MEMORANDUM

Tighe&Bond

Conceptual Evaluation of GAC PFAS Treatment for Well 6

TO: Carl McMorran, Aquarion Water Company

FROM: James Collins, Tighe and Bond

COPY: Mark Fois, Aquarion Water Company; Peter Galant, Tighe and Bond

DATE: February 8, 2021

Executive Summary

Well 6 is one of six wells located in the Mill Road wellfield that supplies the system through the Mill Road Water Treatment Plant (WTP). Well 6 currently has concentrations of PFOA that exceed the NH Maximum Contaminant Level (MCL), individual blended water samples at the point of entry (POE) have exceeded the PFOA MCL, and the running annual average is currently above 80% of the MCL. Concentration have also been increasing in two other wells (Well 9 and 11). To continue to meet the MCL at the Mill Road WTP POE, blending will require increasingly lower production volumes from Wells 6, 9 and 11. Absent the capacity to remove PFOA, the practical effect will be a substantial loss of production capacity in just a few years. Treatment of Well 6 water is required for managing PFAS concentrations at the POE and to reduce the potential for increasing PFAS concentration in Well 9 and 11.

Based on previous bench and pilot-scale testing, GAC is the most effective treatment alternative. Table ES-1 presents the Opinion of Probable Construction Cost and annual O&M Costs for the evaluated option. Installing GAC treatment in the existing garage is the recommended approach to meet the goal of having treatment online by June 2021. In addition, construction within the existing garage allows for future expansion to treat the additional wells, if required in the future. It is recommended to install two pair of GAC vessels for lead/lag operation to provide additional protection again PFAS breakthrough, additional operational flexibility for scheduling media changeouts, and maximizing the GAC usage by allowing greater PFAS breakthrough prior to changeout.

Table ES-1

Opinion of Probable Construction Cost and O&M Costs

	GAC			
	Existing Garage		**New Building**	
	8' Vessels (One Pair)	**8' Vessels (Two Pairs)**	**8' Vessels**	**12' Vessels**
Construction Subtotal	**$792,101**	**$1,079,600**	**$580,081**	**$637,217**
General Conditions - 15%	$118,815	$161,940	$87,012	$95,583
Contingency - 20 %	$132,183	$248,310	$133,419	$146,560
Engineering - 15%	$156,465	$223,480	$120,077	$131,904
Total Project Cost	**$1,200,000**	**$1,713,000**	**$920,588**	**$1,011,264**
Total Annual O&M Cost	**$60,250**	**$60,250**	**$46,279**	**$46,279**

1.1 Existing Conditions and Project Need

Aquarion's water system in North Hampton, Hampton, and Rye includes 17 wells, approximately 140 miles of water main, 5 water treatment facilities, and 4 water storage tanks. Well 6 shown in Figure 1-1 is one of six wells located in the Mill Road well field that supplies the system through the Mill Road Water Treatment Plant (WTP). From 2017-2020, the Mill Road well field provided 48% of the company's production and Well 6 alone provided 5-10% of total production during high-demand months (June-August) and up to 10-15% of daily system production. Per- and Poly-fluoroalkyl Substances (PFAS) have been detected in five of the six wells at the Mill Road well field. Well 6 has the highest PFAS concentrations followed by Well 11 and 9, which are located downgradient of Well 6. The water from all of the Mill Road wells is blended at the Mill Road WTP prior to chemical treatment for corrosion control and disinfection. New Hampshire has maximum contaminant levels for four PFAS. Regulatory compliance is based on samples collected at the point-of-entry (POE) to the distribution system after the water from all wells is blended and treated at the WTP. Well 6 currently has concentrations of PFOA that exceed the NH MCL, some individual blended water samples at the POE have exceeded the PFOA MCL, and the running annual average at the POE is currently above 80% of the MCL (Table 1-1). The lower POE concentrations in the last two quarters are due to management of how much water in pumped from Well 6, and Aquarion continues to reduce its pumping volume to assure that the MCL is not exceeded.

