Crozet Area Projects

DAVE TUNGATE

DIRECTOR OF OPERATIONS AND ENVIRONMENTAL SERVICES

MAY 8, 2024

CROZET COMMUNITY ADVISORY COMMITTEE

RIVANNA WATER & SEWER AUTHORITY

Agenda

- Rivanna Water and Sewer Authority Background
- Crozet Water System
- Crozet Wastewater System
- Recent Capital Improvements and Studies
- Current and Near-Term Improvements
- Operations
- PFAS

Rivanna Water and Sewer Authority

Overview

- Created in 1972 by joint action of the Charlottesville City Council and Albemarle County Board of Supervisors

- Provides wholesale drinking water and wastewater services for the public utility customers of the City and the County

- 100 Employees

- $48 M Annual Operating Budget

- $ 371 M 5-year Capital Improvement Budget

Rivanna Water and Sewer Authority Board of Directors

Mike Gaffney, RWSA Board Chair

Sam Sanders, RWSA Vice-Chair
City Manager, Charlottesville

Jeff Richardson, RWSA Secretary-Treasurer
County Executive, Albemarle County

Brian Pinkston, Councilor
Charlottesville City Council

Ann Mallek, Supervisor
Albemarle County Board of Supervisors

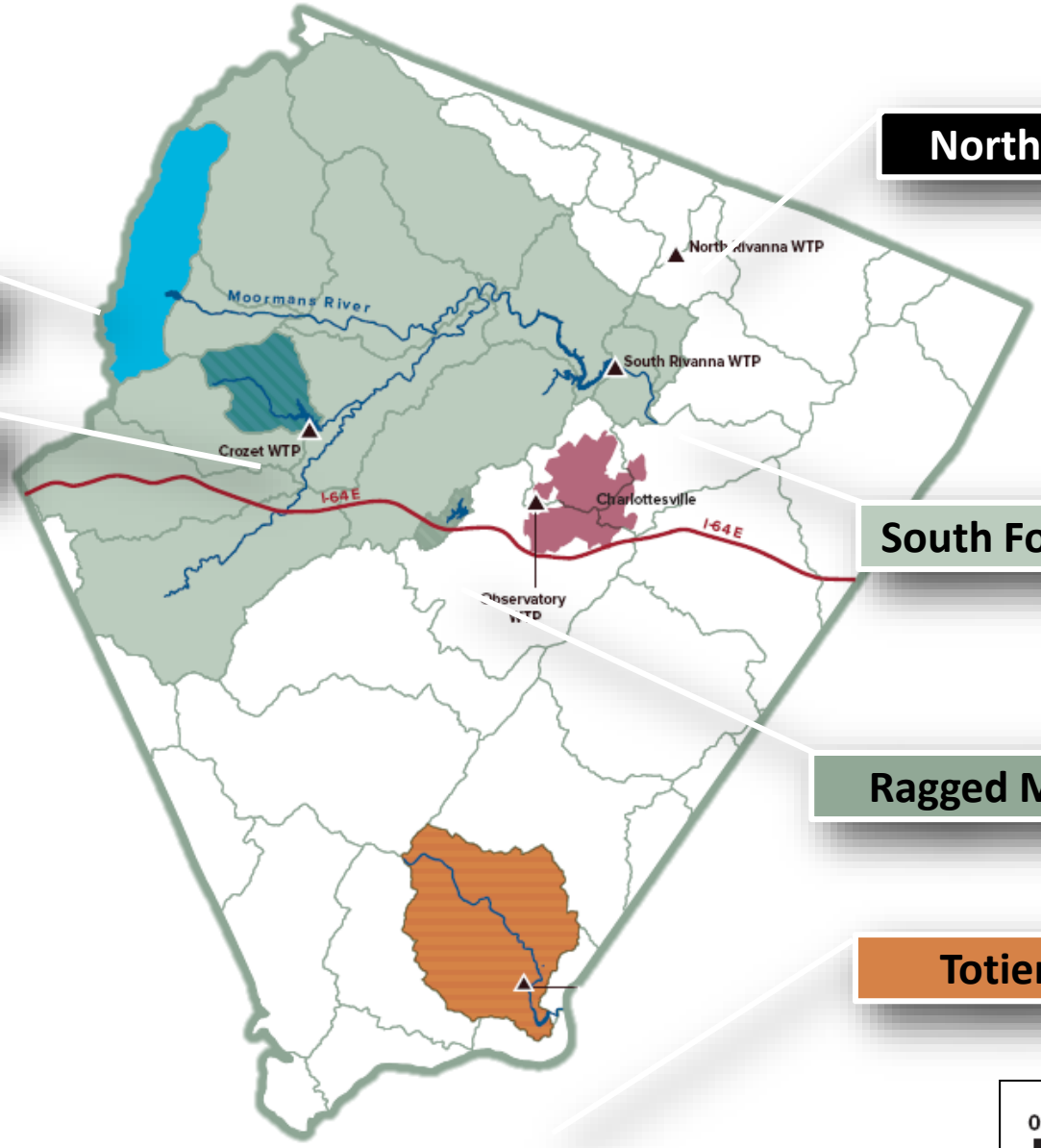
Lauren Hildebrand
Director of Utilities
City of Charlottesville

Gary O'Connell
Executive Director
Albemarle County Service Authority

RWSA Provides Wholesale Drinking Water and Wastewater Treatment for 2 Customers

~10 MGD (daily average) to >130,000 people in City of Charlottesville and Albemarle County

RWSA surface water supplies



Sugar Hollow Reservoir

Beaver Creek Reservoir

North Fork Rivanna River

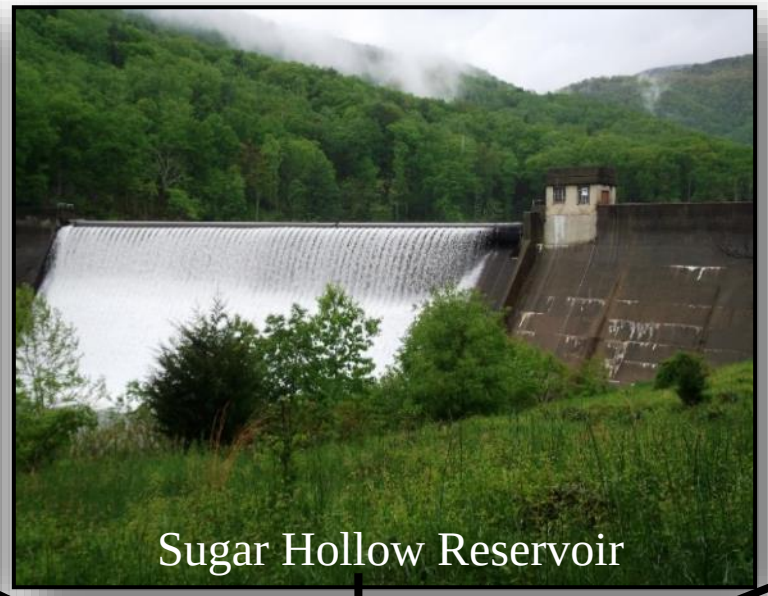
South Fork Rivanna Reservoir

Ragged Mountain Reservoir

Totier Creek Reservoir.

