

**City of Richmond
Department of Public Utilities**

Drinking Water Quality Report 2021



DEPARTMENT OF
**PUBLIC
UTILITIES**

Table of Contents

Letter from the Director	1
Mission, Vision and Values	1
About Us	2
About Our Financial Structure	3
About Our Water	3
Consumer Confidence Report	5
<i>Health Information</i>	9
<i>Definitions</i>	10
<i>Lead</i>	12
Integrated Watershed Management	14
Community Connection	16
Financial Support For Customers	17



Letter from the Director

This year has continued to present opportunities for us all to reimagine how we function. In the water sector that has meant, among other things, how to ensure we continue providing safe, clean and affordable water while also making the necessary improvements and ensuring the ongoing maintenance our aging infrastructure requires. This is not an easy balance, but one which

I've been proud of our team for managing well.

The services we provide every day are critical to public health and safety and impactful to the quality of life we experience in the region. I'm proud of the DPU team – as employees they have worked around the clock to be there for customers. Whether it's responding to an emergency water main break, maintaining critical machinery, monitoring water and wastewater quality, administering a program to help replace lead service lines or the many support services needed to make this happen, we are here for you!

Our mission, vision and values are below, but I also highlight the six current strategic initiatives for our department: customer focus, efficiency, workforce development, financial health and stability, infrastructure planning, innovation and workforce development. These initiatives are guiding the work we do, as we continue to serve the needs of our customers and the community while focusing on environmental stewardship and resource conservation. These focused efforts are critical to meeting the demands of a growing and rapidly changing environment. We provide a glimpse of those efforts in this report. I invite you to follow us on social media and to visit our website to learn more about DPU's amazing accomplishments (see the back cover).

As a long-time professional in the water and wastewater industry, I realize the work ahead of us and I am excited to be at the helm as we forge ahead. I've been proud of the work DPU's team does every day. I am grateful to our citizens who recognize the impacts of the services we provide and I look forward to your continued support.

Yours in service,
April N. Bingham, MPA
Department Director

Mission, Vision and Values

Our mission is to provide safe and reliable utility service while creating exceptional value. Our vision is to proactively serve the utility needs of regional customers through environmental stewardship and resource conservation while providing cost effective safe service. The values we operate under are: Customer Satisfaction, Operational Excellence, Financial Growth and Stability, and Employee Pride and Ownership.

About Us

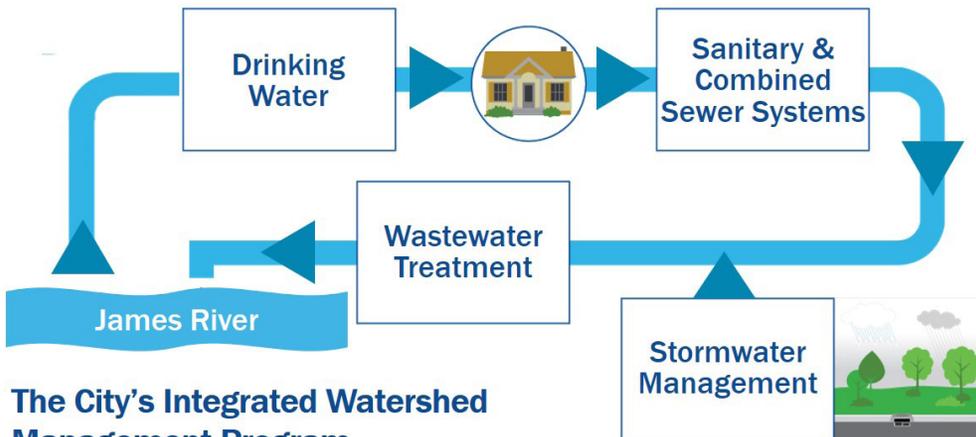
The City of Richmond Department of Public Utilities operates five utilities: natural gas, water, wastewater, stormwater and electric streetlighting, serving more than 500,000 residential and commercial customers in Richmond and the surrounding metropolitan region.