TABLE 1-1
Mill Road Well Field POE PFOA Concentrations

Date	Concentration (ppt)	Running Annual Average (ppt)	NH MCL (ppt)
Jan. 2020	14	10	12
May 2020	11		
July 2020	9		
Dec. 2020	7		

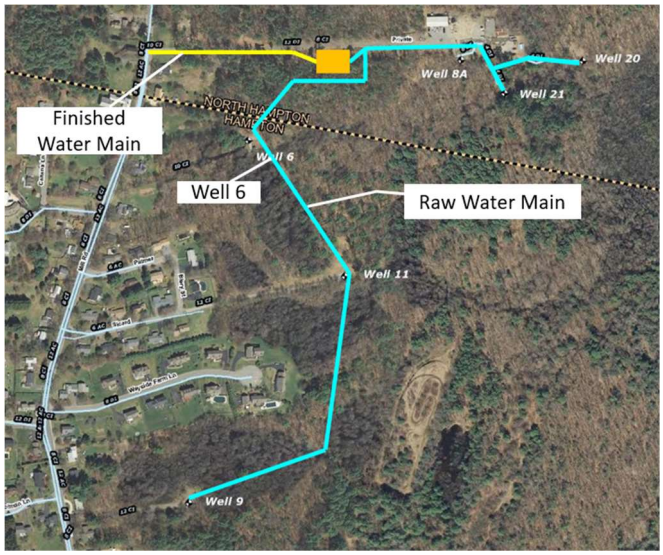

Figure 1-1: Map of the Mill Road Wellfield

Well 6 is currently the last well turned on and contains the highest PFAS concentrations. Limiting operation of Well 6 increases the risk of PFAS migrating to Wells 11 and 9, which are higher producing wells. PFAS concentrations, particularly PFOA, are rising in Wells 9 and 11. To continue to meet the MCL at the Mill Road WTP POE, blending will require increasingly lower production volumes from Wells 6, 9 and 11. Absent the capacity to remove PFOA, the practical effect will be a substantial loss of production capacity in just a few years. Treatment of Well 6 water is being implemented to reduce PFAS concentrations at the POE and to reduce the potential for increasing PFAS concentrations in Well 11 and 9.

PFAS in the Mill Road well field cannot be traced to a single source. There are several hot spots within two miles of the wellfield that could be potentials sources. Therefore, there is no clear path to identifying a responsible party who may bear the cost of treating the PFAS contamination. To determine a potential source, Aquarion would have to develop the burden of proof to identify a responsible party and pursue compensation through legal recourse, which would be a long expensive process with no guarantee of success.

1.1.1 PFAS Concentrations

Aquarion has continued extensive production well and distribution system monitoring for PFAS concentrations.

Figures 1-2 through 1-5 present the NH regulated PFAS and total PFAS concentrations in the Mill Road production wells and combined entry point to the distribution system (Mill Road WTP). Well 6 has the highest measured concentration of individual compounds as well as total concentrations.