0 1 2 5 10 Miles


South Fork Rivanna Reservoir

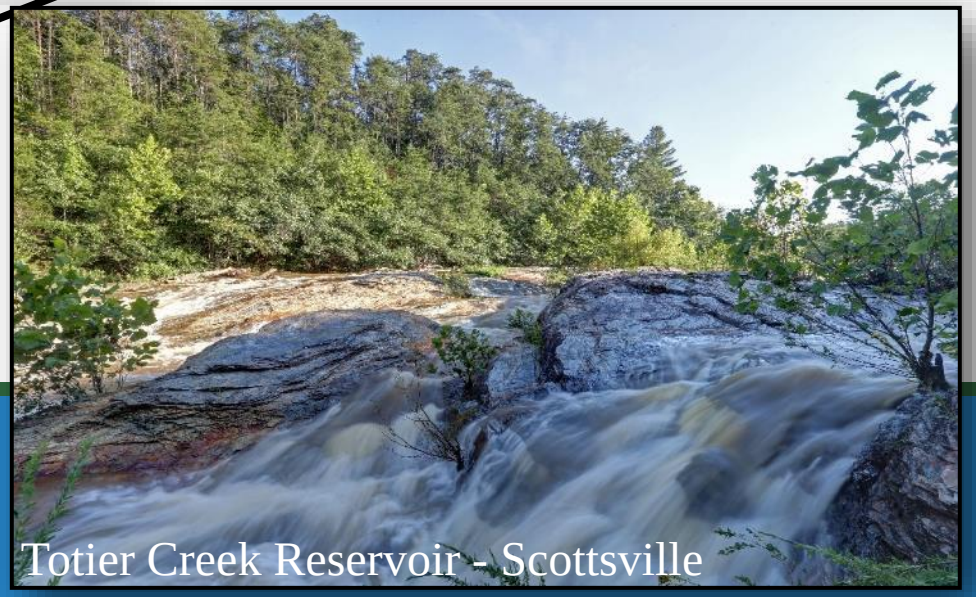

Sugar Hollow Reservoir


Ragged Mountain Reservoir

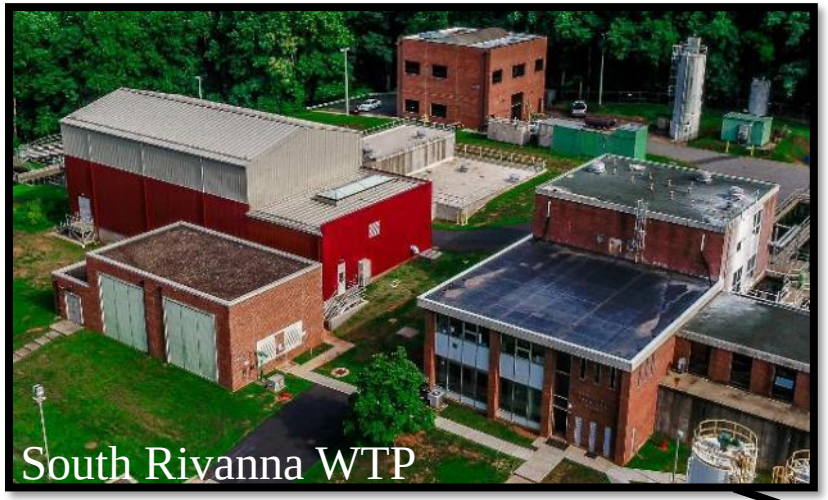
Urban Area

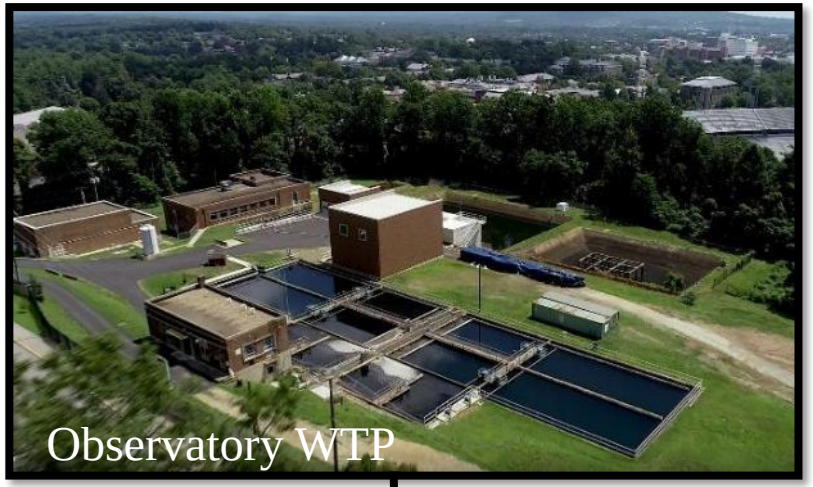
3.3 Billion Gallons

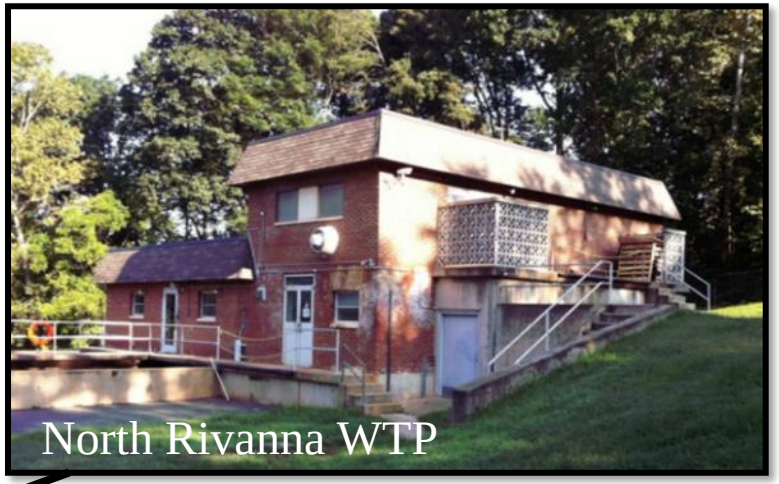

Beaver Creek Reservoir- Crozet


Totier Creek Reservoir - Scottsville

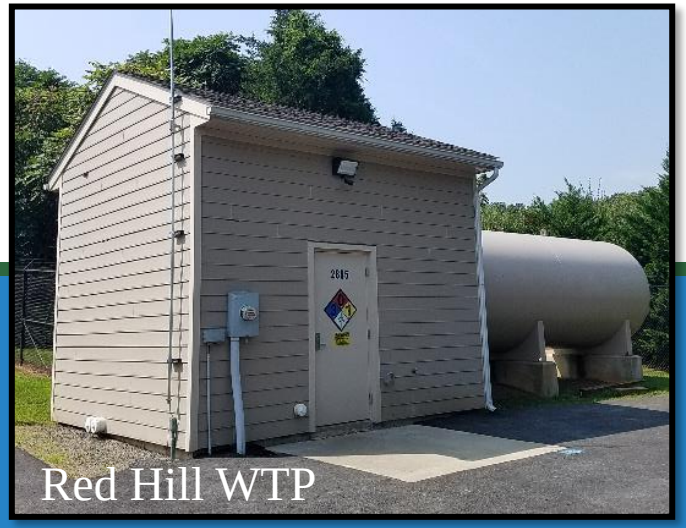
5 Water Supply Reservoirs







Urban Area



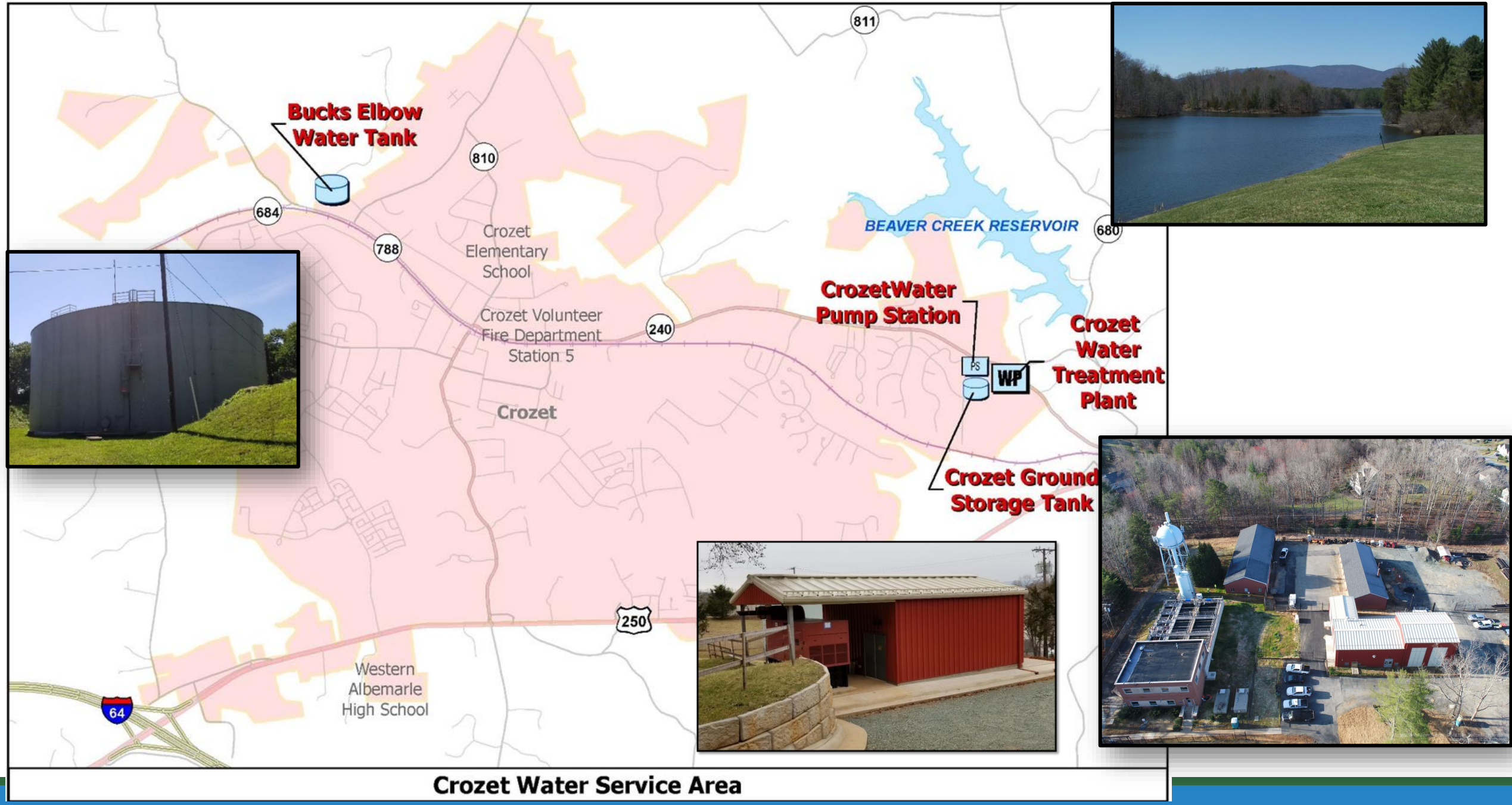
6 Water Treatment Plants

4 Wastewater Facilities

Crozet Service Area

