



## SECONDARY WATER QUALITY TREATMENT SYSTEM REQUEST

Brackenridge Estates Well #1

NC 40-92-080

WSF ID No: TP1

AQUA NORTH CAROLINA, INC.

### A. EXECUTIVE SUMMARY

The Brackenridge Estates Master Water System is comprised of 1 approved and active well and 1 point of entry (POE), TP1. The master system consists of a well with a 58 gpm, 5 horsepower motor submersible pump, a well house, well head piping, chlorination system, caustic soda chemical feed system, polyphosphate chemical feed system, a 5,400-gallon ASME coded hydropneumatic tank with automatic air-water volume control and air compressor, approximately 1,675 feet of 6-inch and 680 feet of 4-inch water mains, valves and other related appurtenances along Jonaway Circle, Bracken Ridge Lane and Blakenbran Trail to serve Brackenridge Estates Subdivision with 21 lots located off Brackenridge Lane. **The latest combined Fe and Mn concentration at Brackenridge Estates Well #1 is 1.81 mg/L on 11/04/2021, which makes it one of Aqua's Group 1 Priority Secondary Water Quality Projects as per the Water Quality Plan.**

Aqua has previously analyzed purchased water (PW) for other systems. Purchase water is not available unless the homeowners all petition for annexation and extension of municipal water and sewer service.

Aqua has evaluated if interconnecting with an adjacent Aqua water system is possible. Based on the systems near Brackenridge Estates, they too have similar secondary water quality issues. Therefore, Aqua does not believe it would be prudent to invest in interconnecting these systems together at this time.

Capex and Opex estimates are given below in Section D.2.

Aqua proposes installing an oxidation-filtration system at Brackenridge Estates Well #1 in order to remove Fe/Mn below the sMCLs.

### PROPOSED SYSTEM REQUIRING TREATMENT

- |   |                                     |
|---|-------------------------------------|
| 1. System Name:   | <u>Brackenridge Estates Well #1</u> |
| 2. PWS ID:  | <u>NC 40-92-080</u>                 |
| 3. No. Active Residential Connections, as of December 2021: | <u>19</u>                           |
| 4. No. Permitted Residential Connections:                   | <u>21</u>                           |
| 5. List of DEH/PWSS Approved Wells and Storage              |                                     |

**TABLE 1:** Approved and Active Wells in Proposed System\*\*

Well Name and No.	Capacity (GPM)			Max, Avg., Min Pump Runtime from Past 12 Months (hrs./day)	Latest POE Inorganic Sampling Results							
	APPC***	Max, Avg, Min from Past 12 Months			Fe (mg/L)*	Mn (mg/L)	Fe/Mn Loading Rate (lbs./day)	Fe/Mn Loading Rate (lbs./yr.)	Average Fe/Mn Loading Rate Per Residential Customer (lbs./yr.)			
TP1	58	73	36	19	13	5	2	1.58	0.232	0.4	143	7.5

\*Raw samples are taken directly at the wellhead before chemical treatment and point of entry (POE) samples are taken after chemical injection and treatment but before the tank and distribution system

\*\*Loading calculations based on 12 hour per day runtime

\*\*\*APPC = Approved Pumping Capacity

**TABLE 2:** Existing Storage at Well Sites

Well Name and No.	Storage Description		Most Recent Cleaning Date
	Type	Gallons	Dist. System
TP1	Hydro	5,400	Jan. 2022

6. Past Three (3) Years Flushing Occurrences, list month/year:

Response: Oct. 2020, July 2021, Jan. 2022

7. Next Planned Distribution System Flushing Occurrence:

Response: This water system will be flushed again by July 2022 and on an ongoing annual basis. Disclaimer: Flushing does not completely remove the mineral accumulation in the distribution mains when utilizing water with exceptionally high levels of iron and manganese in the source water.

8. List of chemicals being used:

**TABLE 3:** Existing Chemicals Used at Well Site

Well Name and No.	State Approved Treatment			
	Disinfectant	Caustic	Sequestrant	Fe/Mn Filter
TP1	X	X	X	N/A

9. Current description of the water treatment system for each well over the past three (3) years, including specific names of chemicals and dates of changes:

Response: Started feeding sequestrant at the Brackenridge Estates well on 9/18/2015. Cartridge filter installed in 2017.

10. Planned changes (if any) for chemical treatment within the next six (6) months:

Response: None

11. Comments on Approved/Current Well Capacity.

Response: None

**B. CURRENT SECONDARY WATER QUALITY CONCERNS**

1. How many wells require treatment? \_\_\_\_\_ 1\*

\*15 A NCAC 18C.1511 and 15 A NCAC 18C.1512 requires systems to provide treatment for concentrations of iron greater than 0.3 mg/L and for manganese greater than 0.05 mg/L.