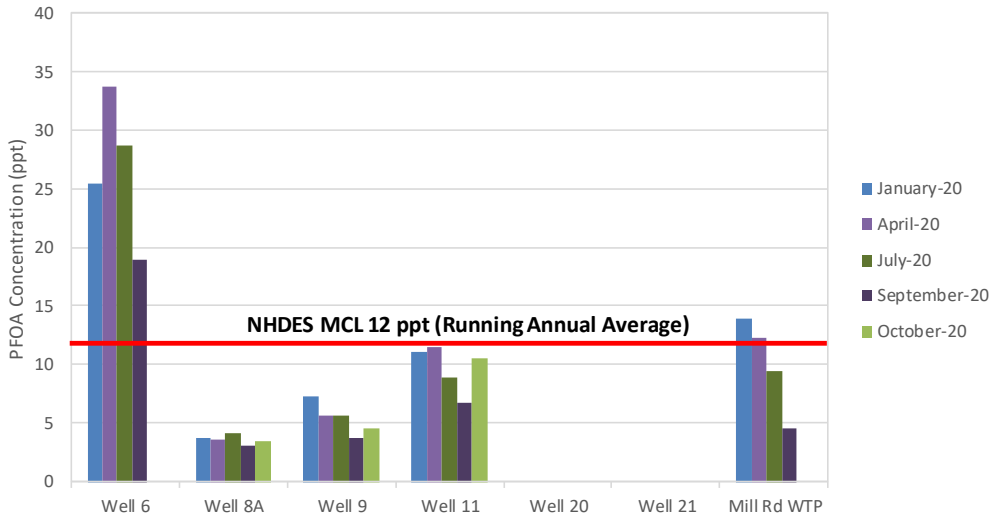

Figure 1-2: PFOA: Mill Road Wells 2020 (Note: Samples with non-detect PFAS concentrations are not included on the Figure)

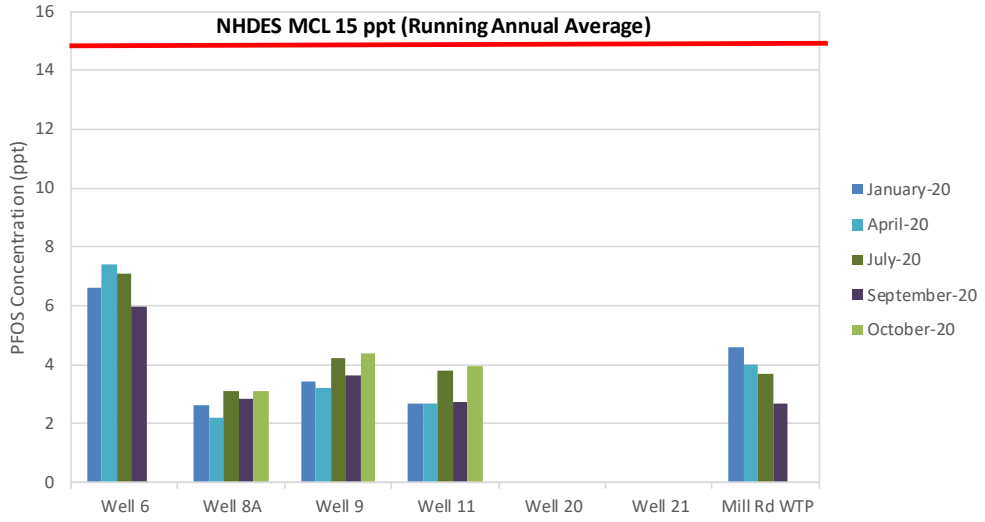

Figure 1-3: PFOS Mill Road Wells 2020 (Note: Samples with non-detect PFAS concentrations were are not included on the Figure)

