

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.

Table of Contents

Quick Facts 2

Message from the EPA..... 4

How to Interpret Our Data 5

Regulatory Testing..... 6

Voluntary Testing of Unregulated Compounds 10

Lead..... 16

Water Treatment Process 18

Drinking Water Sources 20

Infrastructure..... 24

On the Cover: Bushy Park Reservoir

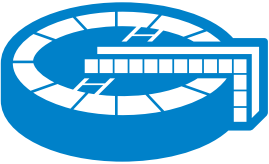
Questions / Extra Copies
Communications department: (843) 727-7146

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



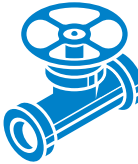
1

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




10,500

Fire hydrants



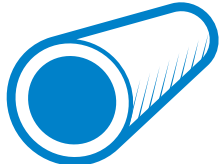
38,000

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



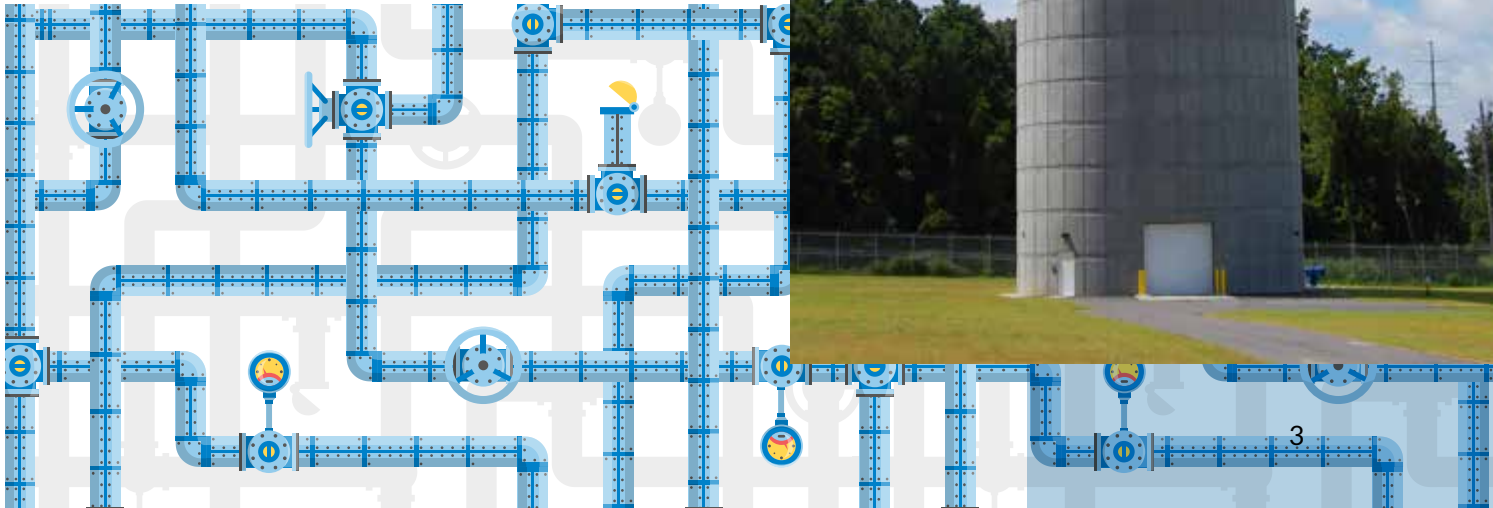
105.5 Million

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 \(1-800-426-4791\)](tel:18004264791).

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

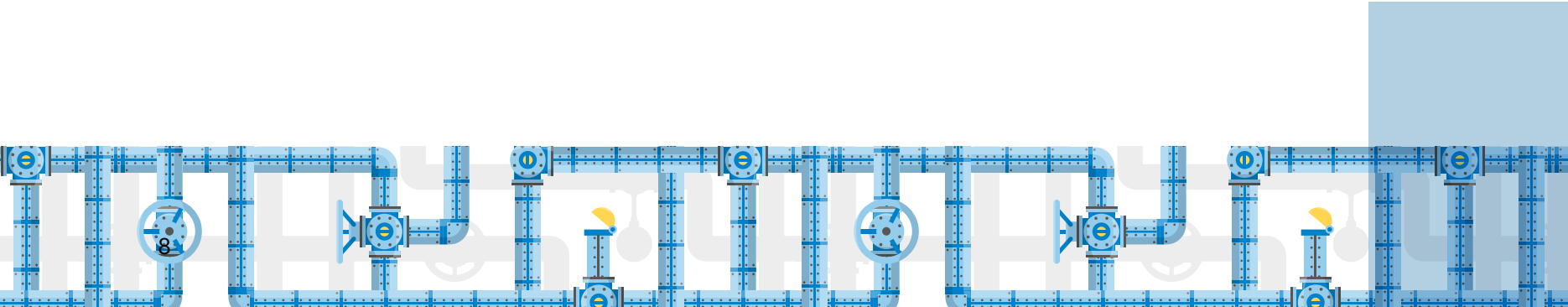
These are the compounds we are required to test for, and all were below the regulatory limit.

