

Water Quality Report 2021



We met or surpassed
all regulatory water
quality requirements.

Welcome to Charleston Water System



Our Mission.
Support public health and protect the environment.

Our Vision.
Achieve excellence and exceed customer expectations.

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On the Cover: Bushy Park Reservoir

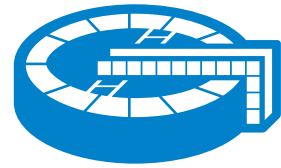
Questions / Extra Copies
Communications department: (843) 727-7146

En Español Este informe contiene información muy importante sobre su agua beber. Tradúzcalo ó hable con alguien que lo entienda bien.

Get Involved Our Board of Commissioners meets monthly and meetings are open to the public. Citizen participation is welcomed. Meetings are typically held the fourth Tuesday of every month at 9 a.m. at 103 St. Philip Street. More information: www.charlestonwater.com.

Public Water System ID#: 1010001

Quick Facts



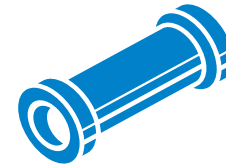
1
Largest water treatment plant
by permitted capacity in S.C.



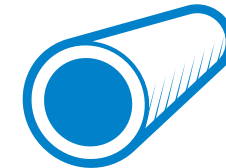
10,500
Fire hydrants



38,000
Water valves



1,850
Miles of water mains



33
Miles of raw water tunnels



450,000
People served in the
tri-county area



123,000
Retail customer accounts



9
Wholesale customers



\$40,000
Spent since 2017 on voluntary
unregulated compound testing



20,000
Total annual water
quality tests



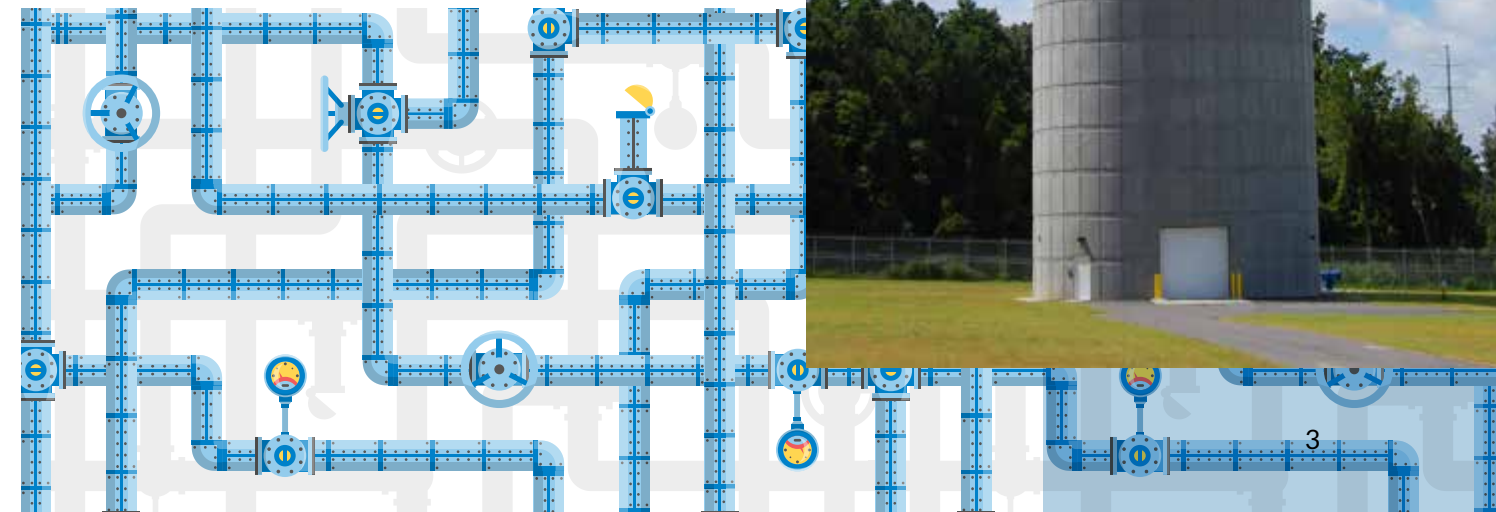
64 Million
Gallons per day, average
daily volume treated



105.5 Million
Gallons per day, largest recorded
volume treated in one day



115.4 Million
Gallons per day, DHEC permitted
capacity



Message from the EPA

Some people may be more vulnerable to contaminants in drinking water than the general population. Immunocompromised persons, such as persons with HIV/AIDS or other immune system disorders, persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, some elderly and some infants can be particularly at risk from infections.