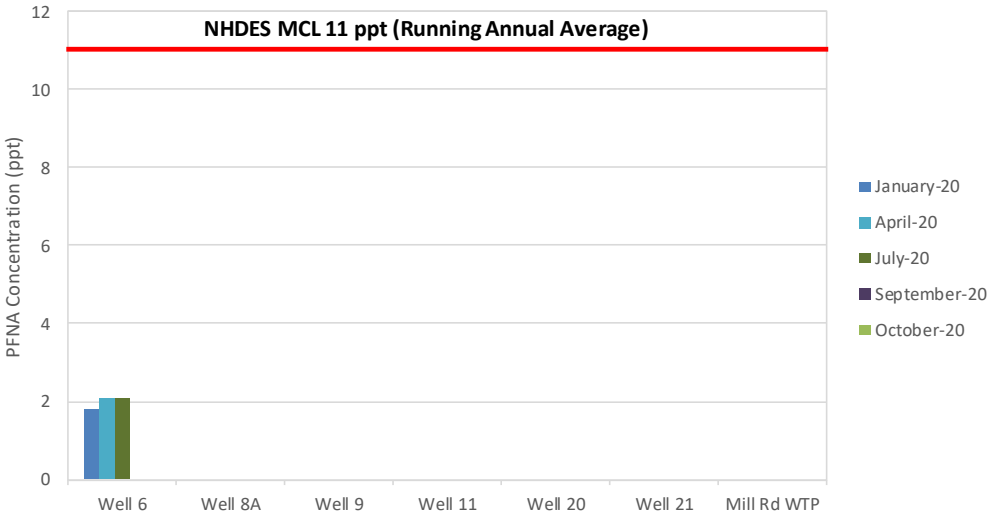

Figure 1-4: PFNA Mill Road Wells 2020 (Note: Samples with non-detect PFAS concentrations are not included on the Figure)

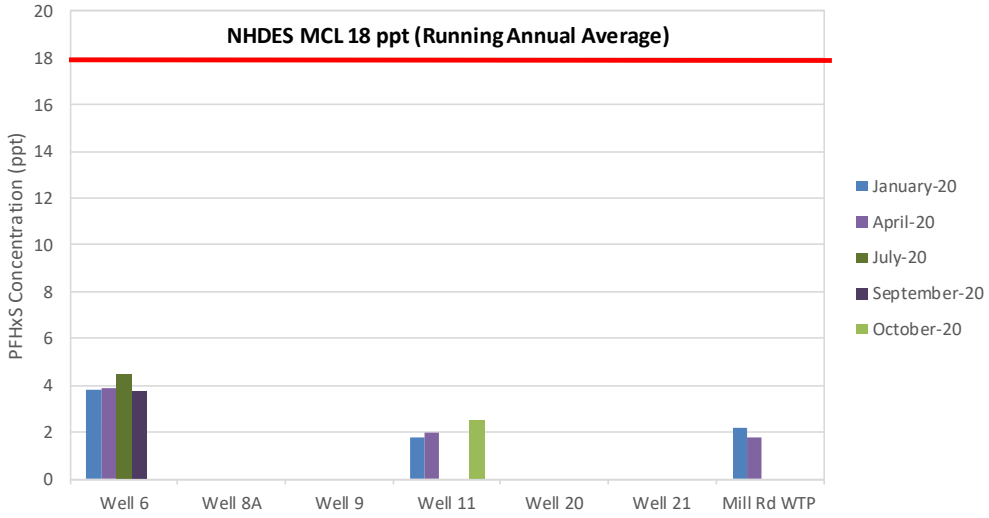

Figure 1-5: PFHxS Mill Road Wells 2020 (Note: Samples with non-detect PFAS concentrations are not included on the Figure)

PFOA concentrations in Well 11 have approached the NH MCL in three of the last four samples collected. PFOA is the only PFAS that has been detected above the NH MCLs in any of the Mill Road wells. Figure 1-6 and Table 1-2 shows the increasing trend in PFOA concentrations at Wells 6 and 11 from fall 2017 to summer 2020. Wells 9 and 11 are the two largest producing wells in the well field (Table 1-3). To continue to meet the MCL at the Mill Road WTP POE, blending will require increasingly lower production volumes from Wells 6, 9 and 11. Absent the capacity to remove PFOA, the practical effect will be a substantial loss of production capacity in just a few years. Additionally, Well 6 will be needed to meet summer 2021 demand as determined by usage history over the past years. Aquarion believes it is critical to install PFAS treatment before this upcoming summer to meet the likely summer 2021 demands.