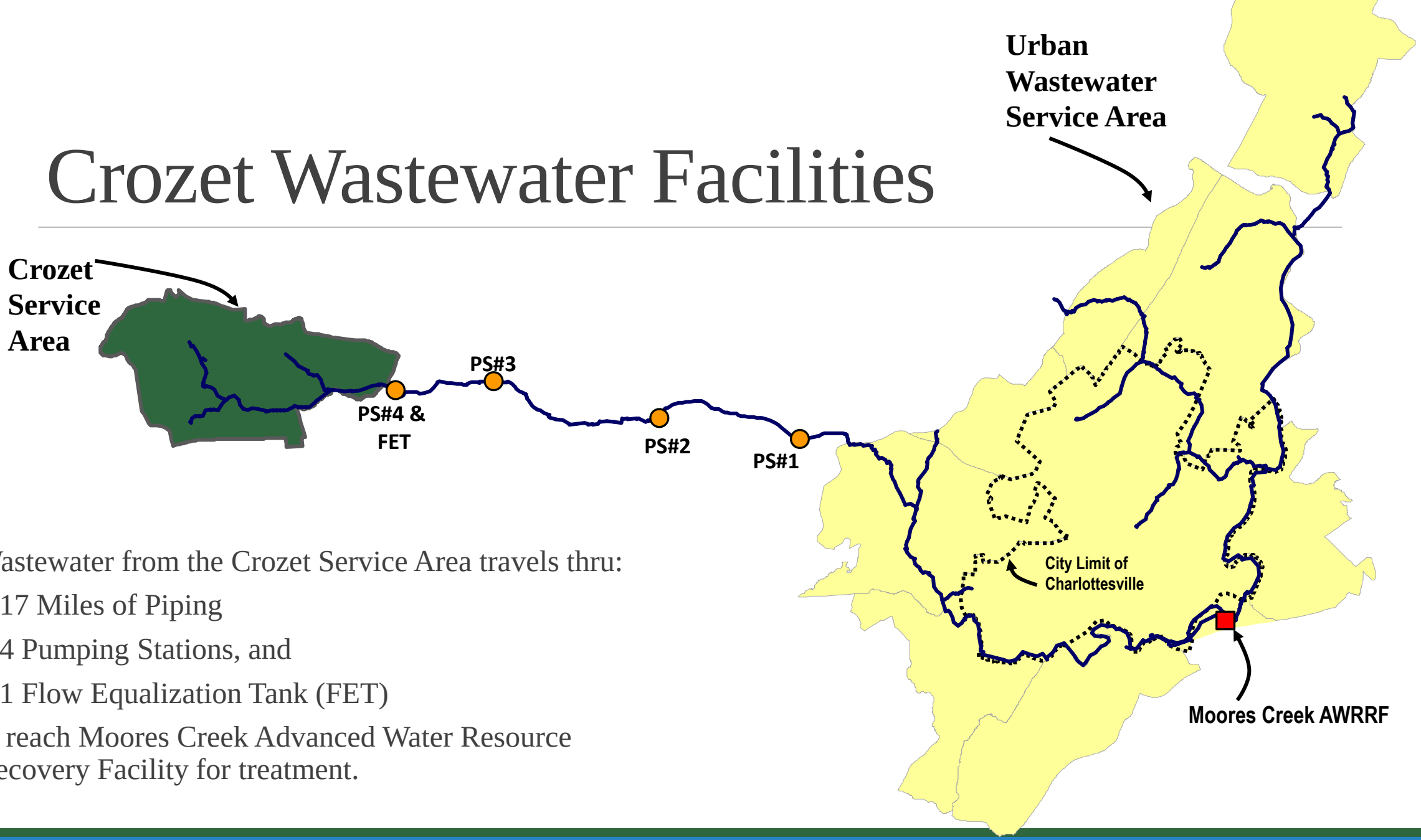
Crozet Area Water Facilities

- Beaver Creek Reservoir
- Raw Water Intake & Pump Station
- Raw Water Pipeline
- Crozet Water Treatment Plant
- Finished Water Pump Station
- Buck's Elbow Tank



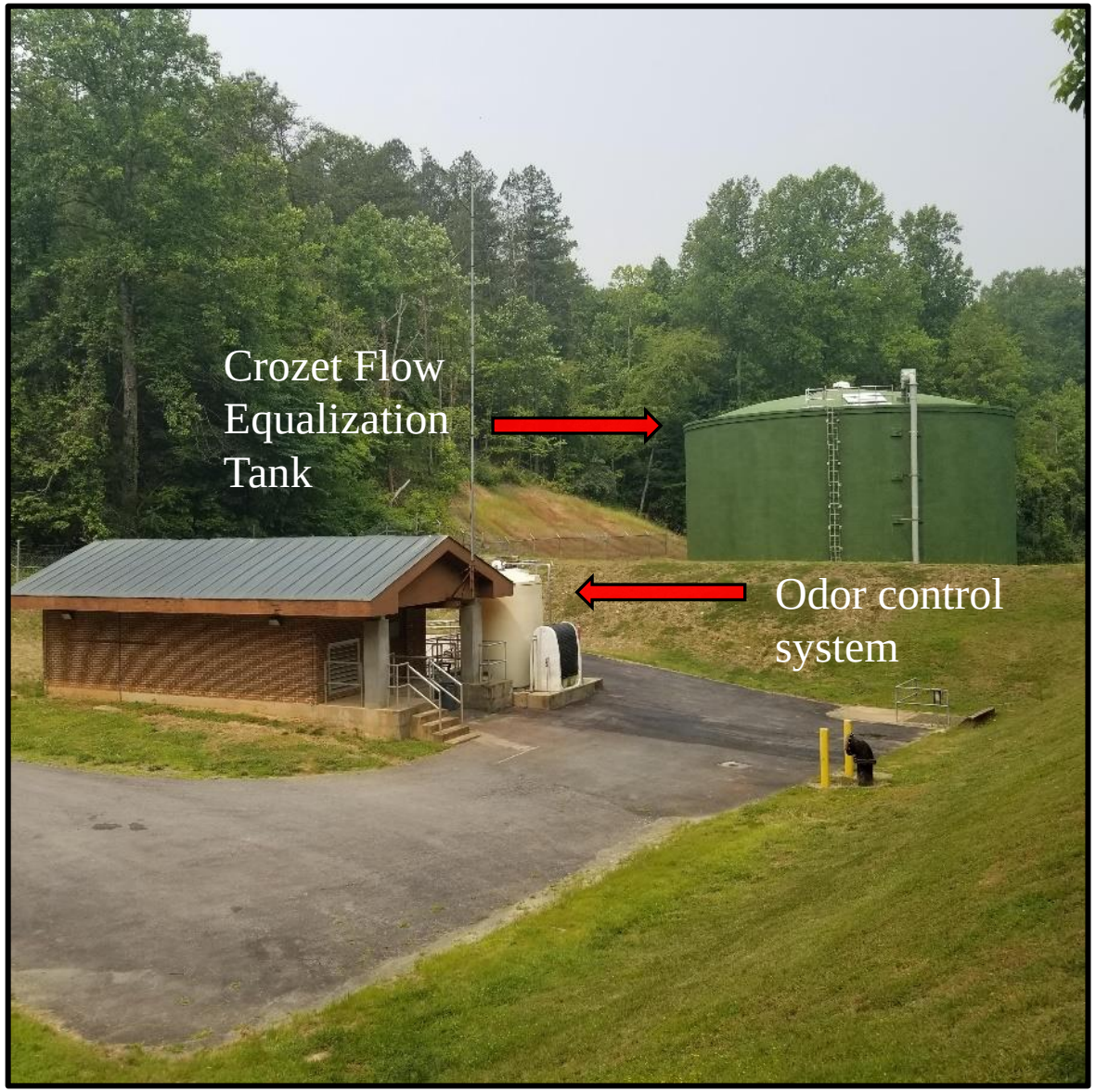
Crozet Water Service Area

Crozet Wastewater Facilities



- Wastewater from the Crozet Service Area travels thru:
  - 17 Miles of Piping
  - 4 Pumping Stations, and
  - 1 Flow Equalization Tank (FET)

  to reach Moores Creek Advanced Water Resource Recovery Facility for treatment.