These people should seek advice from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the [Safe Drinking Water Hotline \(1-800-426-4791\)](https://www.epa.gov/safe-drinking-water-hotline).

Possible Contaminants In Source Water

The sources of drinking water, both tap water and bottled water, include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over land and into waterways, it dissolves natural minerals and picks up substances from animals or human activity.

To protect public health, [water treatment plants reduce contaminants](#) to safe levels established by regulations.

- 💧 **Organic compounds**, including synthetic and volatile organics, which are by-products of industrial processes and petroleum production, can also come from gas stations, runoff, and septic systems.
- 💧 **Inorganic compounds**, such as salts and metals, which can be naturally occurring or the result of storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- 💧 **Microbes**, such as viruses and bacteria, may come from septic systems, livestock, pets and wildlife.
- 💧 **Radioactive compounds** can be naturally occurring or the result of oil and gas production and mining activities.
- 💧 **Pesticides and herbicides** may come from agriculture, runoff, and residential uses.

How to Interpret Our Data

USEPA Definitions

Maximum Contaminant Level Goal (MCLG) The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Maximum Contaminant Level (MCL) The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

Action Level (AL) The concentration of a contaminant, which, if exceeded, triggers treatment or other requirements that a water system must follow.

Treatment Technique (TT) A required process intended to reduce the level of a contaminant in drinking water.

Maximum Residual Disinfectant Level Goal (MRDLG) The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contamination.

Maximum Residual Disinfectant Level (MRDL) The highest level of disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Regulatory Testing Abbreviations

ppm Parts per million (mg/L)

ppb Parts per billion (ug/L)

ppt Parts per trillion (ng/L)

LRAA Locational Running Annual Average

RAA Running Annual Average

NTU Nephelometric Turbidity Units



Regulatory Testing

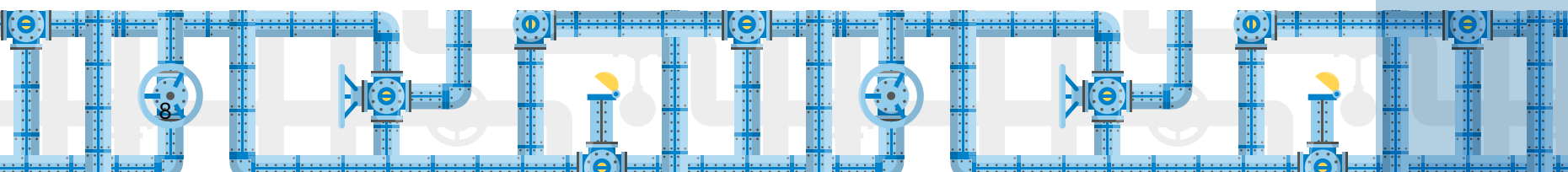
These are the compounds we are required to test for, and all were below the regulatory limit.

	Required Regulatory Report	Maximum Contaminant Level (MCL) set by EPA	Maximum Contaminant Level Goal (MCLG)	Actual Level in CWS Water for 2021	Year Sampled	Possible Sources in Water
	Turbidity A measure of the amount of suspended particles in the water (cloudiness); an indicator of overall water quality and filtration effectiveness.	Requires a specific treatment technique; 95% of monthly samples must be less than 0.3 NTU.	NA	0.10 NTU highest level detected. 100% of monthly samples met the limit. Range: 0.07 – 0.10 NTU.	2021	Soil runoff.
	Cryptosporidium (in source water) A parasite spread through human and animal waste that causes gastrointestinal illness.	No MCL exists.	Zero Cryptosporidium oocysts per 1 liter of water.	0.1 per liter. Range: 0 to 0.1 per liter.	2021	Human and animal sources.
	Giardia (in source water) A parasite spread through human and animal waste that causes gastrointestinal illness.	No MCL exists.	Zero Giardia oocysts per 1 liter of water.	0.3 per liter. Range: 0 to 0.3 per liter.	2021	Human and animal sources.
Inorganic Compounds	Copper A metal widely used in household plumbing that may corrode into water.	90 th percentile of all samples collected must be less than the 1.3 ppm action level.	1.3 ppm.	90 th percentile = 0.09 ppm. No samples exceeded the action level. Range: 0 to 0.14 ppm.	2021	Corrosion of household plumbing materials.
	Lead A metal no longer used in water pipes, but may be present in plumbing fixtures or old pipes; may corrode into water.	90 th percentile of all samples collected must be less than the 15 ppb action level.	0 ppb.	90 th percentile = 2.1 ppb. One sample exceeded the action level. Range: 0 to 19 ppb.	2021	Corrosion of household plumbing materials.
	Nitrate/Nitrite (as N) Nitrates and nitrites are nitrogen-oxygen compounds that can become a source of pollution in the form of unwanted nutrients.	Nitrate 10 ppm. Nitrite 1 ppm.	Nitrate 10 ppm. Nitrite 1 ppm.	0.09 ppm. Range: 0.09 to 0.09 ppm.	2021	Runoff from fertilizers.
	Fluoride A substance that is naturally occurring in some water sources, particularly groundwater. It is also added to drinking water to help prevent tooth decay.	4 ppm.	4 ppm.	0.08 ppm in source water. 0.46 ppm in finished water. Range: 0.43 to 0.52 ppm.	2021	Naturally occurring in source water and adjusted during treatment to prevent tooth decay.
Disinfectants	Chlorine Dioxide A disinfection agent added in small amounts to protect against microbes.	0.8 ppm.	0.8 ppm.	0.26 ppm. Range: 0 to 0.26 ppm.	2021	Added for disinfection.
	Chloramine Residual A compound of chlorine and ammonia added in small amounts to treated water to protect against microbes.	4 ppm MRDL.	4 ppm MRDLG.	3.0 ppm Running Annual Average. Range: 2.0 – 3.0 ppm.	2021	Added for disinfection.