DPU is responsible for all aspects of water services for the City. The water, wastewater and stormwater utilities are part of the City's Integrated Watershed Management Program, along with the sanitary and combined sewer systems and the floodwall and levee system. DPU is committed to improving water quality in the James River and has been working toward that goal for a long time in collaboration with numerous partners.

We follow and exceed regulations and standards set by the Environmental Protection Agency (EPA) and the Virginia Department of Health (VDH) to ensure that we prevent a health crisis due to waterborne disease.

We are members of the National Association of Clean Water Agencies (NACWA), the American Water Works Association (AWWA), the American Water Works Association Research Foundation, and the Association of Metropolitan Water Agencies. These organizations are dedicated to furthering knowledge and research on safe drinking water.

We have a team of over **300** water professionals who maintain **1,200** miles of waterlines comprised of **982** pipelines. Our water is distributed to more than **65,000** residential, commercial and industrial customers. Our water plant can produce **132** million gallons per day and we treat **68.4** million gallons per day. We perform **58,000** tests on more than **16,000** water samples.



The City's Integrated Watershed Management Program

About Our Financial Structure

DPU operates an enterprise fund, which separates all revenues and expenditures from all other City departments that are otherwise accounted for in the general fund. Each of the department's utilities is operated as a separate business, per City Code.

Because we must ensure that we can continue to safely provide reliable and quality utility services, DPU has the responsibility to continue to actively invest in the maintenance, upgrade and replacement of the facilities, distribution and collection systems. This is only possible through the financial strength maintained by due diligence and keen oversight of the department's revenues and expenditures. This commitment helps maintain excellent bond ratings, making it more cost effective to finance the myriad of capital projects and operating and maintenance programs.

DPU undergoes an annual budget process in coordination with the City budget department. This process includes the assistance of financial consultants and modeling tools to help determine the rates required to maintain high levels of service. Rates help fund the upkeep of the aging infrastructure as we work to improve utility service delivery, expand the sustainable environment and improve operational efficiencies.



About Our Water

While our water system was originally formed in 1829, our water treatment plant was completed along the James River in 1924, expanded in 1950 and has been upgraded over the years. We serve as one of the largest water producers in Virginia with a water distribution system that includes over 70 million gallons of water storage, allowing us to reliably provide water to users during high demand periods and during fires or other emergencies.

Our facility also provides water to the surrounding areas through wholesale contracts with Henrico, Chesterfield and Hanover counties. Highly trained personnel, modern laboratories and millions of dollars in treatment facilities ensure that Richmond's water meets or exceeds federal and state water quality standards. The water utility has an ongoing program of upgrading its pumping stations and distribution system. The water treatment plant is protected from the James River by a floodwall similar to the one protecting the downtown Richmond area.