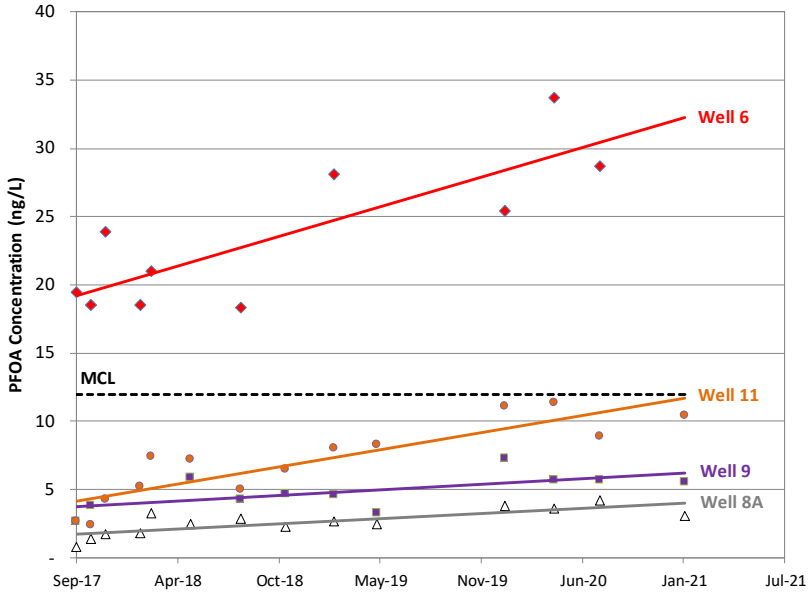

Figure 1-6: Increasing PFOA Trends in Mill Road Wells (2017 – 2020)

TABLE 1-2
Mill Road Well Field PFOA Concentrations

	PFOA Concentrations (ppt)			
Date	**Well 06**	**Well 08A**	**Well 09**	**Well 11**
9/19/2017	19.5	0.8	2.7	2.7
10/17/2017	18.5	1.4	3.8	2.4
11/15/2017	23.9	1.7	N/A	4.3
1/23/2018	18.5	1.8	N/A	5.2
2/13/2018	21.0	3.3	N/A	7.4
5/2/2018	no data	2.5	5.9	7.2
8/9/2018	18.3	2.9	4.3	5.0
11/7/2018	no data	2.3	4.7	6.5
2/11/2019	28.1	2.7	4.6	8.0
5/7/2019	no data	2.5	3.3	8.3
1/14/2020	25.4	3.8	7.3	11.1
4/20/2020	33.7	3.6	5.7	11.4
7/20/2020	28.7	4.2	5.7	8.9
1/4/2021	no data	3.1	5.6	10.4

TABLE 1-3
Mill Road Well Production Data (2011-2016)

Well	**Consensus Yield[2] (gpm)**	**Avg Daily Flow Rate (gpm)**
Well 6	300	111
Well 8A	172	86
Well 9	294	194
Well 11	500	245
Well 20[1]	170	23
Well 21[1]	190	61

[1] Wells 20 and 21 are not operated concurrently.

[2] Consensus yield is the NHDES approved maintainable yield from the well. Daily flow rates may exceed the consensus yield

1.2 Alternative Evaluation and Basis of Design

1.2.1 PFAS Treatment

Tighe & Bond prepared the *Mill Road PFAS Preliminary Treatment Analysis* (September 2019) to summarize the results of the PFAS bench and pilot scale testing, and to provide a preliminary GAC WTP design and opinion of probable construction cost for treatment of Well 6 and a rate impact analysis as a result of the proposed project. The memorandum concluded that construction of treatment for Mill Road WTP would cost approximately $3,800,000 for Phase 1 (treat Well 6 only) and $2,500,000 for Phase 2 (treatment of the whole wellfield), for a total project cost of $6,300,000.

Based on current PFAS concentrations and the risk of PFAS migration, Aquarion Water Company has a goal of treating Well 6 by the summer of 2021. Two new alternatives were evaluated to reduce project costs and schedule. The alternatives include utilizing the existing garage or building a smaller building adjacent to Well 6 just for treating Well 6. Each alternative was evaluated with two GAC vessel sizing options to balance costs and treatment efficiency. This evaluation assumes additional winterization, including underground piping, tank insulation, natural gas heating, and ventilation for year round operation.

1.2.2 Vessel Sizing

Three GAC vessels sizes were evaluated for treating Well 6 (Table 1-4), 8', 10', and 12' diameter vessels located in a new metal building and 8' diameter vessels located within the existing Garage located along Shop Road.