Crozet pump station 4 intersection 240/250

Crozet sewer Odor Control

Reduces odors in sewer line from Crozet to Charlottesville

- *Odor control from Crozet costs about $390,000/year*

Recent Capital Improvements and Studies

Granular Activated Carbon Vessels

- Removes Total Organic Carbon (TOC)
- 1 MGD Capacity
- Completed: April 2018
- Cost: $3.4 M

Finished Water Pump Station

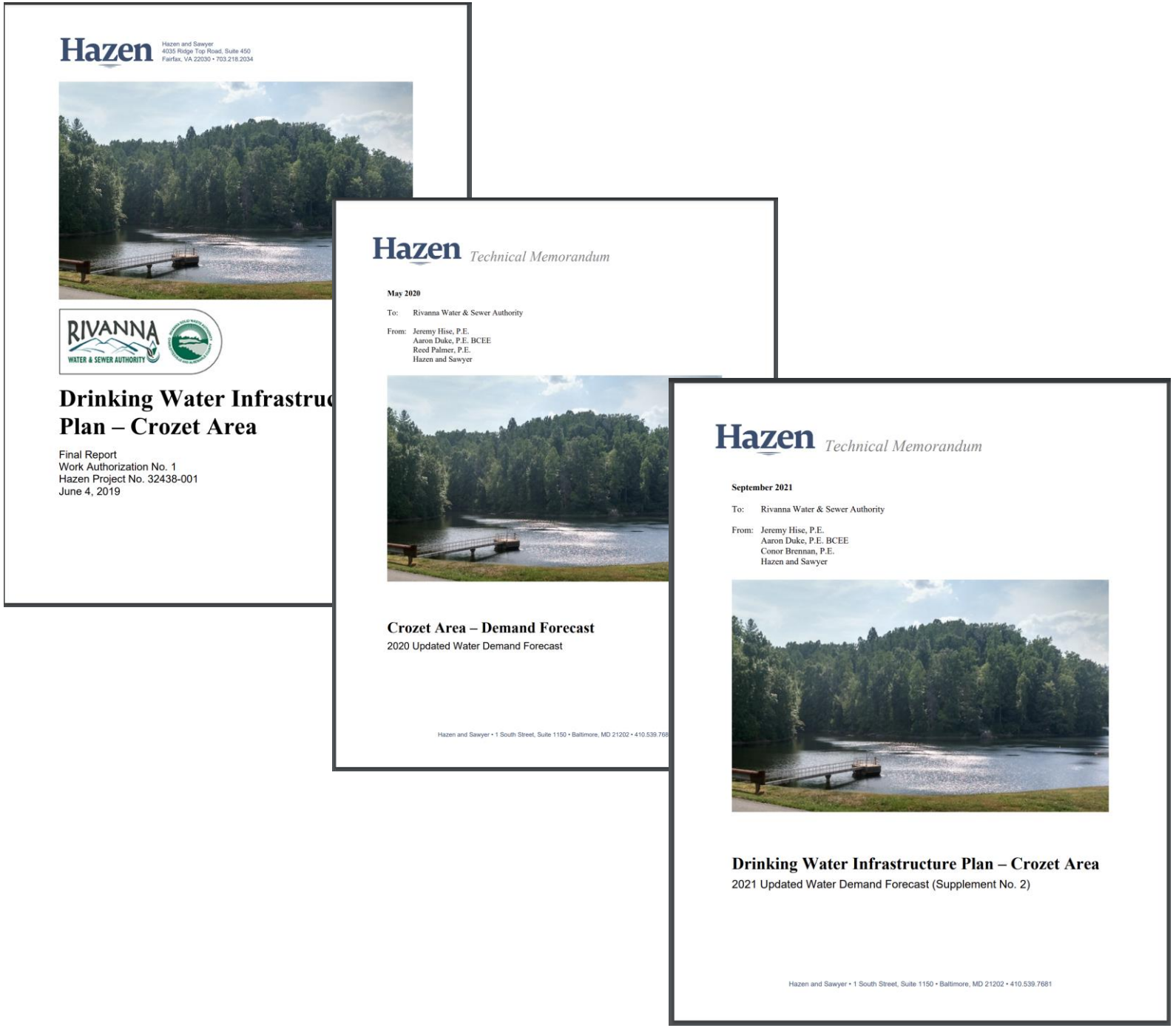
- Pumping Capacity of 2 MGD
- Completed: September 2018
- Cost: $2.6 M

Water Treatment Plant Upgrade

- Plant Capacity Increased from 1 to 2 MGD
- Completed: March 2021
- Cost: $8.5 M

Drinking Water Infrastructure Plan

- Master Plan for Serving Crozet Water Needs thru 2075
- Average Day Demand
  - 2022 = 0.63 MGD (approx.)
  - 2075 = 1.52 MGD
- Completed: June 2019
  - Updated: July 2020
  - Updated: Sept. 2021



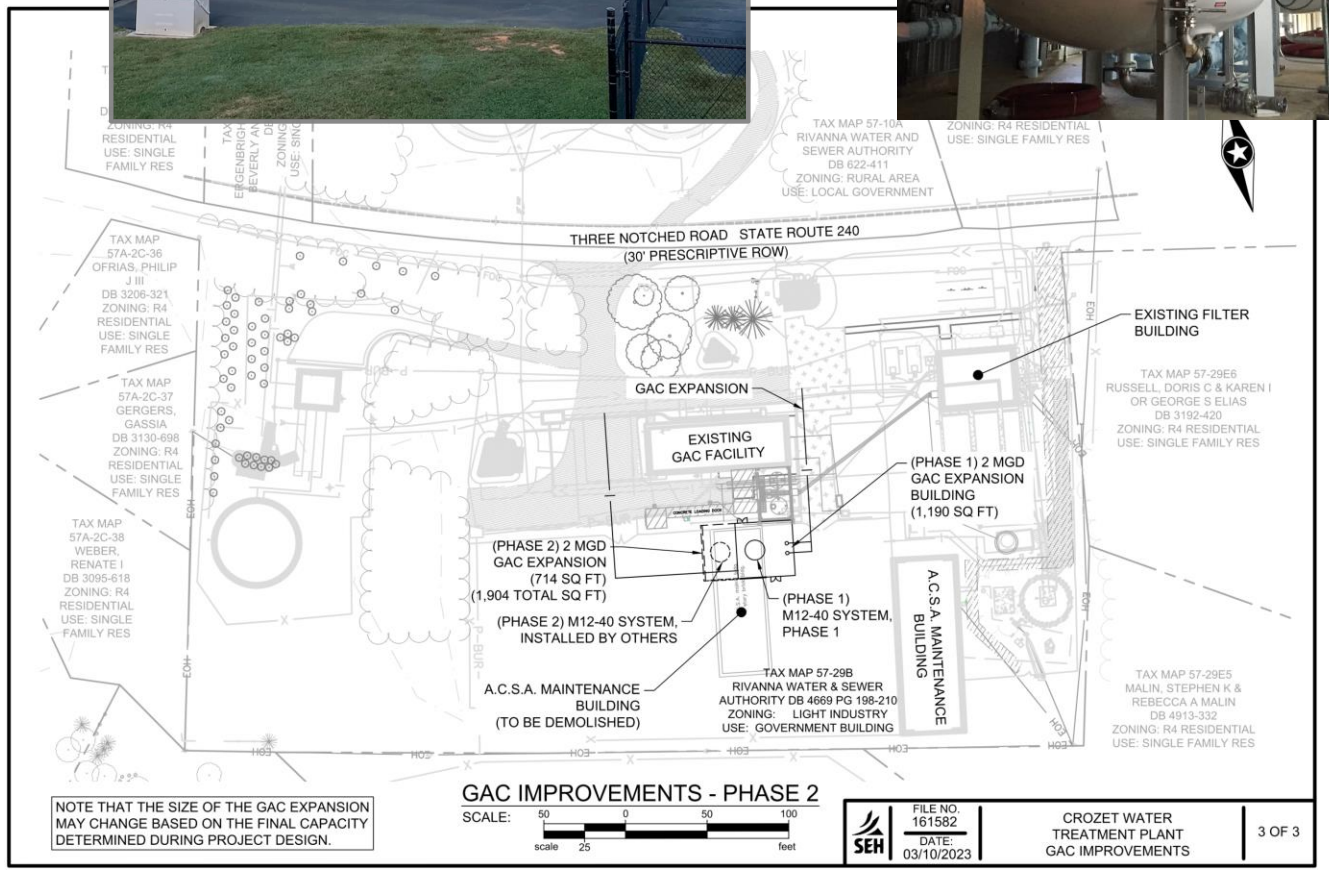
Crozet Wastewater Flow Equalization Tank