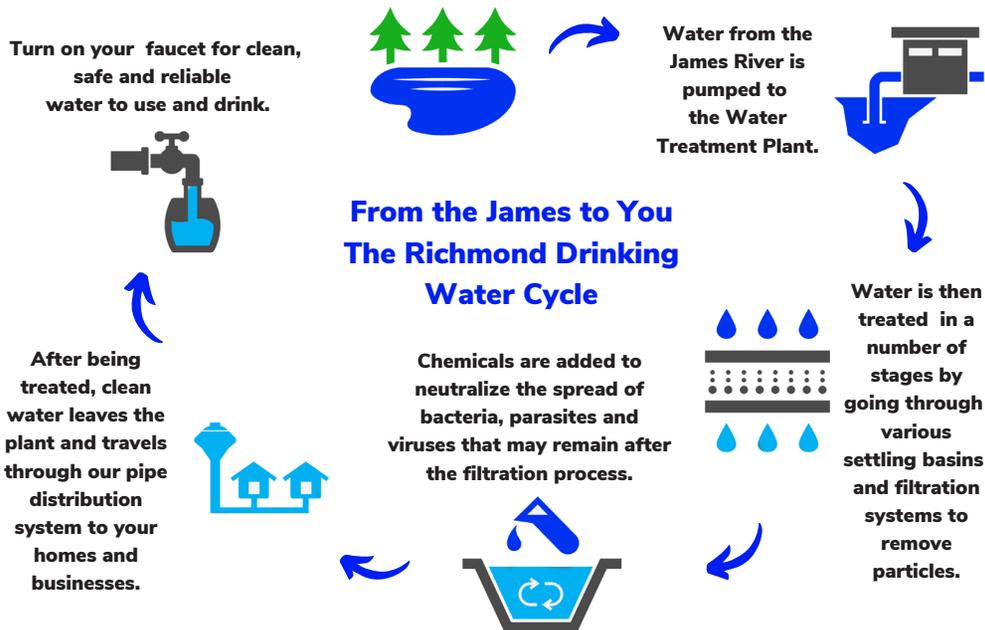
How Our Water is Treated

The James River is the main source of water for the city. Water from the James River is pumped into the Richmond Water Treatment Plant. The pumped water goes through a series of treatment processes. A coagulant is added to the water that causes solids to attract each other and coalesce. The newly formed larger solids will then settle out of the water. After the larger solids have settled, the clear water flows through filters which remove any smaller particles that did not settle. The disinfection process makes the water safe to drink by inactivating harmful organisms. The safe and clean water is pumped back into the pipes and sent to Richmond residents and businesses to use.



Where Our Water Comes From

Richmond gets its water from the James River.



Consumer Confidence Report

Why We Report on Water Quality

The 1996 Safe Drinking Water Act requires water utilities to provide consumers with a yearly report on the source and quality of water they drink. You may also find this information posted on our website at <https://www.rva.gov/public-utilities/water-utility>.



We are proud to report that during 2021 we were in 100% compliance with all federal and state Safe Drinking Water Act MCLs (Maximum Contaminant Levels). Last year DPU conducted 58,267 tests on more than 16,000 water samples. The table lists all the substances that were detected in our drinking water during 2021. The presence of these substances in water does not necessarily indicate that the water poses a health risk. Unless otherwise noted data presented in this table is from testing performed January 1 through December 31, 2021.

Inside the Water Quality Report

The water quality report is a snapshot of the city's drinking water quality over the past year. Included is information about your water, what it contains and how it compares with standards mandated by the U.S. Environmental Protection Agency (EPA) and the Virginia Department of Health. This report is being provided to comply with the 1996 Safe Drinking Water Act. Landlords, businesses and other property owners are encouraged to share this drinking water quality report with tenants.



For free additional copies or more information about your water and this report, call the City of Richmond Department of Public Utilities at 804-646-5224.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some substances. The presence of substances does not necessarily indicate that the water poses a health risk. More information about substances and potential health effects may be obtained by calling the EPA Safe Drinking Water Hotline at 1-800-426-4791.

Microbial Contaminants

Substance	Likely Source	Richmond's Highest Monthly # of Positive Samples	Richmond's Highest Monthly % of Positive Samples	MCL	MGLG	Sample Date	Violation
Total Coliform (TC)	Naturally present in the environment	4	3.33% ¹	TT	N/A	Aug 2021	No
Escherichia Coli (EC)	Human and animal fecal waste	0	0%	An E. coli-positive repeat sample following a total coliform-positive routine sample OR A total coliform-positive repeat sample following an E. coli-positive routine sample OR Failure to collect all require repeat samples following an E. coli-positive routine sample OR Failure to test for E. coli when any repeat sample is total coliform-positive.	0	2021	Yes ² (not an MCL violation, but a monitoring violation for failure to test for E. coli following a total coliform positive routine sample)