Three vessels sizes were evaluated for footprint and backwash requirements within a new building, but capital costs were only developed for two options to bracket the potential capital costs. For the 8' diameter vessels, a lead and lag vessel would be required to achieve the target Empty Bed Contact Time (EBCT) of 10 minutes. The target EBCT can be achieved with a single 10' or 12' diameter vessel. The evaluated vessels would all be able to keep building heights below 35 feet to avoid the need for a zoning variance.

Only a shorter 8' diameter vessel (7,500 lbs of carbon) was evaluated for construction within the existing garage building along Shop Road. Standard 8' diameter vessels (10,000lbs of carbon) do not fit within the available clearances within the garage. The garage has an interior clearance height of 15' at the highest point and larger 8', 10', or 12-foot vessels do not meet this height restriction. Utilization of the existing garage will eliminate the need for a new structure and the aFssociated permitting requirements.

Parallel and lead/lag operation were evaluated for the various option. Parallel operation reduces capital costs but results in higher annual O&M costs. With parallel operation, the GAC must be monitored more closely for PFAS breakthrough with earlier media changeout than with a lead/lag operation. Lead/lag operation provides greater protection against PFAS breakthrough and additional operational flexibility for scheduling media changeout with shorter down time for changeouts.

TABLE 1-4
GAC Contactors

	8' Vessels (Garage)	8' Vessels	10' Vessels	12' Vessels
Design flow rate (gpm)	360			
Vessel operation	Parallel or Lead/Lag	Lead/Lag	Lead	Lead
Number of vessels	2 or 4	2	1	1
Vessel diameter (ft)	8	8	12	12
Media/vessel (lbs)	7,500	10,000	20,000	20,000
Total installed media (lbs)	15,000 or 30,000	20,000	20,000	20,000
Standard pressure rating (psi)	125			
Volume of media per vessel (gallons)	1,664	2,219	4,438	4,438
Design EBCT (min) per vessel	11.1	6.2	12.3	12.3
Media size (units)	12 x 40			
Bed volumes treated to media changeout[1]	75,000			
Changeout frequency at design flow rate (days)	482	321	642	642
Changeout frequency at 300 gpm flow rate (days)	578	385	770	770
GAC Vessel Purchase Price	$250,000 (pair of vessels)	$250,000 (pair of vessels)	$210,000 (lead)	$225,000 (lead)

[1] Assumed changeout based on breakthrough of regulated PFAS

[2] Assumed a building large enough for lead/lag operation

1.2.3 Backwashing

The GAC will require 20 – 30 minutes of media backwashing prior to operation after each changeout. The required backwash flow rate is approximately 8 gpm/ft^2. Table 1-5 summarizes the backwashing volumes required for each vessel size. The backwash flow rate and volume decrease with smaller diameter vessels. This analysis assumes that waste washwater will be collected in a rental frac tank and either disposed of on-site, if acceptable, or pumped out and disposed of off-site.

Table 1-5
Estimated Backwash Volumes

Vessel Size	Backwash Flow Rate (gpm)	Backwash Volume for One Vessel (gallons)
8'	400	8,000 – 12,000
10"	630	12,000 – 19,000
12'	900	18,000 – 27,000

To backwash the vessels, temporary hosing would connect to the existing hydrant located near Well 8A or Well 6 on the Well 11 and 9 raw water transmission main depending on the selected treatment location. The temporary hosing can typically be provided by the media vendor during media changeout if the hydrant is located near the treatment facility. Backwash water will be supplied by Well 8A or Wells 9 and 11. Therefore, backwashing will only be able to occur if the well(s) are in operation.

Backwash waste washwater could also be collected in conical settling tanks installed on a concrete pad outside of the metal building. The conical tanks would allow for better settling of the GAC fines for reducing the volume to be disposed of off-site, if required. Two 10,000 gallon conical settlings tanks would be required to allow sufficient storage for the backwash of both eight foot diameter vessels or one 12 foot diameter vessel. This would add an additional cost of approximately $77,000 to the OPCC of the project, including contingency.