(Data continued on next page.)

Regulatory Testing, continued

	Required Regulatory Report	Maximum Contaminant Level (MCL) set by EPA	Maximum Contaminant Level Goal (MCLG)	Actual Level in CWS Water for 2021	Year Sampled	Possible Sources in Water
Disinfection Byproducts	Total Trihalomethanes (Stage 2) Stage 2 of the Disinfectants and Disinfection Byproducts Rule requires the locational running annual average (LRAA) for each sampling location to be below the MCL. CWS has eight sampling locations.	Locational Running Annual Average must be below 80 ppb.	NA	LRAA: 13 ppb. Range: 5.35 to 20.37 ppb.	2021	Byproduct of disinfection.
	Total Haloacetic Acids (Stage 2) Stage 2 of the Disinfectants and Disinfection Byproducts Rule requires the locational running annual average (LRAA) for each sampling location to be below the MCL. CWS has eight sampling locations.	Locational Running Annual Average must be below 60 ppb.	NA	LRAA: 13 ppb. Range: 5.49 to 17.23 ppb.	2021	Byproduct of disinfection.
	Chlorite A byproduct formed when chlorine dioxide is used to disinfect water.	1 ppm.	0.8 ppm.	Highest level detected: 0.75 ppm. Range: 0.34 to 0.75 ppm.	2021	Byproduct of disinfection.
Organics & Bacteria	Total Organic Carbon (TOC) The measure of organic substances in a body of water, mostly from naturally occurring sources such as plant material. TOC provides a measurement for the potential formation of disinfection byproducts.	No MCL; EPA requires a specific treatment technique.	Required % removal depends on source water, 35% - 50%.	Removal range: 53% to 61%. 58% removed.	2021	Naturally present in the environment.
	Total Coliform Bacteria A group of bacteria whose presence in water indicates possible contamination with soil or waste from warm blooded animals.	No more than 5% samples total coliform-positive.	0%.	1.8% highest level detected in any monthly sample. All repeat samples were satisfactory. Range 0% to 1.8%.	2021	Naturally present in the environment.
Synthetic Organic Contaminants (Pesticides and Herbicides)	2, 4-D (2, 4-dichlorophenoxyacetic acid) Popular herbicide used for killing weeds.	70 ppb.	70 ppb.	Highest level detected: 0.12 ppb. Range: 0.12 to 0.12 ppb.	2021	Runoff from herbicide used on row crops.



Voluntary Testing of Unregulated Compounds

All were below their EPA Health Advisory or drinking water standard.

