our regional water supply.

We invite collaboration and meaningful discussion on the road that lies ahead. We have launched a Water Reuse Action Plan (WRAP) action, a collaborative platform for regional and federal partners to explore reuse, administered by the US Environmental Protection Agency.

The future holds sobering challenges—extreme drought is increasingly likely in our lifetime. Nature does not respect the jurisdictional boundaries of neighboring utilities. Therefore, we must act together, with open minds and bold hearts. Join us. Let's build together.

As the Chair of DC Water's Board of Directors, I want to be clear about why this work cannot wait. On July 3, 2024, we narrowly avoided a water supply emergency with our single source, the Potomac River. That close call exposed a vulnerability with region-wide consequences—economic losses which could reach \$15 billion in the first month of a major disruption<sup>1</sup>.

Our answer is **Pure Water DC**—a program to improve resilience of our water supply. We will safeguard our first source, optimize our distribution system, add local storage, align with regional emergency storage efforts, and pursue a second source, with advanced water reuse from Blue Plains as a leading option.

The Board has approved \$21 million of seed funding over three years to study, pilot solutions, educate the public, and scale near- and medium-term solutions while longer-horizon regional storage projects mature<sup>2</sup>. This will not be nearly enough to fully address the problem, but it is a crucial first step signaling DC Water's commitment and leadership on this issue in the region. We expect that this commitment will have a multiplicative effect.

There is an unmet need to address water supply resilience in the next few decades despite the regional efforts underway to develop shared storage solutions which will become available over thirty years from now. Therefore, we are acting now through engagement and collaboration with neighboring water supply partners to lead a regional response for short to medium term water supply needs. While estimates on the full cost of solutions are still being developed, we are committed to starting now on a path towards securing a resilient water supply.

On behalf of the Board, I'm proud to present the resolution and our strategy for the Pure Water DC program which state our commitment to regional water supply resilience.

# 78%

The Potomac serves 78% of the region's population<sup>5</sup>.

### Free Flowing Potomac River

# 5%

Up to 5% of water supplied by the Washington Aqueduct is de facto reuse<sup>8</sup>.

# 25%

Data centers could account for over 25% of regional consumption by 2050<sup>7</sup>.

### Potomac Watershed Boundary

### Fairfax Water Service Area

### WASHINGTON

### Blue Plains Advanced Wastewater Treatment Plant

### Tidal Potomac River

- City of Fairfax
- City of Falls Church
- Arlington County
- City of Alexandria
- Loudoun County
- Fairfax County
- Montgomery County
- Prince George's County

# \$15bn

The region would incur \$15 billion gross regional product (GRP) losses in the first month of a water supply disruption<sup>1</sup>.

# Context



The public water system that supplies Washington, D.C. was commissioned in 1853 by an act of Congress to improve water supply resilience for the fast-growing city whose demand was extending beyond what wells and springs could supply. The Washington Aqueduct was designed, built, and operated by the US Army Corps of Engineers (USACE) and is still relied upon to supply our water 163 years later.

In 1965, a historic drought prompted the federal government to commission several studies on the available options for water supply resilience. Regional cost share agreements were signed to allow for the construction of Jennings Randolph Lake in West Virginia and Little Seneca Reservoir in Maryland which are shared reservoirs used to store water for downstream use during shortages. In 1978, the Low Flow Allocation Agreement (LFAA) was established to provide formulas for allocation of water in times of drought. In 1979, the Interstate Commission on the Potomac River Basin (ICPRB) established the Cooperative Water Supply Operations on the Potomac (CO-OP), leading to the creation of the Water Supply Coordination Agreement (WSCA) which requires utilities to coordinate operations and use of resources during drought, and was developed to help ensure that allocation according to formulas in the LFAA would never need to be invoked.

One of the studies commissioned after the 1965 drought resulted in a 1984 report by the USACE showing that, with appropriate treatment, a mix of tidal Potomac water and Blue Plains effluent could be made safe for human consumption<sup>3</sup>. Because of our need for a drought-proof second source, we are now revisiting this option as part of our solutions portfolio.

The Washington Aqueduct relies exclusively on the Potomac River for its supply which is sourced from four states and 11,560 square miles. Although it may appear we have an abundance of water, especially if viewed from Great Falls Park, we are threatened by the potential of either accidental or intentional contamination of the river, and there are emerging concerns about water scarcity caused by drought and increasing consumption<sup>4</sup>.

Our water still comes from one source, the Potomac River, and is transferred to DC Water by a single entity. As we evaluate current and future vulnerabilities, previous proven water recycling options need to be assessed and incorporated into the broader region's water security solutions.