All GAC media can release small amounts of arsenic during initial operation (typically less than 200 bed volumes) depending on site specific water quality. Calgon GAC F400AR media was assumed for this evaluation and is expected to have an initial arsenic leaching of less than 5 μg/L after initial backwash. Well 6 is approximately 10% of the total water flow for the Mill Road Water Treatment Plant. After blending, arsenic concentrations will be well below the MCL at the Mill Road WTP Point of Entry. To further reduce potential arsenic concentrations at startup, Calgon can also provide media with additional acid washing to reduce the expected concentration to less than 2 μg/L. This media has an additional cost of $3,000 for each media changeout.

1.2.4 Building and Site Design

Two locations were evaluated for PFAS treatment 1) new building adjacent to Well 6 and 2) existing garage. Site layouts are presented in Appendix A.

1.2.4.1 New Building

The construction costs assume an insulated metal building with a concrete foundation. The building assumes one roll up door, two man doors, lights, gas unit heaters, and ventilation. The building for each vessel alternative was sized to accommodate the vessel skid (two vessels and valve rack) and 8 feet of clearance on each size. The assumed building sizes are summarized in Table 1-6. It was assumed that only one 10' or 12' vessel would be initially installed but that the building would be sized for adding a second vessel, if required in the future. For the 8' vessel it was assumed that two vessels would be installed initially and that room for future vessels would not be included.

Table 1-6
Building Size

Vessel Size	Building Size (LxWxH)
8′	38′ x 26′ x 20′
10″	42 x 27 x 27
12′	47′ x 30′ x 20′

Appendix A shows the proposed location of the new building. The building would be located in North Hampton at the corner of the Well 6 access drive and the existing clearing for the raw water mains to the Mill Road WTP.

Gas Main

The building was assumed to include gas unit heaters for year-round operation. A gas service is provided to the Mill Road Water Treatment Plant. It was assumed that there is sufficient capacity at the gas meter to service the new building. A gas main will be constructed from the gas meter at the Mill Road WTP to the proposed building along the route of the existing water main and electrical clearing.

Site Access

A truck turning analysis was completed to determine clearances for building and site access. The analysis indicated that additional clearing and gravel would be required at the entrance of the Well 6 access drive to allow trucks to enter the Well 6 access road. Trucks entering the facility would be required to turn around at the garage area of Shop Road and then enter the Well 6 access drive from the east. The additional clearing and gravel drive are shown on Sheet 1.

Piping Layout

To isolate Well 6 and allow the operation of Wells 9 and 11 while backwashing, a wye and isolation valve would be cut in before the intersection of the piping from Wells 6, 9, and 11. New 8″ HDPE piping would be installed from the wye to the proposed building. Water would be discharged into the existing 16″ water main to the north of the proposed building. A fire hydrant would be installed along the discharge line to allow for filter to waste capability for start-up.

1.2.4.2 Existing Garage

The 8′ vessels would be located within the existing garage along Shop Road. Two alternatives are presented for the 8′ Vessels, the first alternative includes one vessel pair which provides up to 6.2 min of EBCT per vessel at the design flow and 12.4 min of EBCT at the operating flow. The second alternative includes two 8′ vessel pairs, which allows the facility to operate in lead/lag operation with the same EBCTs per vessel. Note GAC usage rates will increase if the EBCT is less than 10 min. The pilot data showed breakthrough of PFOA at 60,000 bed volumes treated at 7.5 min of EBCT as compared to an anticipated PFOA breakthrough at 75,000 bed volumes treated at 10 min of EBCT.

Gas Main

This analysis assumed that the HVAC system within the existing garage will require upgrading to maintain sufficient heating and ventilation. Therefore, a gas main will be constructed from the gas meter at the Mill Road WTP to the existing garage along Shop Road.