Unregulated Compound Position Statement and testing schedule: www.charlestonwater.com/positionstatement

Compounds with Health Advisories	Units	Aug 2018	Nov 2018	Feb 2019	May 2019	Oct 2020	Nov 2021	Feb 2022	May 2023	EPA Health Advisory	Secondary Drinking Water Standards
2,4-D (2,4-dichlorophenoxyacetic acid)	ppt	NA	NA	NA	8.7	NA	NA	NA		200,000*	NA
Aluminum	ppb	74	58	38	35	70	78	73		NA	50 to 200
Atrazine	ppt	22	19	7.2	16	24	NA	NA		700,000*	NA
Barium	ppb	14	12	16	17	14	12	13		7,000*	NA
Bromodichloromethane	ppb	5.6	3.7	3.3	2.9	5.2	1.6	0.96		100*	NA
Bromoform	ppb	NA	NA	NA	NA	NA	NA	0.5		1,000	NA
Chloroform	ppb	7.2	2.7	2.6	3.2	7.1	0.77	NA		350*	NA
Dibromochloromethane	ppb	2.6	2.0	1.6	1.5	1.9	1.6	1.0		700*	NA
Formaldehyde	ppb	NA	NA	NA	7.1	7.3	6.3	NA		7000*	NA
Diuron	ppt	NA	NA	NA	NA	82	NA	NA		100,000*	NA
Manganese	ppb	13	6.4	3.3	9.6	8.5	4.3	3.9		1,600*	NA
Perchlorate	ppb	NA	NA	0.13	0.12	NA	0.09	0.44		25*	NA
PFOA	ppt	5.0	4.1	4.4	5.3	4.3	4.7	4.5		70**	NA
PFOS	ppt	9.7	6.1	6.3	7.0	7.5	6.0	5.4		70**	NA
Simazine	ppt	NA	6.9	14	16	NA	NA	NA		700,000*	NA
Strontium	ppb	53	41	43	53	46	39	44		20,000*	NA
Zinc	ppb	NA	NA	6.3	NA	NA	5.2	NA		10,000*	NA

*EPA Drinking Water Equivalent Level (DWEL) | **EPA Health Advisory, as data is not available.

(Data continued on the next page.)

Voluntary Testing of Unregulated Compounds, continued

Additional unregulated compounds detected during unregulated compound testing.	Units	Aug 2018	Nov 2018	Feb 2019	May 2019	Oct 2020	Nov 2021	Feb 2022	May 2023	EPA Health Advisory	Secondary Drinking Water Standards
1,4 Dioxane	ppb	0.11	0.14	0.32	0.33	0.11	0.31	0.56		NA	NA
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	ppt	NA	4.0	NA	NA	NA	NA	NA		NA	NA
Acesulfame-K	ppt	NA	32	160	88	46	NA	NA		NA	NA
Atenolol	ppt	NA	NA	NA	5.8	NA	NA	NA		NA	NA
Boron	ppb	37	32	26	22	28	31	28		NA	NA
Chromium, hexavalent	ppb	0.06	0.06	0.06	0.06	0.33	0.20	0.17		NA	NA
DEA (Diethanolamine)	ppt	NA	NA	NA	NA	6.2	NA	NA		NA	NA
DEET	ppt	NA	12	NA	NA	21	NA	NA		NA	NA
Erucylamide	ppt	NA	NA	NA	NA	NA	5.8	5.3		NA	NA
Iohexal	ppt	NA	19	19	51	21	NA	NA		NA	NA
Lincomycin	ppt	NA	24	NA	NA	NA	NA	NA		NA	NA
NDMA	ppt	7.5	3.4	5.6	5.1	7.7	NA	NA		NA	NA
NMEA	ppt	NA	2.5	NA	NA	NA	NA	NA		NA	NA
PFBA	ppt	7.0	NA	NA	NA	8	4.8	5.6		NA	NA
PFBS	ppt	3.8	4.0	3.2	3.5	2.9	3.5	3.8		NA	NA
PFHpA	ppt	3.2	2.9	2.3	2.8	2.6	3.0	3.0		NA	NA
PFHxA	ppt	5.6	5.7	4.3	5.6	4.9	6.3	7.7		NA	NA
PFHxS	ppt	3.3	2.8	2.1	2.2	2.7	2.2	2.2		NA	NA
PFPeA	ppt	7.5	7.5	4.7	5.8	5.5	7.2	8.8		NA	NA
Quinoline	ppt	NA	19	NA	NA	NA	NA	NA		NA	NA
Sucralose	ppt	NA	950	640	580	430	NA	NA		NA	NA
Tetrahydrofuran	ppb	NA	NA	NA	6.1	20	NA	NA		NA	NA
Theobromine	ppt	NA	NA	16	NA	NA	NA	NA		NA	NA
Total Trihalomethanes	ppb	15.4	8.4	7.5	7.6	14.2	NA	NA		NA	NA

Water Characteristics

Parameter	Units	2021 Average	Highest Level Recommended by EPA
Chloride	ppm	15	250
Color	PCU	3	15
Iron	ppm	.12	0.3
Manganese	ppm	<0.05	0.05
Total Dissolved Solids (TDS)	ppm	67	500
Sodium	ppm	9	No Standard
Alkalinity	ppm	29	
Conductivity	µmhos/cm	179	
Hardness	ppm	56 (3.27 gpg)	
Ortho-phosphate	ppm	1.1	
Silica	ppm	7.2	
Temperature	F	69.8° (21°C)	

Water Characteristics Abbreviations

These parameters affect aesthetics, such as taste, odor, hardness, etc. The EPA has secondary standards for some of these parameters, which are recommended guidelines.