# Solution Portfolio

There is no silver bullet we can employ to improve the resilience of our supply. A portfolio of solutions will be needed to improve both DC Water's supply resilience but also and contribute to regional supply resilience in the short and long term. In general, a 'yes, and...' approach to opportunities is the best strategy to comprehensively address resilience. The opportunities we have identified span from operational actions and collaboration all the way to the major, long-term infrastructure projects that will have the biggest impact since the creation of Jennings Randolph Lake.

We are identifying initiatives that will be pursued by DC Water which do not close us off from any other solutions, such as improving our distribution system, as well as options that would require regional participation to enact.

As we consider solutions, we must look across multiple time horizons, from near-to medium-term (now and next) of 5 to 20 years to longer term solutions that will become available 20 to 50 years in the future (later).

## REGIONAL ALIGNMENT

Working with watershed partners to improve supply resilience



## PROTECTING THE FIRST SOURCE

Acting to enhance the resilience of our only supply



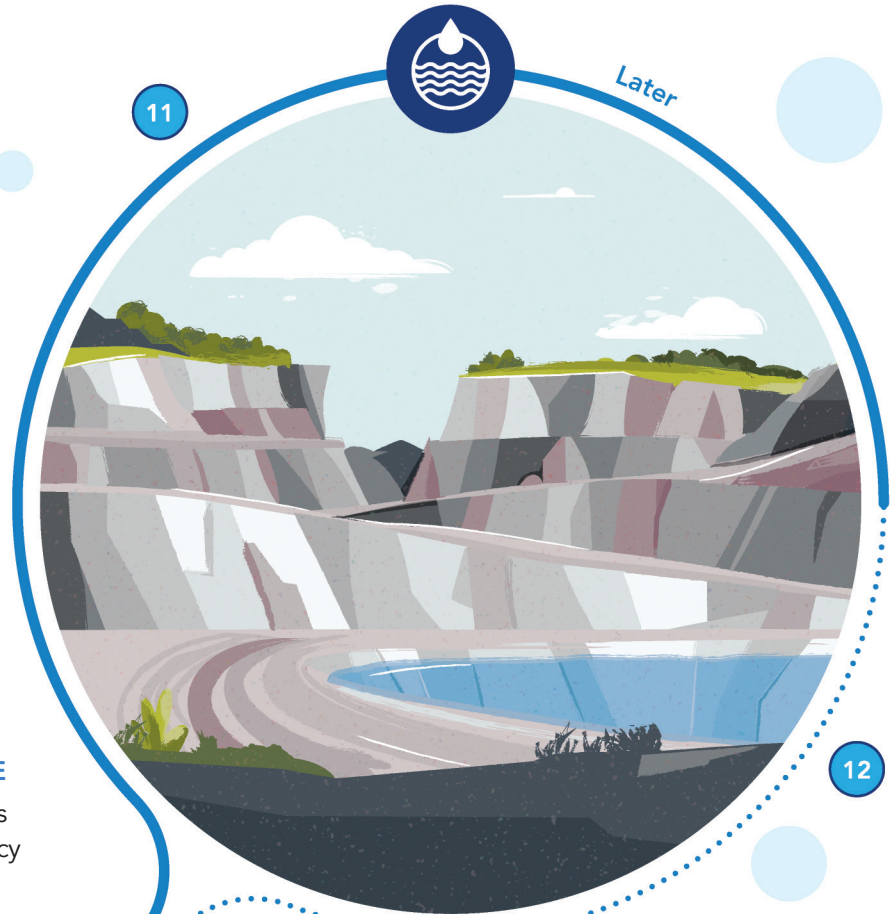
## DISTRIBUTION SYSTEM OPTIMIZATION

Improving our assets to limit planned and unplanned losses



## LONG TERM REGIONAL EMERGENCY STORAGE

New reservoirs for the long-term



**SECOND SOURCE**  
Developing options  
for supply redundancy



- | DC Water Ownership          | Regional Ownership                     |
|-----------------------------|--|
| 1 ICPRB & MWCOG             | 7 Local System Upgrades & Storage      |
| 2 USACE Study               | 8 Leveraging Existing Capital Projects |
| 3 WRAP Working Group        | 9 Pure Water DC Discovery Center       |
| 4 Basin Governance          | 10 Reuse Feasibility Study             |
| 5 Infrastructure Governance | 11 Travilah Quarry                     |
| 6 Operational Coordination  | 12 Virginia Quarry                     |



## REGIONAL ALIGNMENT

Our region benefits from mature and well-respected organizations whose work on resilience options has informed our vision. We will continue to increase our engagement in regional efforts, contributing resources in those areas most relevant to DC Water—namely, the application of reuse in providing a second source of water.