- Stores Wet-Weather Flow to Minimize Impact on Downstream Sewer Capacity
- 1 MG Concrete Wastewater Storage Tank next to Pump Station No. 4
- Trims Peak Wet Weather Flows
- Completed: November 2022
- Cost: $5.4 M

Current and Near-Term Improvements

Crozet WTP GAC Expansion Phase 1

- Provides for full GAC treatment up to 2 MGD
- GAC is a leading best management practice to remove DBP pre-cursers and can be used to manage removal of other emerging contaminants
- Receiving $3.43M in grant funding from VDH ($3.17M FY22 BIL and $0.26M FY23 BIL)
- Finalizing GAC media evaluation and beginning preliminary design work
- Completion: 2025 - 2026
- Budget: $6.6 M; 100% ACSA



Crozet Wastewater Pump Stations 1-4 Rehabilitation

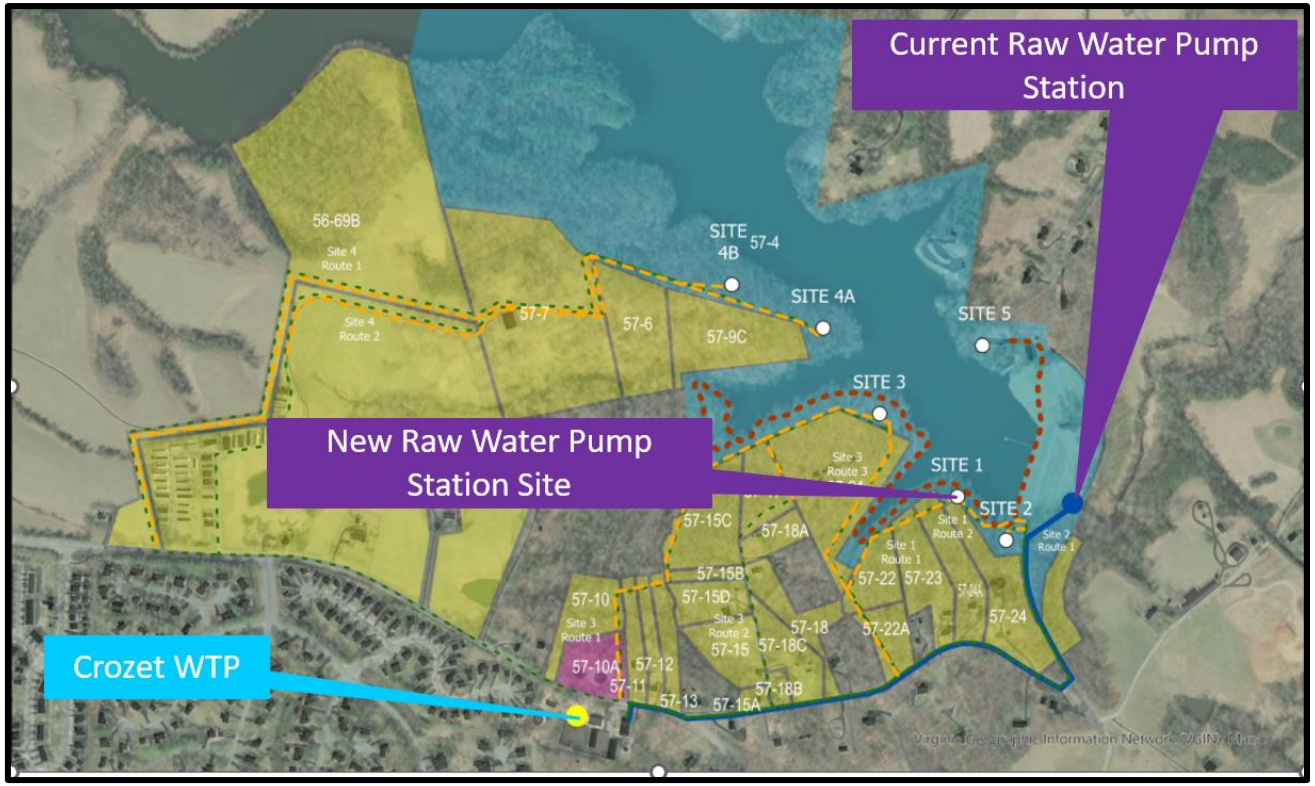
- Conveys Crozet Wastewater to the Moores Creek Advanced Water Resource Recovery Facility
- Rehabilitate Buildings and Equipment at the end of Useful Life
- Completion: 2026
- Cost: $10.9 M

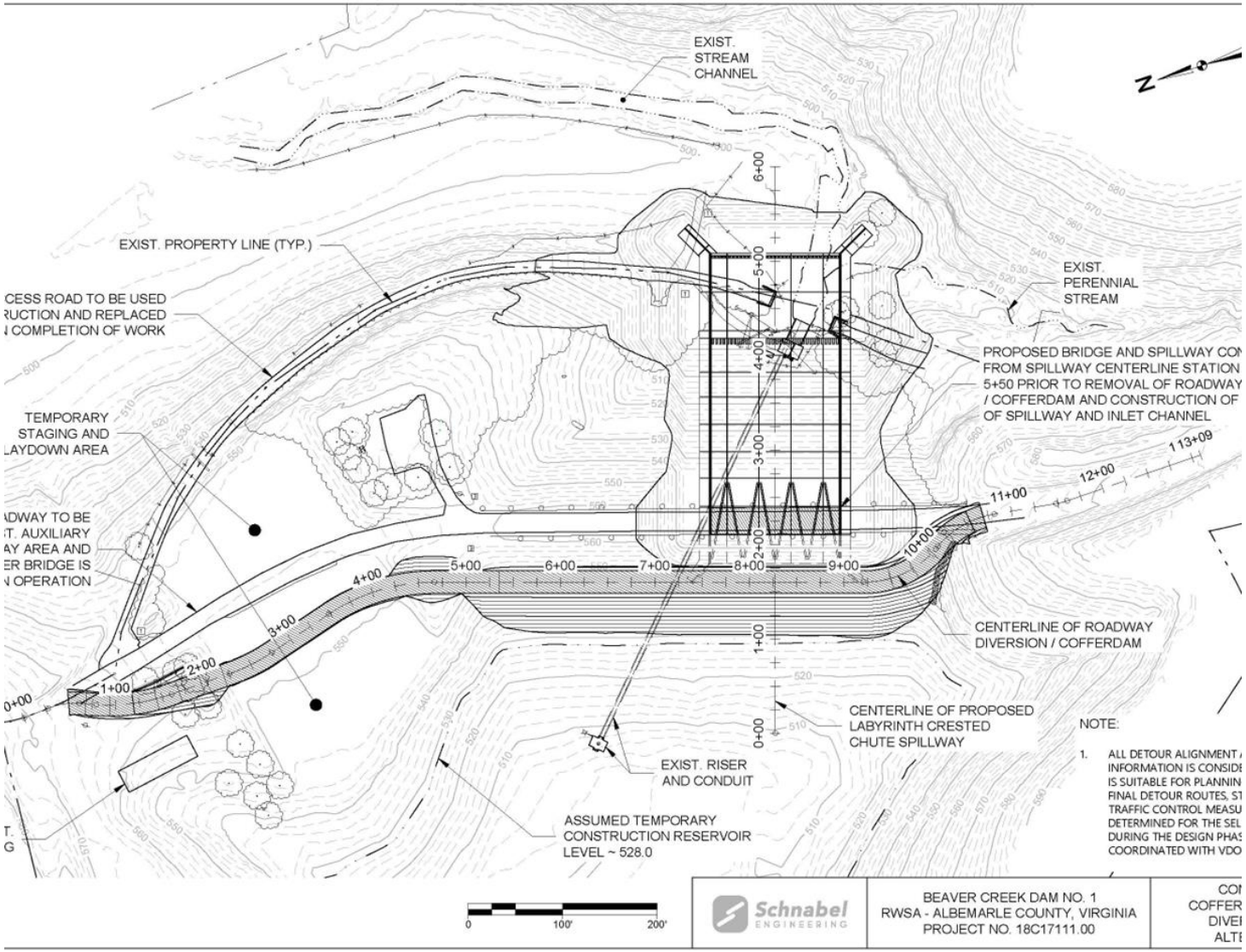
Beaver Creek Dam, Pump Station & Piping Modifications

- Replace spillway to meet VDCR Dam Safety standards
- Replace the raw water pump station, intake, and pipe to the Crozet WTP
- Completion: 2026 – 2029
- Budget: $47.1 M
  - Requesting Federal Funding ($17 M)