- ppm** Parts per million
- PCU** Platinum Cobalt Units
- gpg** Grains per gallon
- µmhos/cm** Micromohs/cm

EPA's 2020 Unregulated Contaminant Monitoring Rule (UCMR4)

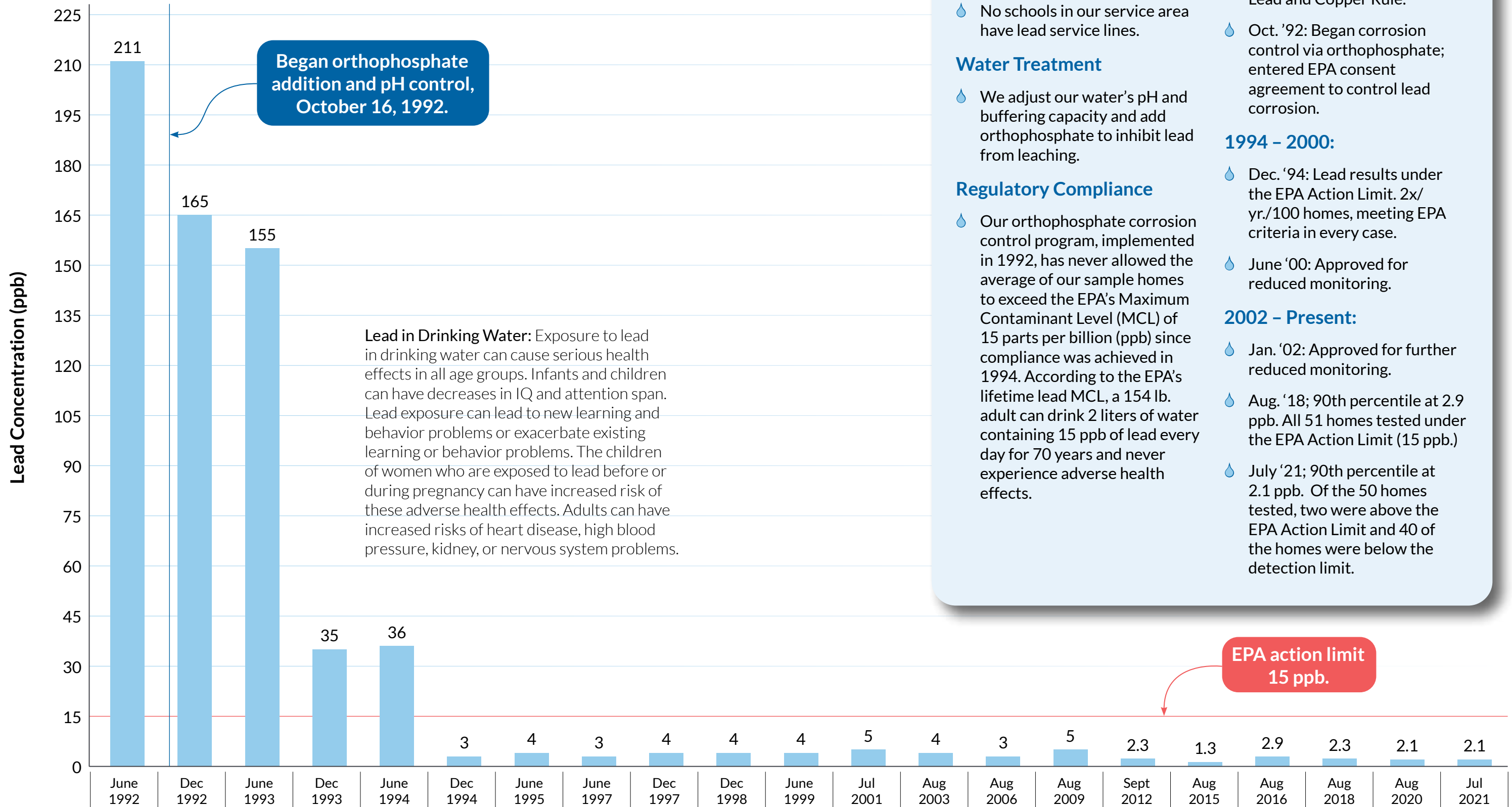
UCMR participation requires most recent data to be published in the CCR until the next round of UCMR testing (2025).

