



## SECONDARY WATER QUALITY TREATMENT SYSTEM REQUEST

Kimmon Place Well #3

NC 43-92-125

WSF ID No: P03

AQUA NORTH CAROLINA, INC.

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### A. EXECUTIVE SUMMARY

The Cotesworth Downs Master Water System is comprised of 4 approved and active wells, Kimmon Place Wells #1 and 3 and Kensington Manor Wells #1 and 2, and four points of entry (POE), P02, P03, P04, and P05. The master system includes four (4) wells, with a total combined yield of 214 gpm; two 5,400-gallon hydropneumatic tanks, one 10,000-gallon hydropneumatic tank for a total combined storage of 20,800 gallons; and serving a total of 203 approved residential service connections (137 connections in Cotesworth Dons Master System and 66 connections in Kensington Manor). **The latest Mn concentration at Kimmon Place Well #3 is 0.526 mg/L and combined Fe/Mn is 1.736 mg/L on 9/27/2021, which makes it one of Aqua's Group 1 Priority Secondary Water Quality Projects as per the latest Water Quality Plan.**

Aqua previously installed an oxidation-filtration system at Kensington Manor Well #2.

Aqua has previously analyzed purchased water with the City of Raleigh for other systems. Purchased water is not available unless all homeowners petition for annexation and extension of city water and sewer service.

Aqua has evaluated if interconnecting with an adjacent Aqua water system is possible. Based on the systems near Cotesworth Downs, they also 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. Interconnection would also increase connections above 299 and require installation of elevated water storage.

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

Aqua proposes installing an oxidation-filtration system at Kimmon Place Well #3 in order to remove Fe/Mn below the sMCLs.

### PROPOSED SYSTEM REQUIRING TREATMENT

- |   |                             |
|---|-----------------------------|
| 1. System Name:   | <u>Kimmon Place Well #3</u> |
| 2. PWS ID:  | <u>NC 43-92-125</u>         |
| 3. No. Active Residential Connections, as of December 2021: | <u>198</u>                  |
| 4. No. Permitted Residential Connections:                   | <u>203</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						
	Yield	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.)		
P02	25	46	23	14	12	6	3	< 0.022	0.101	0.0	6	0.0
P03	44	39	31	11	19	7	0.5	1.21	0.526	0.3	118	0.6
P04	35	35	28	13	14	5	1	0.0241	0.00097	0.0	2	0.0
P05	110	90	78	23	23	6	1	<0.022	<0.0015	0.0	4	0.0

\*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.

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

Well Name and No.	Storage Description		Most Recent Cleaning Date
	Type	Gallons	Dist. System
P01 (Inactivated)	Hydro	10,000	May 2021
P02	Hydro	5,400	May 2021
P04	Hydro	5,400	May 2021

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

Response: Sept. 2019, Feb. 2020, May 2021

7. Next Planned Distribution System Flushing Occurrence:

Response: This water system will be flushed again by Dec. 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
P02	X	N/A	X	N/A
P03	X	N/A	X	N/A
P04	X	N/A	N/A	N/A
P05	X	N/A	X	Greensand Filtration

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 Kimmon Place and Kensington Manor wells in Feb. 2014. Harmsco cartridge filters were installed at Kimmon Place wells 1 and 3 in 2017. Manganese Dioxide filtration installed Aug. 2019 for Kensington Manor Well #2.

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. In addition, the manganese concentrations at Kimmon Place #3 are almost two times the Health Advisory Level of 0.3 mg/L. DEQ is also issuing Notice of Deficiencies for systems that have active wells that exceed the EPA HAL. Aqua's communication with DEQ on this subject has been supplied to the Public Staff. The most recent was the November 29, 2021, submission.

2. Can system operate with single well offline? No\*

\*Many of the customers regularly irrigate during the spring/summer/fall months, resulting in increased demand and long well runtimes. Kimmon Place 3 is required to meet system demand and keep up pressures during these high demand periods. Moreover, wells that are not utilized to supply the distribution system are required to notify DEQ in advance and provide an action plan to address the manganese concentrations.