Regulated Substances

Substance	Likely Source	Richmond's Results	Richmond's Range	MCL	MGLG	Sample Date	Violation
Fluoride (ppm)	Added to promote dental health	0.76	0.511 - 0.759	4	4	2021	No
Nitrate + Nitrite (ppm)	Fertilizer runoff, septic tank leakage, sewage, erosion of natural deposits	0.1		10		May-21	No
Total Organic Carbon Removal Ratio ³	Naturally present in source water	1.0	0.0 to 2.0	TT removal ratio \geq 1.0		2021	No
Alpha Emitters (pCi/L)	Erosion of natural deposits	<0.4		15	0	Aug-18	No
Beta Emitters (pCi/L) ⁴	Erosion of natural deposits	2		4	0	Aug-18	No
Combined Radium (pCi/L)	Erosion of natural deposits	<0.5		5	0	Aug-18	No
TTHms (ppb) Total Trihalomethanes ⁵	Byproduct of drinking water disinfection	27	14 - 38	80		2021	No
HAA5 (ppb) Haloacetic Acids	Byproduct of drinking water disinfection	23	12 - 34	60		2021	No
Barium (ppm)	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits	0.031 mg/L		2 mg/L		May-21	No

Disinfectant

Substance	Likely Source	Richmond's Results	Richmond's Range	MRDL	MGLG	Sample Date	Violation
Chloramines (ppm) ⁶	Disinfection	4.0	0.4 - 5.1	4	4	2021	No

Turbidity

Substance	Likely Source	Richmond's Results	MCL	MGLG	Sample Date	Violation
Turbidity (NTU)	Soil Runoff	0.26, 100% ⁷	TT 1.0 NTU, Max \leq 0.3 (95% of the time)		Aug-11-2021	No

¹ If the highest monthly percentage of positive TC samples exceeds 5, Level 1 Assessment will be conducted to identify and correct sanitary defects.

² If the work incurs an EC MCL violation, Level 2 assessment will be conducted to identify and correct sanitary defects. The EPA has implemented the Stage 2 Disinfectants and Disinfection Byproduct Rule (Stage 2 DBPR) and the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR). The Stage 2 DBP Rule provides increased protection against health effects associated with disinfection byproducts (DBPs). The LT2ESWTR further protects public health against Cryptosporidium and other microbial pathogens that may be present in drinking water.

³ TOC Removal Ratio- Amount detected is the lowest of the annual rolling average of the four quarterly calculations made in 2021; range is the minimum and maximum of all samples used to calculate average

⁴ The MCL for beta particles is 4mrem/year .EPA considers 50 pCi/1 to be the level of concern for beta particles.

⁵ TTHMs and HAA5s- Richmond's results are the maximum of the rolling annual average. The range is the minimum and maximum of all 2021 samples used to calculate those averages.

⁶ Chloramines – Amount detected is the maximum of the annual rolling average; range is the minimum and maximum of all samples used to calculate average.

⁷ Turbidity – Highest single measurement and the lowest monthly percentage of samples meeting monthly turbidity limits.

Lead and Copper

Substance	Likely Source	Richmond's Results (90 th Percentile)	Richmond's Range	MCL	MCLG	Sample Date	Violation
Copper (ppm)	Corrosion of household plumbing; leaching from wood preservatives	0.058	No results exceeded action level	Action Level = 1.3	1.3	2019	No
Lead (ppm)	Corrosion of household plumbing; erosion of natural deposits	2.5	No results exceeded action level	Action Level = 15	0	2019	No

¹90th Percentile – The levels reported for lead and copper represent the 90th percentile of the total number of sites tested. The 90th percentile is equal to or greater than 90 percent of our lead and copper detections.

Unregulated Monitored Substances

Substance	Likely Source	Richmond's Results	MCL	Sample Date	Unit
Aluminum	Erosion of natural deposits; addition of water treatment substances	<0.05		2021	ppm
Manganese	Naturally present in the environment	<0.01		2021	ppm
Nickle	Corrosion of household plumbing	<0.01		2021	ppm
Sodium	Naturally present in the environment; addition of water treatment substances	16.2	*	2021	ppm
Sulfate	Naturally present in the environment; addition of water treatment substances	32		2021	ppm

*State and federal agencies recommend sodium levels in water not exceed 20 milligrams per liter (mg/L) for people on very low sodium diets and 270 mg/L for people on moderately restricted sodium diets