Compound	Units	Raw Water		Finished Water		Distribution Water	
		Average	Range	Average	Range	Average	Range
HAA5	ppb					12.19	8.14 - 18.44
HAA6Br	ppb					5.89	4.34 - 8.42
HAA9	ppb					17.28	12.25 - 25.86
Bromide	ppb	0.04	0.03 - 0.04				
Manganese	ppb			9.38	6.15 - 14.4		
Total Organic Carbon (TOC)	ppm	7.45	6.46 - 7.98				



Lead

Tier I Lead Values (90th percentile)



Lead in Drinking Water: Exposure to lead in drinking water can cause serious health effects in all age groups. Infants and children can have decreases in IQ and attention span. Lead exposure can lead to new learning and behavior problems or exacerbate existing learning or behavior problems. The children of women who are exposed to lead before or during pregnancy can have increased risk of these adverse health effects. Adults can have increased risks of heart disease, high blood pressure, kidney, or nervous system problems.

Our Water

- There is no lead in our treated water leaving the plant.
- No schools in our service area have lead service lines.

Water Treatment

- We adjust our water's pH and buffering capacity and add orthophosphate to inhibit lead from leaching.

Regulatory Compliance

- Our orthophosphate corrosion control program, implemented in 1992, has never allowed the average of our sample homes to exceed the EPA's Maximum Contaminant Level (MCL) of 15 parts per billion (ppb) since compliance was achieved in 1994. According to the EPA's lifetime lead MCL, a 154 lb. adult can drink 2 liters of water containing 15 ppb of lead every day for 70 years and never experience adverse health effects.

1992 - 1994:

- June '92: Reported highest lead levels in US under the new Lead and Copper Rule.
- Oct. '92: Began corrosion control via orthophosphate; entered EPA consent agreement to control lead corrosion.

1994 - 2000:

- Dec. '94: Lead results under the EPA Action Limit. 2x/yr./100 homes, meeting EPA criteria in every case.
- June '00: Approved for reduced monitoring.

2002 - Present:

- Jan. '02: Approved for further reduced monitoring.
- Aug. '18: 90th percentile at 2.9 ppb. All 51 homes tested under the EPA Action Limit (15 ppb.)
- July '21: 90th percentile at 2.1 ppb. Of the 50 homes tested, two were above the EPA Action Limit and 40 of the homes were below the detection limit.

Water Treatment Process

How It Works

Alum (aluminum sulfate) – Helps the impurities stick together to form bigger particles called floc. Gentle mixing allows the floc particles to grow bigger and heavier.

Chloramine – Long-lasting disinfectant.

Chlorine Dioxide – Disinfectant.

Filtration – Filtration is a physical process that removes very tiny particles.

Fluoride – Added for dental health. View our fluoride position statement at: www.charlestonwater.com/positionstatement.