### (1) *Coordinating organizations: ICPRB and MWCOG*

The Interstate Commission for the Potomac River Basin (ICPRB) is the region’s leading body in coordinating action to improve the Potomac’s resilience while the Metropolitan Washington Council of Governments’ (MWCOG) work links the role of water to other areas of society, business, and governance. We will continue to participate and partner with both organizations.

### (2) *USACE led Backup Water Supply Study*

In 2024, the U.S. Army Corps of Engineers (USACE) committed \$3 million to developing the Washington D.C. Metropolitan Area Backup Water Supply Feasibility Study<sup>9</sup>. The study is currently in the scoping stage and includes emergency quarry storage and water reuse options for further study. Pure Water DC will provide data to the study before its next milestone in Spring 2028.

### (3) *New working group to explore water reuse*

The Water Reuse Action Plan (WRAP) is an EPA-led program that provides a forum to expand the understanding and application of reuse. DC Water has partnered with regional peers on a WRAP action to explore reuse in our local context.



## PROTECTING THE FIRST SOURCE

Without the Potomac River and infrastructure of the Washington Aqueduct, DC Water has no water to distribute to customers. We must work with our watershed partners to protect the ‘Nation’s River’ as a reliable source of water.

### (4) *Basin Governance*

Resilience of the Potomac River basin has relied upon agreements and governance structures that were initiated 85 years ago. Although amendments have been made, there are aspects that deserve further attention. As the basin is exposed to more and less predictable stressors, we believe the region may be better served by updating the governance structures to help longer term basin resilience.

### (5) *Infrastructure Governance*

The Washington Aqueduct has been operating consistently despite the limitations imposed on it through the existing governance structure and requirements to adhere to federal regulations for employment and procurement. The federal government does not fund the Aqueduct’s operations or capital expenses. Instead, the Washington Aqueduct are fully funded by the three wholesale customers. Exploration of alternative regional governance could allow the Washington Aqueduct to accelerate investments to improve resilience and open new opportunities for capital projects.

### (6) *Operational Coordination*

DC Water’s distribution system and the Washington Aqueduct’s supply system were originally designed as one interconnected system and therefore require close operational coordination.



## DISTRIBUTION SYSTEM OPTIMIZATION

In a system where the average age of pipes is over 80 years old, keeping up with proactive upgrades is a prerequisite to resilience. From water main replacements and other system improvements, DC Water is constantly making upgrades to address its aging infrastructure.

### (7) *Local System Upgrades and Storage*

DC Water’s distribution system has less than a day of water storage available if there is disruption to the supply from the Washington Aqueduct. There are opportunities to modernize the distribution system by adding new metering areas and improving our local storage capacity. Every hour of additional storage will have a meaningful impact on the scope of any second source we implement.

Non-revenue water is inevitable for aging infrastructure systems like DC Water. We are actively working to reduce non-revenue water which will also ultimately reduce the amount of additional water needed to improve our resilience.

### (8) *Leveraging Existing Capital Projects*

DC Water’s overall Capital Improvement Plan (CIP) includes \$9.6 billion of investments over the next ten years. We are in the process of reviewing the CIP through a resilience lens to leverage existing projects that boost overall resilience, increase storage, and improve operational alignment with the Washington Aqueduct. We intend to review these projects to both prioritize their delivery and maximize their impact on resilience.



## SECOND SOURCE

DC Water is a regional wastewater utility. Over 270 million gallons of wastewater from DC, Fairfax and Loudoun counties in VA, and Montgomery and Prince George's counties in MD, is conveyed to the Blue Plains Advanced Wastewater Plant every day and is transformed to become cleaner than the receiving tidal Potomac River.

Through existing regional wastewater pipelines, the Blue Plains facility collects water originating from the Potomac and the Patuxent Rivers, creating a reliable, multi-basin, drought-resistant supply of water. With some additional purification, this water could be used for drinking and for a variety of industrial purposes. The existing infrastructure represents a huge untapped, cost-effective opportunity for the region.

Alternative sources under exploration that could be available within a decade include groundwater extraction and processing water from the tidal Potomac River.

### *(9) Pure Water DC Discovery Center*

Successful water reuse projects around the country include early engagement with the public and regulators. The goals of the Pure Water DC Discovery Center are to test the technologies to create purified potable water from Blue Plains effluent, conduct research for regulatory support, and engage the public through educational exhibits focused on regional resilience. We will preview this facility in Summer 2026.

### *(10) Reuse Feasibility Study*

The findings from the Discovery Center will provide more information about full-scale opportunities. Several options are available for reuse based on different levels of treatment, conveyance, and regulatory requirements resulting in different costs and benefits for the region.