Other Information

Substance	Richmond's Results	EPA's Suggested Limit	Sample Date	Unit
Alkalinity	53.0		2021	ppm
Chloride	14	250	2021	ppm
Hardness	68		2021	ppm
pH (acidity)	7.91	6.5 - 8.5	2021	su
Total Dissolved Solids	131	500	2021	ppm

Health Information

Some people may be more vulnerable to certain substances in drinking water than the general population. Immuno-compromised people - such as those with cancer who are undergoing chemotherapy, those who have undergone organ transplants, those with HIV/AIDS or other immune system disorders, and some elderly people and infants - can be particularly at risk from infections. These people should seek advice from their health care providers about drinking water. EPA/CDC (Centers for Disease Control) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial substances are available from the Safe Drinking Water Hotline at 1-800-426-4791.

As water travels over land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material. Water can pick up substances resulting from the presence of animals or human activity.

Health Information (continued)

Substances that may be present in source water include:

- Microbial substances such as viruses and bacteria, which may come from domestic animals, wildlife, septic systems, livestock and sewage treatment plants.
- Inorganic substances such as salts and metals, which can be naturally occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
- Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff and residential uses.
- Organic chemicals, including synthetic and volatile organic chemicals, which are byproducts of industrial processes and petroleum production, and can come from gas stations, urban stormwater runoff and septic systems.
- Radioactive substances, which can be naturally occurring or be the result of oil and gas production and mining activities.



Water treatment significantly reduces the level of these substances in drinking water. In order to ensure that tap water is safe to drink, EPA regulations limit the amount of certain substances in water provided by public water systems. Food and Drug Administration (FDA) regulations establish limits for substances in bottled water, which must provide the same protection for public health.

Definitions

AL – Action Level:

The concentration of a substance which, when exceeded, triggers treatment or other requirements.

LRAA – Locational Running Annual Average:

The running annual average at each sampling location.

MCL - Maximum Contaminant Level:

The highest level allowed by regulation. MCLs are set as close to the MCLGs as feasible using the best treatment technology.

MCLG - Maximum Contaminant Level Goal: The level of contaminant below which there is no known or suspected health risk.

MRDL – Maximum Residual Disinfectant Level: The highest level of a disinfectant allowed in drinking water.

MRDLG – Maximum Residual Disinfectant Level Goal: The level of a drinking water disinfectant below which there is no known or expected risk to health.

MREM – Millirem: A unit of measure that estimates the damage radiation does to human tissue NA – Not applicable

ND – Not detected.

NTU – Nephelometric Turbidity Unit: A measure of turbidity; water cloudiness.

pCi/L – Picocuries per liter: A measure of radioactivity.

ppb – parts per billion or micrograms per liter ($\mu\text{g/L}$)

ppm – parts per million or milligrams per liter (mg/L)

Removal ratio – A ratio between the percentage of a substance actually removed to the percentage of the substance required to be removed.

SMCL - Secondary Maximum Contaminant Level: these standards are developed to protect aesthetic qualities of drinking water and are not health based.

su – standard units. Used in pH measurements.

TT – Treatment Technique: process intended to reduce the level of a substance in drinking water.

Source water – Untreated water

Finished Water – Treated water

Regulated Substances are regulated by the EPA and their concentration cannot be above the MCL.

Unregulated Substances are not regulated by the EPA, but they must be monitored so information about their presence in drinking water can be used to develop limits.

Cryptosporidium

Cryptosporidium is a microbial parasite found in surface water throughout the United States. We collected seven samples in 2017 and found an average of 5.4 Oocysts/100L. This is less than the Action Level of 7.5 Oocysts/100L.

Lead

Lead can get into tap water through home service piping, lead solder used in plumbing and some brass fixtures. Even though the use of lead solder was banned in the U.S. in 1986, it might still be present in older homes. The corrosion of these lead-based materials can add lead to tap water, particularly if water sits for an extended time in pipes, for instance, in the morning, after sitting overnight or when you return from work or from a trip away.