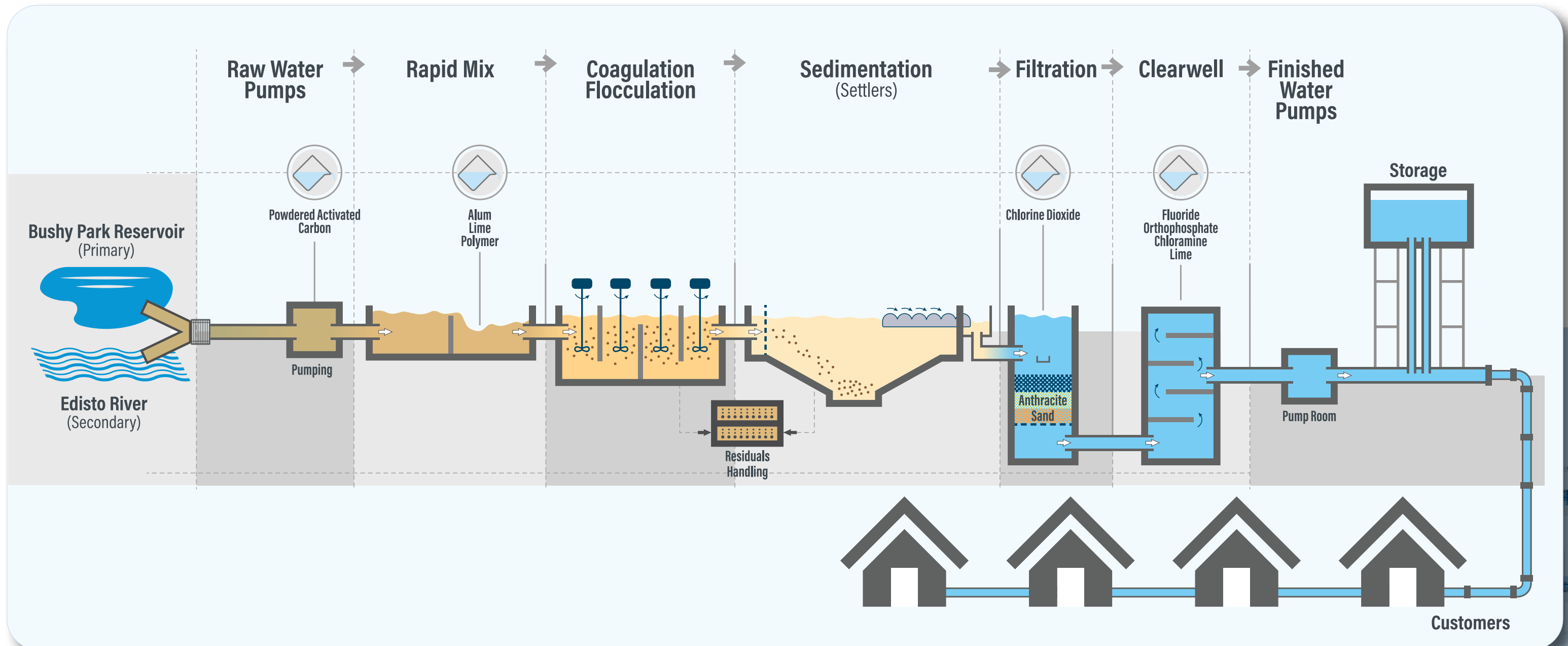
Lime – pH Adjustment for chemical stability.

Orthophosphate – Lead and copper control.

Polymer – Aids with flocculation.

Powdered Activated Carbon – Added for taste and odor control.

Sedimentation (settling) – Sedimentation allows the large, heavy floc particles to settle to the bottom leaving the clean water on top.



Drinking Water Sources

Bushy Park Reservoir is our Primary Water Source

Source Water Protection

To raise awareness about preventing water pollution, SC DHEC identifies potential sources of contamination for each drinking water source in the state: www.scdhec.gov/environment/your-water-coast/source-water-protection.



You Can Help Protect the Water

- 💧 **Pick up the poop!** Pet waste adds bacteria and excess nutrients, which contribute to algae growth that chokes out plants and wildlife.
- 💧 **Don't over-fertilize your lawn.** It washes into storm drains, streams, rivers, and oceans.
- 💧 **No dumping in storm drains.** They empty directly into a waterway.
- 💧 **Proper disposal** of oils, paints, and chemicals.



Drinking Water Sources, continued

Edisto River is our Secondary Water Source

The Edisto River —

- Our intake is located in Givhans Ferry State Park.
- Connected to Hanahan Water Treatment Plant by a 23-mile tunnel.
- In 2020-2021, we spent \$4.6 million to improve our intake structure.



Infrastructure

Adding and maintaining critical infrastructure is an important part of maintaining water quality all the way to customer taps!

Learn more about our capital improvements program:
www.charlestonwater.com/CIP



Hollywood/Ravenel 16-inch Transmission Main Improvements Phase (Recently completed)

The project extended approximately 16,000 feet of transmission main along New Road from Savannah Highway to South Carolina Highway 162, completing a loop between Hollywood and Ravenel, improving potable water and fire protection services to the project area.



Hanahan Water Treatment Plant Expansion (Planning phase)

This project will expand the capacity at the Hanahan Water Treatment Plant from 115.6 million gallons per day to 127.4 million gallons per day to meet projected peak demand for 2034.