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

\*The latest POE combined concentration from Well #3 is 1.736 mg/L

4. Date of most recent POE Fe/Mn sampling results 9/27/2021

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

Cotesworth Downs Well #1 Laboratory Analysis at POE						
Date	Iron (Fe), mg/L			Manganese (Mn), mg/L		
	Tot.	Sol.	Insol.	Tot.	Sol.	Insol.
6/9/2020	<0.022	<0.022	0.0	0.137	0.133	0.004
Kimmon Place Well #1 Laboratory Analysis at POE						
Date	Iron (Fe), mg/L			Manganese (Mn), mg/L		
	Tot.	Sol.	Insol.	Tot.	Sol.	Insol.
8/13/2019	< 0.022	-	-	0.101	-	-
Kimmon Place Well #3 Laboratory Analysis at POE						
Date	Iron (Fe), mg/L			Manganese (Mn), mg/L		
	Tot.	Sol.	Insol.	Tot.	Sol.	Insol.
11/30/2020	1.07	-	-	0.717	-	-
5/26/2021	1.04	< 0.022	1.04	0.476	0.353	0.123
9/27/2021	1.21	0.0234	1.1866	0.526	0.407	0.119
Kensington Manor Well #1 Laboratory Analysis at POE						
Date	Iron (Fe), mg/L			Manganese (Mn), mg/L		
	Tot.	Sol.	Insol.	Tot.	Sol.	Insol.
2/18/2020	0.0241	-	-	0.00097	-	-
Kensington Manor Well #2 Laboratory Analysis at POE						
Date	Iron (Fe), mg/L			Manganese (Mn), mg/L		
	Tot.	Sol.	Insol.	Tot.	Sol.	Insol.
1/22/2019	1.6	0.0352	1.5648	0.246	0.108	0.138
2/19/2019	0.845	0.108	0.737	0.238	0.18	0.058
6/4/2019 Before filter	0.885	0.186	0.699	0.23	0.125	0.105

12/10/2019 After filter	< 0.022	< 0.022	0	< 0.0015	< 0.0015	0
2/18/2020	< 0.022	-	-	< 0.00039	-	-
5/26/2021	< 0.022	< 0.022	0	< 0.0015	< 0.0015	0

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 at least annually in this system.

#### UTILITY COMMISSION REQUIRED INFORMATION

- Well Location Map Attached
- DEH/PWS Approval Letter Attached
- Original 24 hr. Pump Status Report Attached
- Past 36 months of pump status reports Attached
- Inorganic Analysis Report submitted to DEH for well approval Attached
- Past 6 yrs. inorganic analysis from each wellhead Attached
- Past 3 yrs. Fe/Mn analyses, both soluble and insoluble. See Table 4 Above

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

- Total number of customer complaints in past 6 months 14
- Total number of customer complaints in past 12 months 17
- For past 6 months, do customer secondary water complaints exceed 10% of the number of active customers? No
- Provide 12-month list of all water quality complaints Attached
- Provide 12-month list of all completed water quality work orders Attached
- Describe most common customer complaint over the past 12-month period relating to secondary water quality, i.e., discolored water, taste, or odor.

Response: Brown/black/orange dirty water reports.

#### D. PROPOSED SECONDARY WATER QUALITY TREATMENT

- Proposed treatment recommendation: Oxidation-Filtration Treatment System
- System Capex Estimate:

Filter Capex					
	Total design flow rate =	30	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	\$ 25,000	\$ 25,000
5	Construction Bonding, Mobilization and Demobilization	1	EACH	\$ 3,000	\$ 3,000
6	Site Clearing, Grubbing, Grading, Gravel, Erosion Control	1	EACH	\$ 14,000	\$ 14,000
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	\$ 20,000	\$ 20,000
13	Erosion and Sedimentation Control	1	EACH	\$ 2,500	\$ 2,500
14	Aqua Direct Cost (payroll, water quality sampling) @	3%			\$ 8,970
15	Contingency @	5%			\$ 15,399
TOTAL COST/TREATED GPM:					\$ 11,000
TOTAL ESTIMATED PROJECT COSTS:					\$ 330,000

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