Health Effects of Lead

If too much lead enters your body from drinking water or other sources, serious problems can occur. It can damage the brain and kidneys and interfere with the production of red blood cells that carry oxygen to all parts of the body.



The greatest risk of lead exposure is to infants, young children, the elderly and pregnant women. Effects of lead in the brain have been linked to lower IQs in children. Adults with kidney problems and high blood pressure can be affected by even low levels of lead more than healthy adults. Lead is stored in the bones, and can be released later in life. During pregnancy, lead from the mother's bones can be passed to the unborn child, which may affect brain development.

If high levels of lead are found in drinking water, water may contribute up to 20 percent of a person's exposure to lead; 60 percent for an infant who consumes mostly formula mixed with water containing lead.

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Richmond is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 15-30 seconds or until it becomes cold or reaches a steady temperature before using water for cooking or drinking.

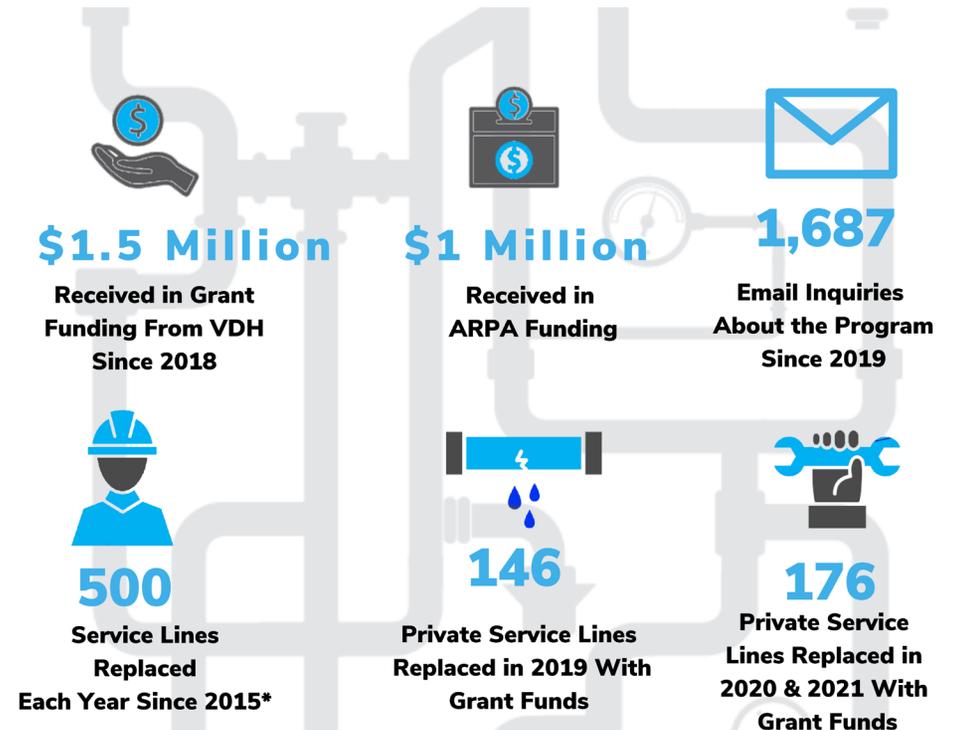
If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing materials, and steps you can take to minimize exposure is available from the Virginia Department of Health Drinking Water Hotline.

Lead Service Line Replacement Program

Lead water service lines are fairly common with older cities and older water utilities. Since we've learned the harmful effects of lead, best practices for reducing exposure to lead have evolved over time. As with most utilities, we were treating lead according to best practices with an inhibitor and then progressing to the removal and replacement of lead water service lines. With full replacements now being the best way to reduce exposure to lead, we began removing lead service lines in the public right of way.



Previously we could only recommend homeowners replace their side. With help from the Virginia Department of Health (VDH), we developed the Lead Service Line Replacement Grant program. Grant funding from VDH has allowed us to offer financial assistance to Richmond homeowners needing to replace their private lead water service lines. A new grant cycle has begun and includes funding from both VDH and the American Rescue Plan Act (ARPA). Part of our lead replacement efforts include mapping to identify all lead service lines in the city.