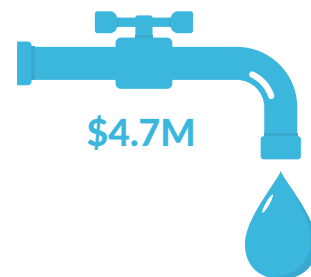
West Ashley Transmission Main Extension (Planning phase)

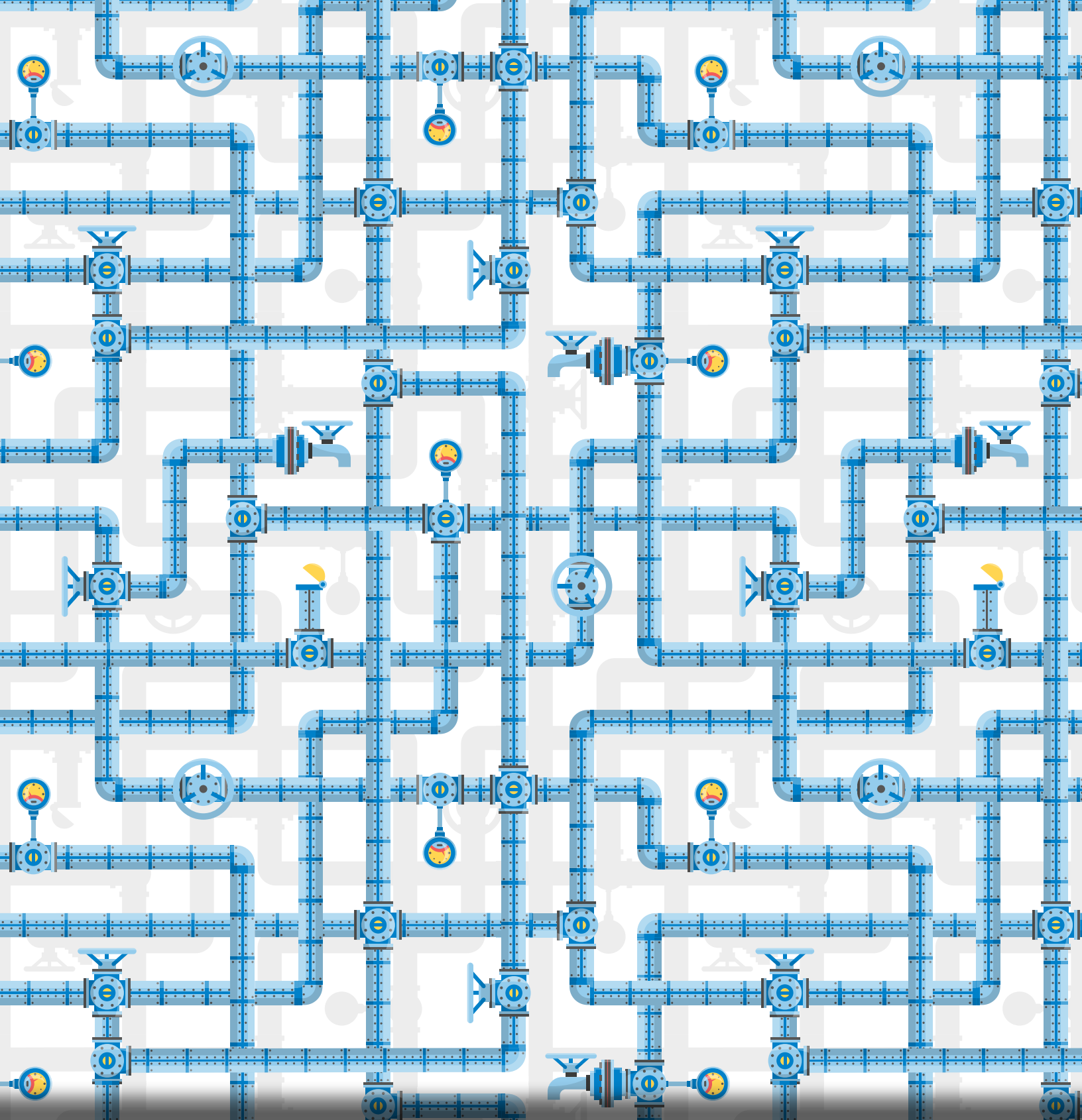
The project will provide the hydraulic capacity to meet the projected demands of West Ashley, the Towns of Hollywood and Ravenel, and wholesale customer St. John's Water Company.



Peninsula Water Main Rehabilitation Phase 3 (Recently completed)

The project rehabilitated approximately 15,650 linear feet of cast iron water main on peninsular Charleston and along East Montague Ave. in North Charleston.





Main Office (Downtown)

103 St. Philip Street
Charleston, SC 29403

This report is published annually in May.

North Area Office*

6296 Rivers Avenue
North Charleston, SC 29418

24/7 Customer Service: (843) 727-6800

**This customer service location is expected to close sometime summer 2022. Our new location will be 6330 Murray Drive, Hanahan, SC.*

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 Charleston Water System |  www.charlestonwater.com