Intentional water reuse could also improve raw water quality for certain regional water suppliers. The Potomac River water serving the DC region already contains 1 to 5% discharge from upstream wastewater facilities (de facto reuse)<sup>9</sup>. Intentional water reuse with advanced treatment has the potential to create a higher quality raw water source and mitigate negative effects of algal blooms or spills in the river.

This study will invite regional stakeholders' input and ultimately inform the USACE-led Backup Water Supply study regarding the water reuse option under consideration.



## LONG TERM REGIONAL EMERGENCY STORAGE

Large scale reservoir storage has been the forerunner solution through which resilience has been discussed and addressed for the DC region since regional resource planning started in the 1960s. Today, multiple neighboring utilities have active plans to use former quarries within their jurisdictions to store Potomac River water for emergency use. However, there are no opportunities for quarry storage within DC's boundaries. DC Water is actively engaged and contributing to the USACE Backup Water Supply Study, which will determine feasibility of these long-term storage solutions.

### *(11) Travilah Quarry - Maryland*

The Travilah Quarry in Maryland has been the subject of multiple studies in the last decade showing planning level feasibility to store raw water and the infrastructure required for conveyance. The currently active quarry could provide 17 billion gallons of storage and be partially operational starting in 2060. There is work to be done to achieve agreement among the regional utilities regarding a governance approach to successfully implement this solution. With appropriate conveyance and governance structures, Travilah Quarry could improve resilience for DC in the long term. However, additional solutions will be required in the near term.

### *(12) Virginia Quarries*

The Luck Stone quarries in Loudoun County, Virginia are being converted to mass storage reservoirs by Loudoun Water. The first of these, Milestone Reservoir, will provide 1 billion gallons of raw water storage and is due to be complete in 2028. Fairfax Water has plans to convert the Vulcan Quarry in Fairfax County, Virginia into a 16.8 billion gallon reservoir by 2085. Agreements to make these quarries beneficial for regional use would need to be explored.

# Implementation

The following three principles will guide the implementation of Pure Water DC.



## FISCAL RESPONSIBILITY

DC Water is pursuing Pure Water DC as a discretionary program because reliance on a single source of water poses unacceptable risk. Acting now is the responsible thing to do. We know that introducing new infrastructure will be an expensive undertaking but the cost of not acting or solving the wrong problem is even higher.

As a region, we must focus on the right problem rather than becoming enamored with any one solution and we must be willing to have courageous conversations in service of the appropriate portfolio of solutions. For this reason, we have clearly defined our problem statement and we invite each regional partner to do the same. We are investing in smart exploration up front to identify the most cost-effective opportunities. We will continue to make a compelling case for smart investment in infrastructure and governance solutions to improve the resilience of our nationally important region and the nation's capital.



## REGIONAL COLLABORATION

We are committed to collaborating meaningfully on the implementation of Pure Water DC. The entire region is taking supply resilience seriously, and we want to leverage all the opportunities for collaboration to support the regional supply resilience agenda.

We have invited regional stakeholders to participate in the EPA-hosted WRAP Action to form a working group so we can have substantive conversations, share findings from our research about reuse, unlock innovation, host workshops, and provide engagement opportunities regarding Pure Water DC.

We will continue to work closely with the regional conveners (MWCOG, ICPRB) to bring peers together to explore reuse and contribute to broader discussions about supply resilience and resource planning, ensuring the District's unique context is incorporated.



## EVIDENCE BASED DECISION MAKING

We are investing in the Pure Water DC Discovery Center because we suspect that some permutation of water reuse will be cost-effective and necessary to ensure drought-proof resilience for our region. We understand that thoughtful research and evidence gathering is required to determine the path forward.

The Discovery Center will support a regional research agenda that goes beyond the application of reuse alone. It will also become a hub of learning about the watershed, the importance of water resource planning and source water protection, and One Water planning concepts to create a more drought-proof water future. In the long term, it will inspire future generations of engineers, scientists, and water sector professionals.

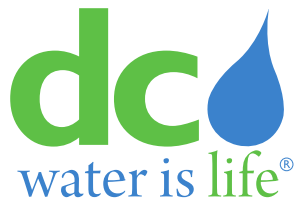
# Timeframe

Pure Water DC currently has \$21 million of funding secured for the next three years to initiate the program, invest in a Discovery Center, and conduct detailed studies to optimize the combination of infrastructure investments that will be required to improve supply resilience. The following program timeline provides highlights for the milestones we are aware of now.



## ENDNOTES

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DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY  
1385 CANAL STREET SE, WASHINGTON, DC 20003