*There were 14,000 lead service lines in the public right of way when replacements began.

Integrated Watershed Management



In addition to the water utility, the wastewater utility and stormwater management programs collectively contribute to clean water. One-third of Richmond is served by a combined sewer system (CSS) that collects rain water runoff and sewage in the same pipe. The CSS transports all of its wastewater to the Wastewater Treatment Plant (WWTP) where it is treated and discharged to the James River. During heavy rainfall, the overflow of water from the pipes go to nearby creeks and the

James River. The CSS was built in the mid-1800s. The design was to pipe all waste to the nearest creek to get it out of the city as quickly as possible as this process solved both flooding and sanitation issues. Over time as the city grew, these creeks were covered over and became piped underground sewers as well as creeks. In the mid-1900s, these pipes were attached to the WWTP and is the current system for the treatment of waste.

Improvements

Richmond has always been ahead of the curve with regard to CSS regulatory and statutory requirements. There has been a lot of progress, but the CSS is very large, very complex, very old and primarily in the most urbanized area of the city.

Improvements to date have been made by separating pipes, adding of larger pipes, adding storage facilities to hold combined water until it's ready to be treated at the WWTP and the creation of infrastructure to reduce the amount of stormwater that enters the system. The Hampton McCloy Tunnel can store up to seven million gallons of combined sewer. The Shockoe Retention Basin can store up to 50 million gallons. Upgrades to the WWTP increased treatment capacity to 75 million gallons of combined sewer a day during dry weather.

The most recent upgrade has increased treatment capacity to 140 million gallons of sanitary sewage and stormwater daily during wet weather events.



Real Time Mapping Data of CSO

In 2021, the City of Richmond became the first locality in the state to introduce a new, public-facing real-time map that shows where and when combined sewer overflows occur. The map indicates if any of the 25 outfall points along the James River have overflowed recently, providing citizens accurate information in helping decide when the river is safe for use. It uses Real Time Decision Support System data and feeds off dozens of rain gauges, flow meters and level sensors that measures the flow in each pipe to help determine water capacity.

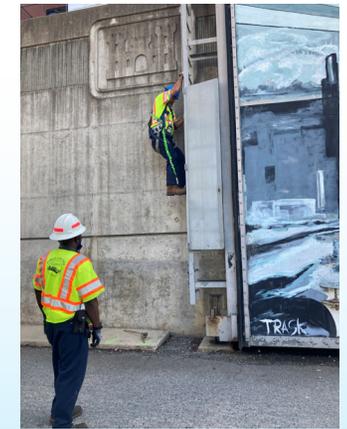
Stormwater Management

The changing weather patterns over recent years have had significant impacts on communities across the country. For Richmond, it has resulted in more significant rainfall and more frequent heavy rain events. The existing stormwater infrastructure was not planned to handle this capacity and is suffering damage at an accelerated degree.

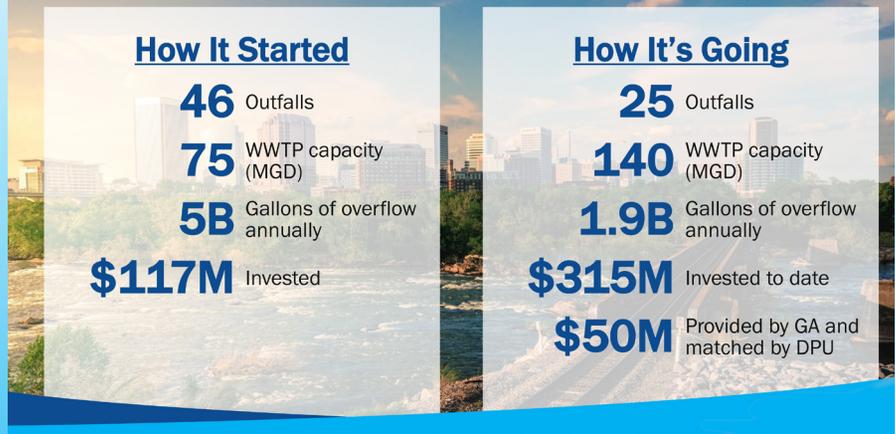


While flooding cannot be eliminated, DPU has mechanisms in place to help reduce the risk.