2. Can system operate with single well offline? No, single well

3. Are combined Fe/Mn concentrations above 1 mg/L? Yes\*

\*The latest POE combined Fe and Mn concentration is 1.81 mg/L

4. Date of most recent POE Fe/Mn sampling results 11/4/2021

**TABLE 4:** Past 3 Years Fe/Mn Analysis

Brackenridge Estates Well #1 Laboratory Analysis						
Date	Iron (Fe), mg/L			Manganese (Mn), mg/L		
	Tot.	Sol.	Insol.	Tot.	Sol.	Insol.
10/9/2014	0.717	-	-	0.178	-	-
10/9/2017	0.632	-	-	0.176	-	-
10/12/2020	1.08	-	-	0.211	-	-
11/04/2021	1.58	0.050	1.530	0.232	0.0784	0.154
11/04/2021 (Raw)	4.390	0.167	4.223	0.230	0.225	0.005

5. Describe previous actions to improve secondary water quality and describe results (i.e., installation of particulate filters and sequestering agents).

Response: See A.9. above. Aqua flushes the water mains annually in this system.

**UTILITY COMMISSION REQUIRED INFORMATION**

- 1. Well Location Map Attached
- 2. DEH/PWS Approval Letter Attached

- |   |                          |
|---|--------------------------|
| 3. Original 24 hr. Pump Status Report                           | <u>Attached</u>          |
| 4. Past 36 months of pump status reports                        | <u>Attached</u>          |
| 5. Inorganic Analysis Report submitted to DEH for well approval | <u>Attached</u>          |
| 6. Past 6 yrs. inorganic analysis from each wellhead            | <u>Attached</u>          |
| 7. Past 3 yrs. Fe/Mn analyses, both soluble and insoluble.      | <u>See Table 4 Above</u> |

Note: For item (6) above, provide information on baseline (w/o treatment – raw samples taken at the well head) and point of entry (after treatment).

**C. CUSTOMER COMPLAINT DATA**

- |   |             |
|---|-------------|
| 1. Total number of customer complaints in past 6 months   | <u>0</u>    |
| 2. Total number of customer complaints in past 12 months  | <u>0</u>    |
| 3. For past 6 months, do customer secondary water complaints exceed 10% of the number of active customers?  | <u>No</u>   |
| 4. Provide 12-month list of all water quality complaints  | <u>None</u> |
| 5. Provide 12-month list of all completed water quality work orders   | <u>None</u> |
| 6. Describe most common customer complaint over the past 12-month period relating to secondary water quality, i.e., discolored water, taste, or odor. |             |

Response: None

**D. PROPOSED SECONDARY WATER QUALITY TREATMENT**

1. Proposed treatment recommendation: Oxidation-Filtration Treatment System
2. System Capex Estimate:

Filter Capex					
	Total design flow rate =	58	GPM		
TASK	DESCRIPTION	QTY	UNIT	UNIT COST	TOTAL
1	Filter Skid, no recycle, sludge management systems required	1	EACH	\$ 123,500	\$ 123,500
2	Backwash Supply System	1	EACH	\$ 25,800	\$ 25,800
3	Freight (estimate from AdEdge)	1	EACH	\$ 4,700	\$ 4,700
4	Engineering Design, Permitting, Bidding, & CA/CO (based on design costs of similar size filters)	1	EACH	\$ 22,410	\$ 22,410
5	Construction Bonding, Mobilization and Demobilization	1	EACH	\$ 3,000	\$ 3,000
6	Site Clearing, Grubbing, Grading, Gravel, Erosion Control	1	EACH	\$ 16,500	\$ 16,500
7	Existing Well House Piping Modifications	1	EACH	\$ 4,500	\$ 4,500
8	Filter Equipment Installation-Including but not limited to all water piping, water treatment filter installation, and necessary appurtenances, within the existing filter building. Also includes all extension piping near filter building	1	EACH	\$ 13,000	\$ 13,000
9	Filter Building Construction-Including but not limited to concrete floor slab, well house erection, finishing, and necessary appurtenances	1	EACH	\$ 42,500	\$ 42,500
10	Backwash Supply Tank Installation: Including but not limited to all piping from 12" above grade to 4" air gap, concrete pad, tank setting, electrical, and necessary appurtenances.	1	EACH	\$ 7,500	\$ 7,500
11	Yard Piping-Including but not limited to all underground pipe, fittings, and valve	1	EACH	\$ 13,000	\$ 13,000
12	Electrical/Controls-Including but not limited to all electrical power and controls wiring, conduit, panels, fixtures, electric heaters, thermostats, junction boxes, control equipment not provide by filter manufacturer, and miscellaneous appurtenances	1	EACH	\$ 20,300	\$ 20,300
13	Aqua Direct Cost (payroll, water quality sampling) @	3%			\$ 8,901
<b>TOTAL COST/TREATED GPM:</b>					<b>\$ 5,345</b>
<b>TOTAL ESTIMATED PROJECT COSTS:</b>					<b>\$ 310,000</b>

Note: The above information is for planning purposes only and is subject to change based on further engineering evaluations, water quality analyses, site conditions, and other site-specific discoveries and information

3. Opex Estimate: \$10,000