Proposed Labyrinth Spillway


Existing Raw Water Pump Station





Beaver Creek Dam

- 4 Cycle Labyrinth Spillway through the Embankment
- Detour Road on the Upstream side of the Dam During Construction
- New Pump Station to be built on the south side of the reservoir (on the first peninsula upstream on the dam)
- Hypolimnetic Oxygenation System (HLOS) to increase subaqueous oxygen and improve water quality

Operations

Beaver Creek Reservoir

- Total Useable volume is **499 million gallons**
  - Community water demand: 0.5 - 1.1 MGD varies with irrigation
  - Over 12 mo. of storage, with no additional inflow

Beaver Creek Reservoir Sampling Program

- Nitrogen
- Phosphorus
- Algae
- Iron & Manganese
- Ammonia
- pH
- Temperature
- Dissolved Oxygen

Beaver Creek Reservoir

Beaver Creek Reservoir on 10/29/2014 during an algal bloom

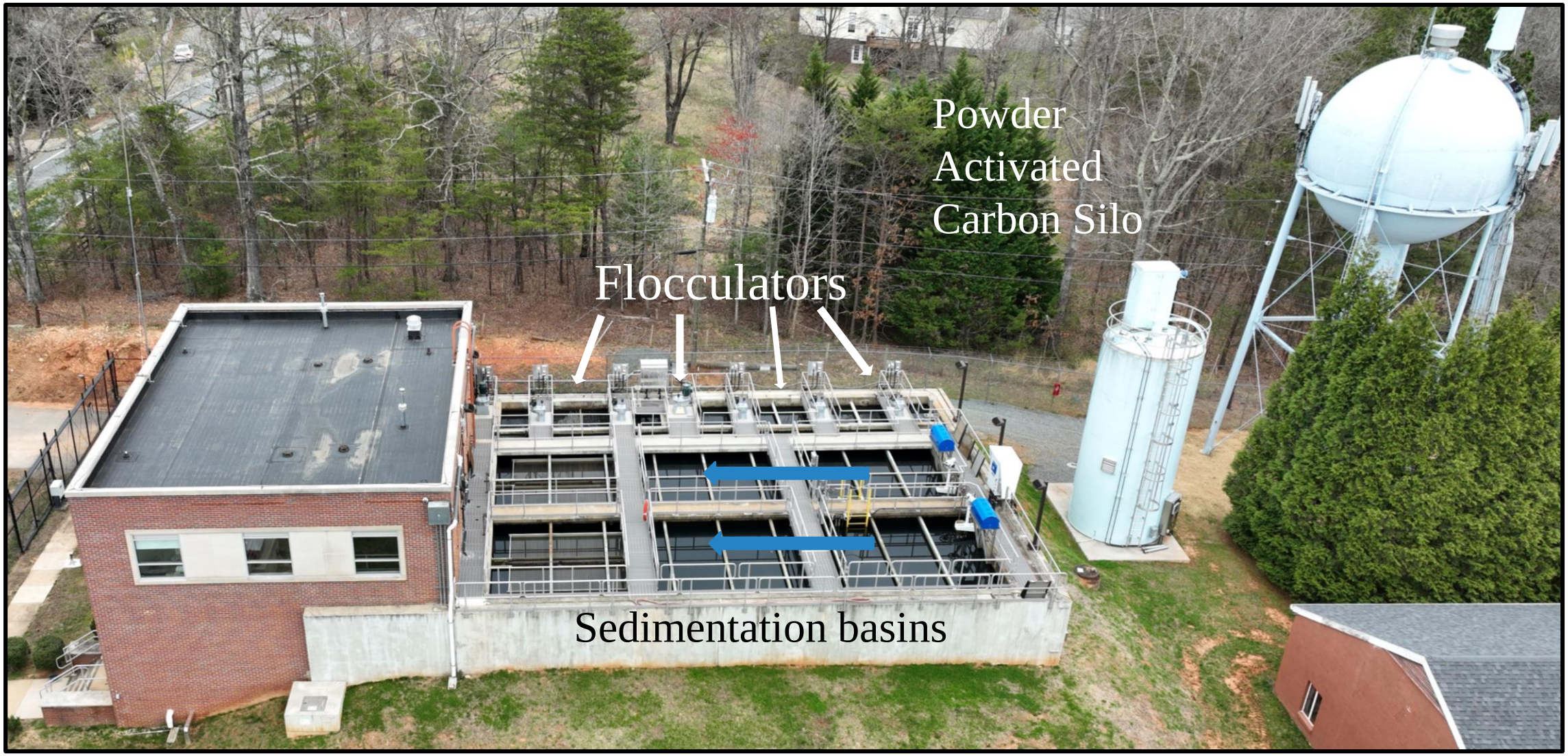
- More information on RWSA algal treatment https://www.rivanna.org/algal-management-program/

- Reservoir Treated in the Warmer Months with Algaecide
  - **Monitor** - Routine Reservoir Sampling & Lab Analysis
  - **Evaluate** - Weekly Algae Counts and Established Thresholds and Procedures
  - **Manage** - Sporadic Treatment (typ. 8-10 x /year) to prevent toxic cyanobacteria blooms
- Professional Application by third party. Public Notice and staff on site to answer questions
- Algaecide is approved for Drinking Water Applications

Water Treatment Plant

Condition of our source water varies

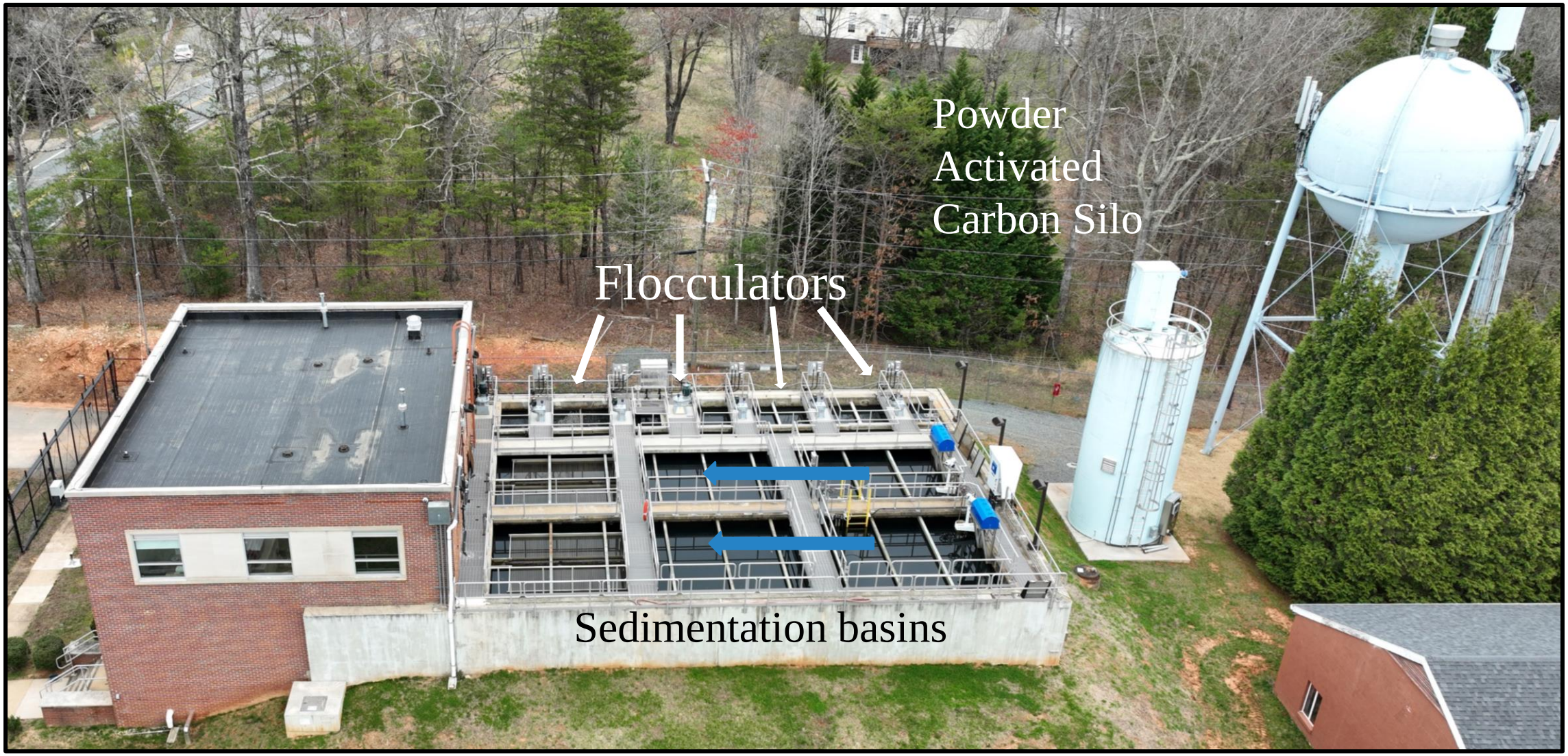
Our customers will not notice a difference