Along with permitting requirements for properties and business and regular stormwater maintenance, DPU also has a floodwall system that was completed in 1994. It spans 3.28 miles, protecting 750 acres of land. The system includes levees and gates that hold back the river water, pump stations that pump out the water trapped behind the wall and three retention ponds that hold excess water from heavy rainfall during river flooding. The system is designed to protect the areas behind it against a flood with an average recurring interval of 280 years. The gates are tested annually to ensure operability.



Combined Sewer System Control



Note: How it started is from the 1970s; 1970s \$117M does not account for inflation; today's \$315M total investment does not account for inflation.

Community Connection

DPU touches the lives of residents, visitors and workers in the city and surrounding communities. In addition to the service calls we make, we engage with our customers throughout the year in other capacities. Whether it's speaking at a City Council, neighborhood or community meeting, speaking to students at local schools, hosting plant tours or talking with customers at community events, we want to make sure our customers are well-informed about the services we provide and see the value in all that we do. In addition to social events, we encourage customers to join us on social media. Find us using the information on the back page.



Fix a Leak Week

During March of every year, we participate in the EPA's Fix a Leak week. During this week-long national campaign, we host small in person and online events educating citizens on how to properly detect and prevent water leaks in their homes and workplaces as part of our conservation effort.

Citizens Academy

DPU Citizens Academy is a four day program that provides Richmond citizens an inside look at the operations of DPU. We work to educate citizens on where our water comes from, how to detect leaks, how we clean our water and more.



Drinking Water Week

Observed annually in May and sponsored by the American Water Works Association, Drinking Water Week recognizes the critical role drinking water plays in our daily lives. We host small events throughout the city to remind citizens of the importance of water.

DPU Friends and Family Day

This annual event brings together the families of DPU employees and members of the community for an interactive opportunity to learn what it's like to work for DPU. The day includes facility tours, games, interactive demonstrations and other family-friendly activities.

Financial Support For Customers

DPU understands financial hardships and wants to ensure every customer has access to safe, clean and reliable utility services. Several options are available to assist customers.

MetroCare Heat Program provides funds to eligible families and individuals who are having trouble paying their primary heating bills due to a financial difficulty or other special hardship. The program period begins Dec. 15. Residents within DPU's Richmond Gas Works' service territory may apply for funds through MetroCare.

MetroCare Water Program provides funds to eligible families and individuals who are having difficulty paying their primary water bills due to financial concerns. There is an application process and ratepayers can receive up to \$500 per applicant if approved.

MetroCare Water Conservation Program provides eligible homeowners with financial assistance for plumbing repairs and the replacement of water-inefficient appliances with EPA WaterSense products to conserve water and reduce wasteful consumption. This program includes an audit approved by the Department of Energy for all eligible homeowners as a method for improving water use efficiency.

SeniorCare Program caters to the unique needs of seniors 65 years of age and older in the Richmond metropolitan community. Senior customers can sign up for this program and take advantage of Winter Service Assurance, no late fees, security deposit waiver program, annual weatherization kit giveaways and third party notification.



In addition to the affordability and assistance programs, DPU provides ratepayers with tools to control their bills. The lifeline water rate was instituted in 2019, and encourages water consumption by discounting the first four Ccfs of water consumption. Property owners can also reduce their stormwater bill by installing stormwater runoff reduction measures. Customers can also take advantage of flexible payment plan options.

For more information on these and other services, give us a call at 804-646-4646.

CUSTOMER SERVICE & SUPPORT

CARES Act
Utility Relief

\$12.2M

TO

13,389

CUSTOMERS



ARPA
Utility Relief

\$7M

TO

13,261

CUSTOMERS



FY22 Fuel
Assistance
Allotments

\$1,082,861.90





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