| | 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)



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.

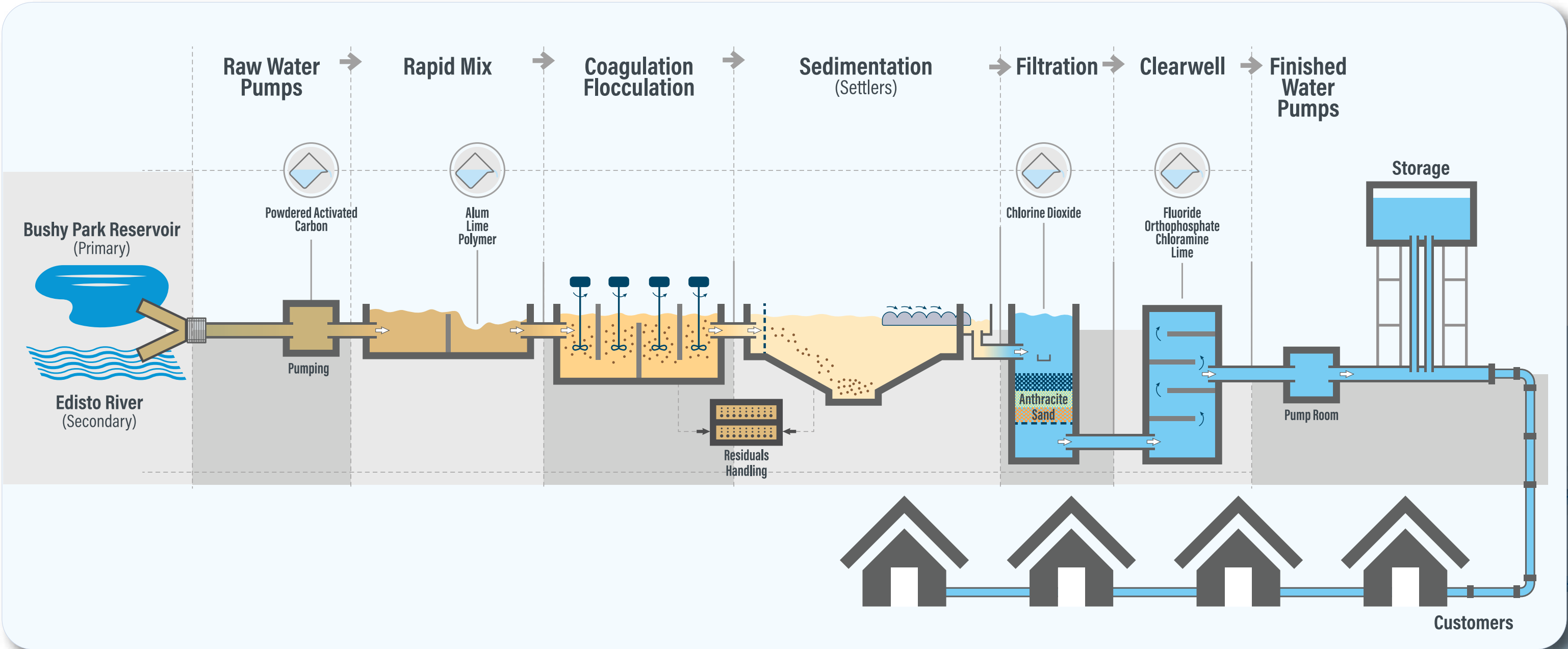
Lime — pH Adjustment for chemical stability.

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

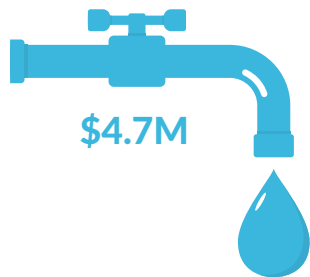
Adding and maintaining critical infrastructure is an important part of maintaining water quality all the way to customer taps!