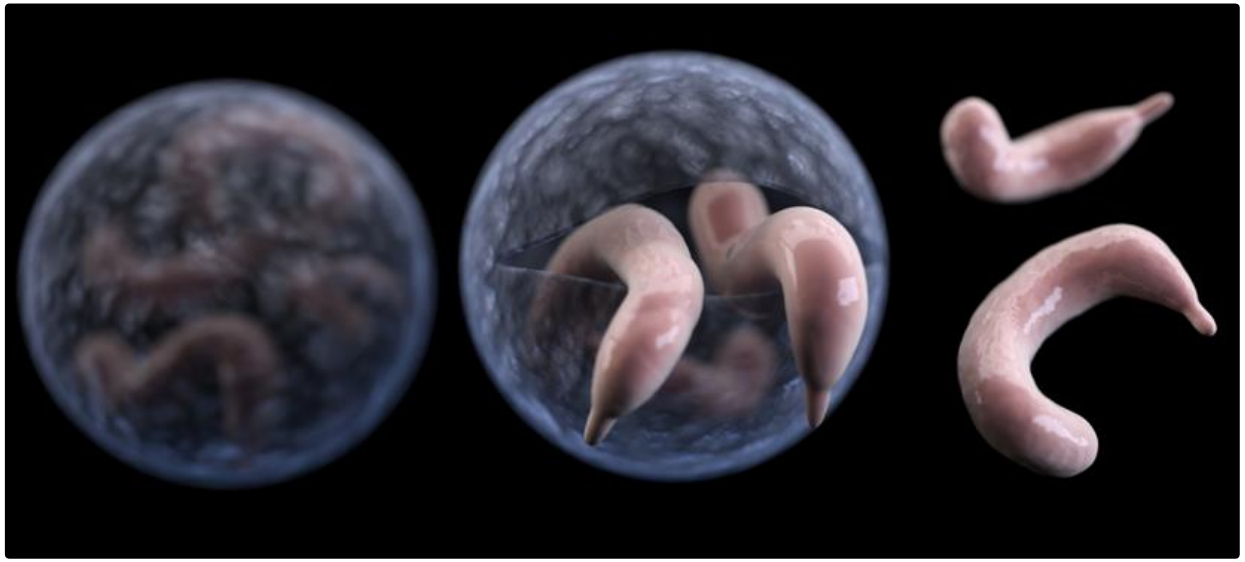
Crozet Water Treatment Plant

Filters at Crozet
Water Treatment Plant

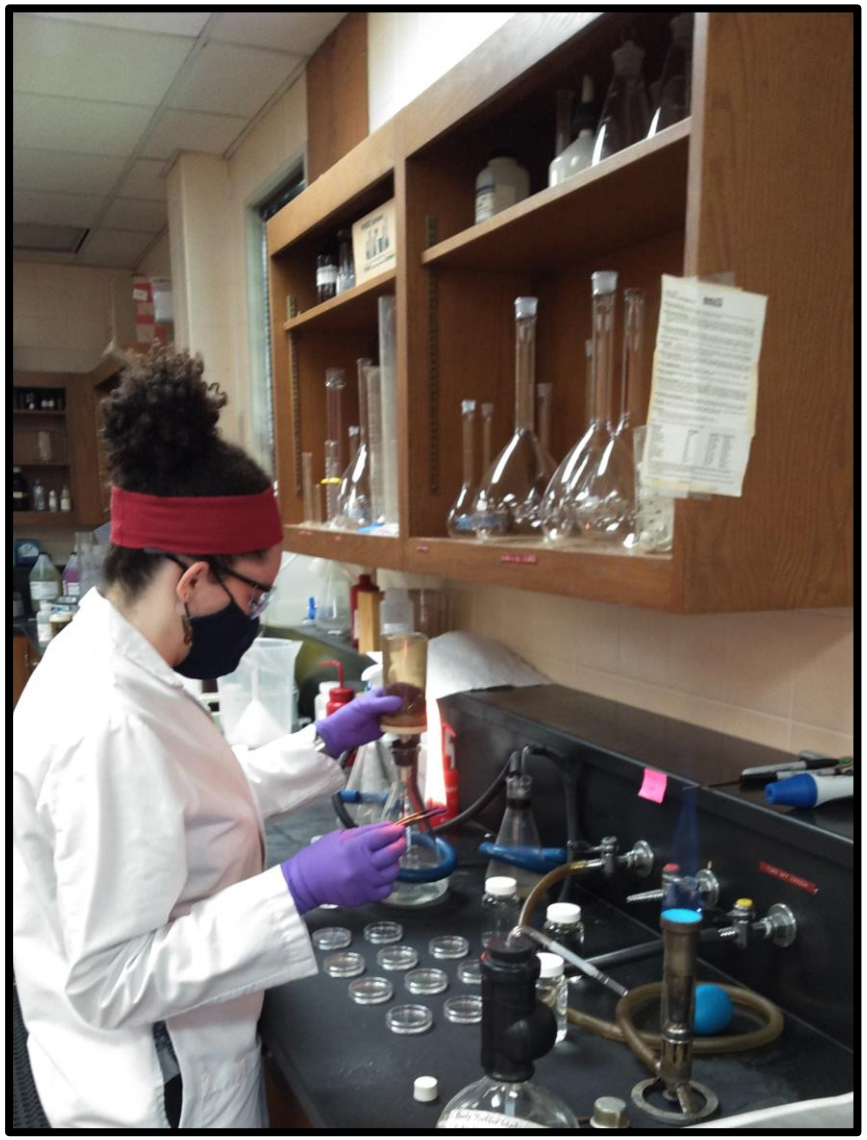
Lab area at Crozet
Water Treatment Plant



Crozet Water Treatment Plant



Giardia & Cryptosporidium



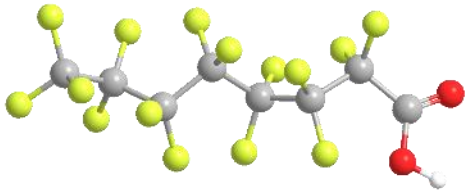
Drinking Water Reporting Requirements

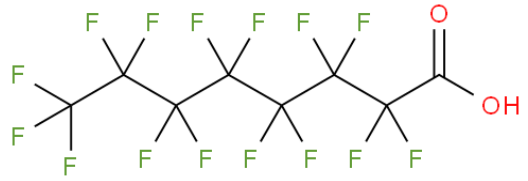
Monthly reports submitted to Virginia Department of Health include the following:

- Daily water volume pumped in and out of each water plant
- Daily chemical dosages of each chemical fed at every water plant (coagulant, lime, powder activated carbon, polymer, corrosion inhibitor, chlorine, and fluoride)
- Filter performance, water temperatures (raw and finished), and distribution system water quality

PFAS

PFAS





- PFAS: Per-and Polyfluoroalkyl substances are synthetic chemicals that included several different classes (e.g., PFOA, PFOS, Gen X)

- They make consumer products more water resistant, stain resistant (Scotchgard™), and reduce friction (Teflon)

- Primary ingredient in many fire-fighting foams

- Approximately 12,000 PFAS chemicals exist and EPA approved test methods to detect 29 PFAS chemicals.

EPA PFAS Drinking Water Standards

On April 10, 2024, EPA finalized a National Primary Drinking Water Regulation (NPDWR) establishing legally enforceable levels, called Maximum Contaminant Levels (MCLs), for six PFAS compounds in drinking water. PFOA, PFOS, PFHxS, PFNA, and HFPO-DA as contaminants with individual MCLs, and PFAS mixtures containing at least two or more of PFHxS, PFNA, HFPO-DA, and PFBS using a Hazard Index MCL to account for the combined and co-occurring levels of these PFAS in drinking water. EPA also finalized health-based, non-enforceable Maximum Contaminant Level Goals (MCLGs) for these PFAS.

PFAS abbreviations

PFAS chemical abbreviation	PFAS chemical name
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
PFHxS	Perfluorohexanesulfonic Acid
HFPO-DA (Gen X chemicals)	Hexafluoropropylene oxide dimer acid
PFNA	Perfluorononanoic Acid

New EPA PFAS regulations

PFAS Compound	MCLG	MCL
PFOA	0	4.0 parts per trillion (ppt or ng/L)*
PFOS	0	4.0 ppt
PFHxS	10 ppt	10 ppt
HFPO-DA (Gen X chemicals)	10 ppt	10 ppt
PFNA	10 ppt	10 ppt
Mixture of two or more PFHxS, PFNA, HFPO-DA, and PFBS	Hazard Index 1 (unitless)	Hazard Index 1 (unitless)

1 part per trillion is the same as :

- 1 inch in 16 million miles
- 1 penny in $10 B
- 1 second in 32,000 years

Crozet PFAS results

Crozet WTP	Sampling Location		
Sampling Date	Raw Total PFAS (ng/L)	Finished Total PFAS (ng/L)	Lab Method
12/20/2018	BDL	BDL	537
12/11/2019	BDL	BDL	537.1
7/30/2020	BDL	BDL	537.1
3/10/2021	BDL	BDL	537.1
9/21/2021	2.5	BDL	533
3/9/2022	BDL	BDL	537.1
7/12/2022	BDL	BDL	537.1
8/23/2022	BDL	BDL	1633
2/22/2023	BDL	BDL	537.1
5/25/2023	N/S	BDL	533/537.1
8/9/2023	8.1	BDL	533/537.1
9/19/2023	BDL	BDL	533/537.1
11/6/2023	BDL	BDL	533/537.1
1/9/2024	BDL	BDL	533/537.1
1/12/2024**	BDL	N/S	533
2/8/2024	N/S	BDL	533/537.1
2/9/2024	BDL	N/S	533/537.1

*- BDL is Below lab Detection Level

N/S - No sample

** Raw only due to shipping error

Crozet WTP	Sampling Location				
Sampling Date	Raw PFAS (ng/L)	Finished PFAS (ng/L)	PFAS detected (ng/L)	Concentration (ng/L)	Lab Method
9/21/2021	2.5	BDL	Perfluoropentanoic acid (PFPeA)	2.5	537.1
8/9/2023	3.7	BDL	Perfluorobutanoic acid (PFBA)	3.7	533
8/9/2023	4.4	BDL	Perfluoropentanoic acid (PFPeA)	4.4	533

1 part per trillion is the same as :

- 1 inch in 16 million miles
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Granular Activated Carbon Contactors

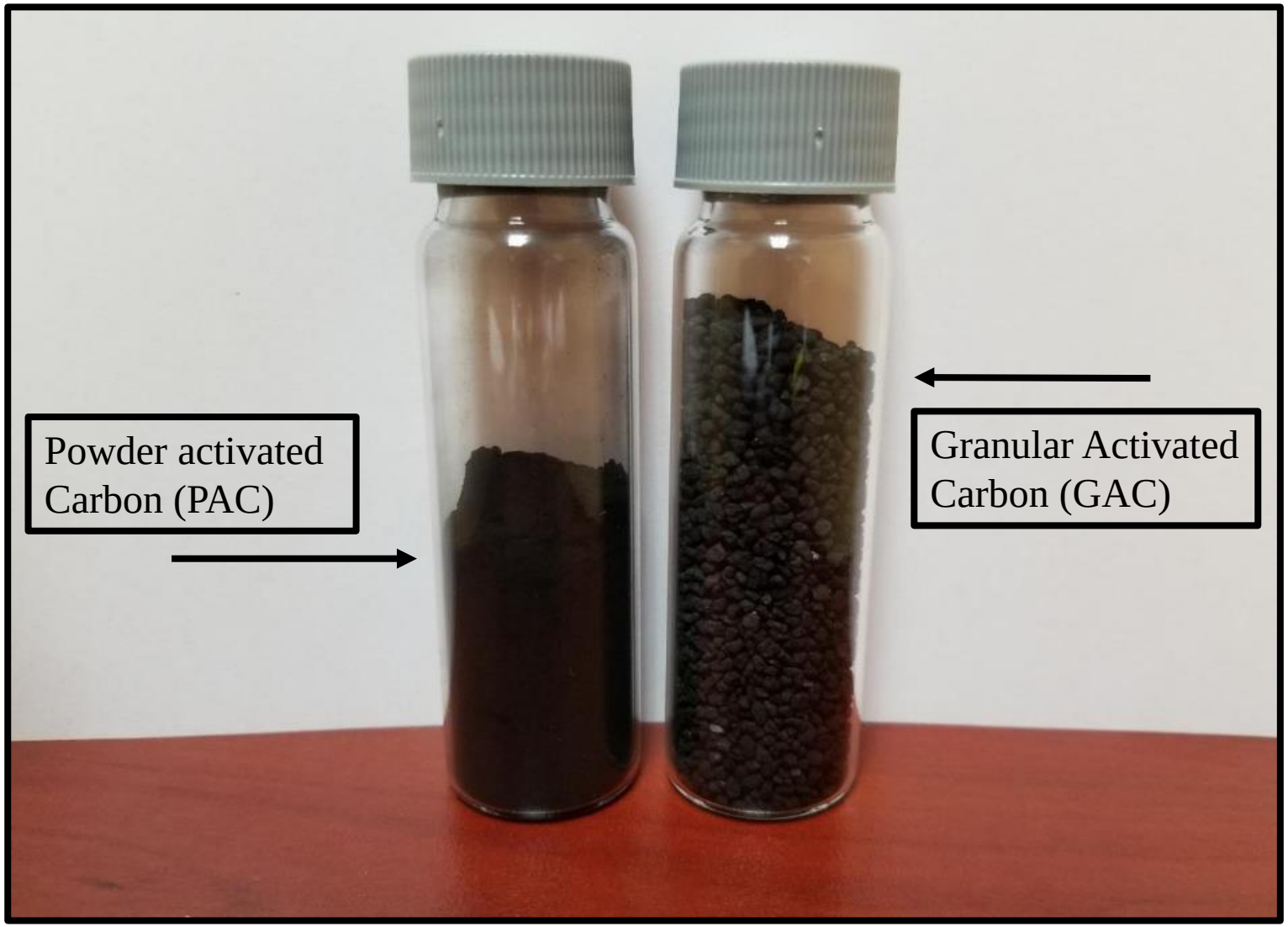
South Rivanna WTP
8 Contactors
320,000 pounds of GAC
8 MGD Capacity

Observatory WTP
6 Contactors
240,000 pounds of GAC
6 MGD Capacity

North Rivanna WTP
1 Contactor
40,000 pounds of GAC
1 MGD Capacity

Crozet WTP
2 Contactors
40,000 pounds of GAC
1 MGD Capacity

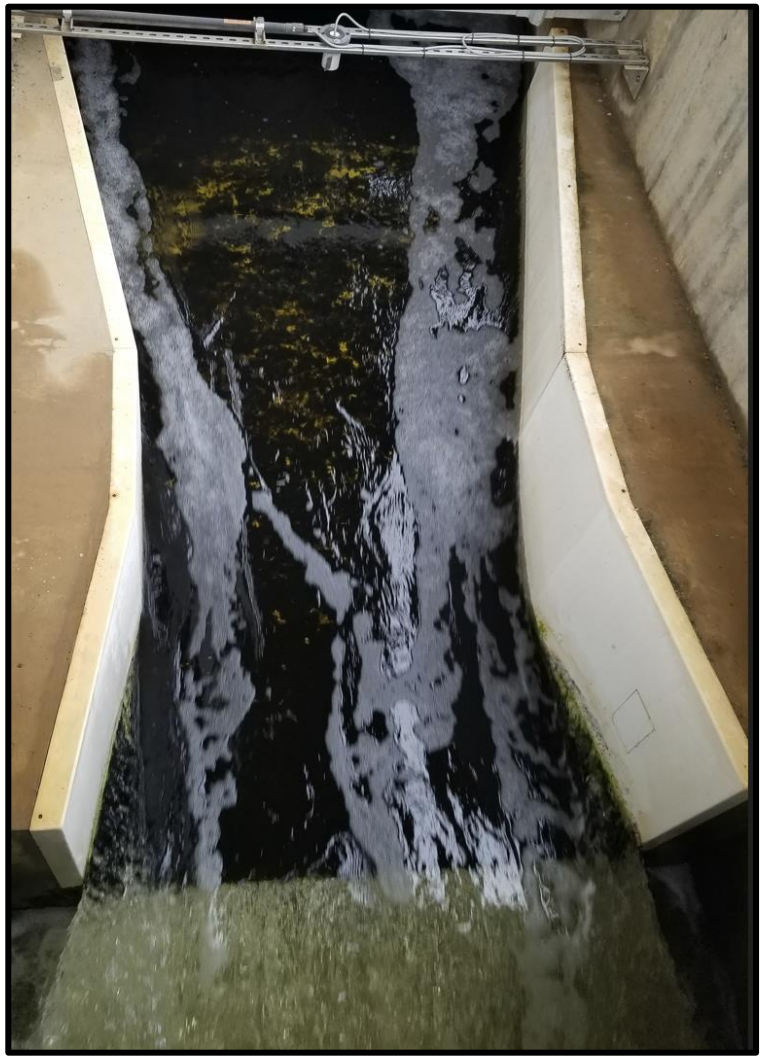
Scottsville WTP
2 Contactors
12,000 pounds of GAC
0.25 MGD Capacity



Activated Carbon

Sewage entering wastewater plant

Water leaving the wastewater plant



Questions?

RIVANNA
WATER & SEWER AUTHORITY