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



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.



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)

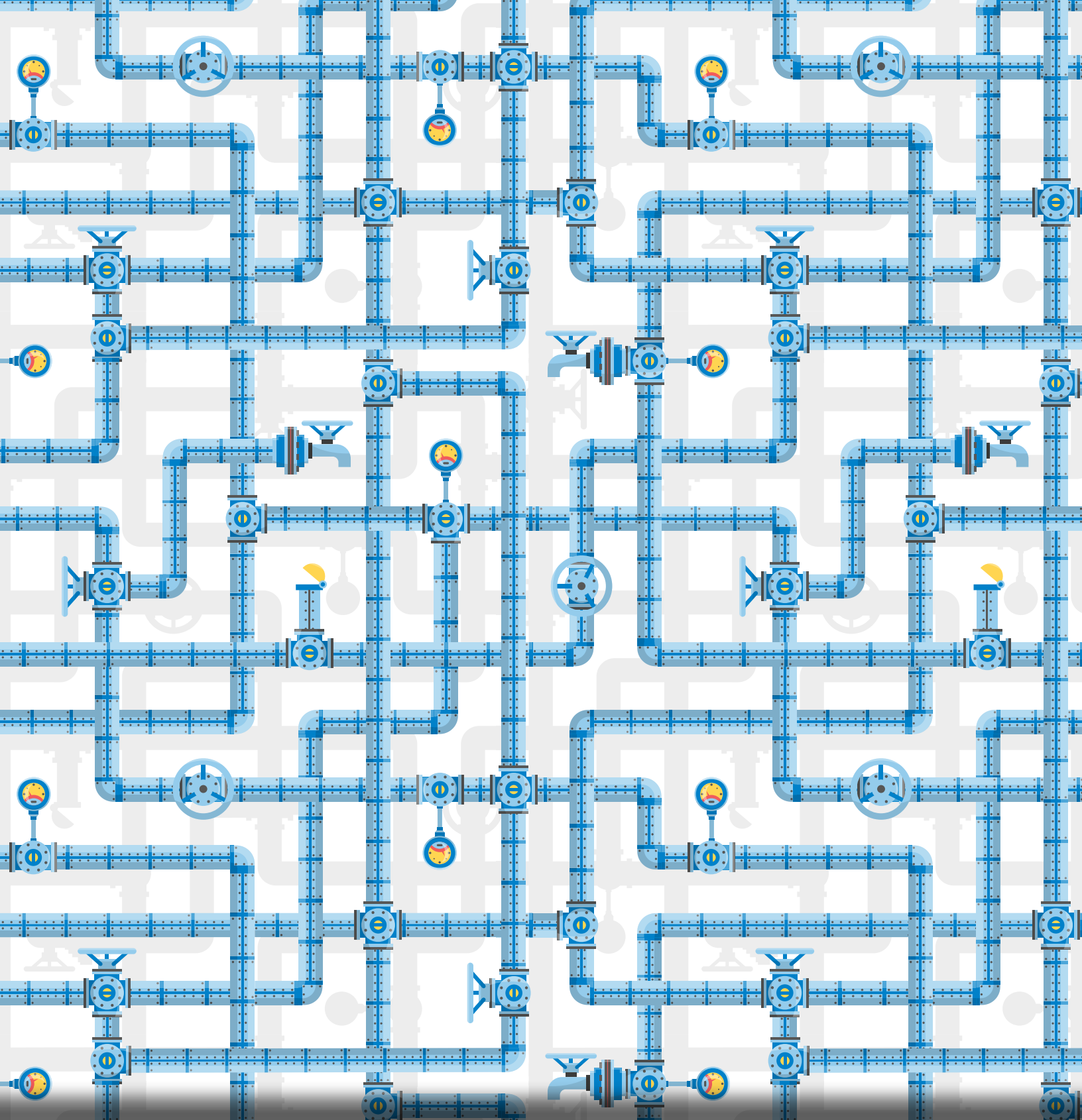
This project will expand the capacity at the Hanahan Water Treatment Plant from 115.6 million gallons per day to 127.4 million gallons per day to meet projected peak demand for 2034.



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.





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.*

 @CharlestonWater |  @ChasWaterSystem |  YouTube.com/CharlestonWater
 Charleston Water System |  www.charlestonwater.com