Piping Layout

To treat the Well 6 water at the garage location, a wye and isolation valve would be cut in before the intersection of the piping from Wells 6, 9, and 11. Approximately 670 feet of 8" HDPE piping would be installed from the wye along the Well 6 access drive and along Shop Road past the Mill Road WTP. The 8" water main would transition to 16" HDPE water main after the Mill Road Water Treatment Plant and 375' of 16" HDPE piping would be installed to the existing garage location.

Building Upgrades

To house the GAC vessels within the existing garage, the garage would require several upgrades. The existing building roofing system is leaking in two locations. Therefore, the roof would require replacement to provide a watertight structure to house the new treatment equipment. In addition, the building insulation system does not meet the current building code. The insulation would be upgraded including installing insulated garage doors to minimize heat loss from the building. The building lighting system would require upgrading to provide sufficient lights in the location of the proposed GAC vessels. An upgrade to the lighting system will require the addition of backup lights and exit lighting.

1.2.5 Permitting

The following permitting is expected for the construction of PFAS treatment. The selected boiling location will impact local town permitting.

- New Building
  - North Hampton Permitting
    - Special Exception for a public utility building from the ZBA
    - Site Plan Review
  - NHDES design review

- Existing Garage
  - NHDES design review

1.3 Opinion of Probable Construction Cost

The conceptual opinion of probable construction cost (OPCC) for the PFAS treatment systems is based on Class 3 level construction cost estimates, as defined by the Association for the Advancement of Cost Engineering (AACE) International Recommended Practices and Standards. The expected accuracy range of a Class 3 estimate is between -20% to +30%. The conceptual OPCC is based on equipment costs obtained from Calgon Carbon and ECT2. Cost estimates for the new building were based on 8' and 12' GAC vessels to bracket potential capital costs. The presented costs are based on the following assumptions:

- Installation of one 12' vessel and valve rack or two 8' vessels with valve rack.
- Waste washwater will be collected in a rental frac tank and discharged locally with fines vacuumed out for disposal.

- PFAS treatment will be located in an insulated metal building with gas unit heaters, one roll up door and two man doors for 8', 10' or 12' vessels.
- PFAS treatment will be located in the existing garage for 8' vessels.
- GAC vessels will have spray-on insulation to minimize sweating in the summer.
- Well pump upgrades are not included
- Cost multipliers:
    - General conditions: 15%
    - Contingency: 20%
    - Design and construction phase engineering: 15%
- Annual O&M costs
    - Replacement frequency based on pilot test data for NH regulated PFAS
    - Labor for media changeout and additional power due to added head loss was excluded from the annual O&M costs
    - Frac tank will be onsite for 30 days

Table 1-7 summarizes the opinion of probable construction costs for all four alternatives. Cost details are provided in Appendix B. Costs assume flow meters and pressure differential sensors will be included on each vessel with communication back to the PLC at the existing Mill Road WTP.

Table 1-7

Opinion of Probable Construction Cost and O&M Costs

	GAC			
	Existing Garage		New Building	
	8' Vessels (One Pair)	8' Vessels (Two Pairs)	8' Vessels	12' Vessels
Site Work	$227,050	$227,050	$124,644	$124,644
Building	$193,300	$193,300	$160,437	$215,073
Process Equipment	$371,750	$659,250	$295,000	$297,500
Construction Subtotal	**$792,101**	**$1,079,600**	**$580,081**	**$637,217**
General Conditions - 15%	$118,815	$161,940	$87,012	$95,583
Contingency - 20 %	$132,183	$248,310	$133,419	$146,560
Engineering - 15%	$156,465	$223,480	$120,077	$131,904
Total Project Cost	**$1,200,000**	**$1,713,000**	**$920,588**	**$1,011,264**
Annual O&M Costs for Media Changeout and Backwashing				
Backwash Tank Rental	$2,000	$2,000	$1,000	$1,000
Media Replacement	$35,250	$35,250	$22,279	$22,279
Water Quality Sampling	$21,000	$21,000	$21,000	$21,000
Natural Gas	$2,000	$2,000	$2,000	$2,000
Backwash	$2,000	$2,000	$2,000	$2,000
Total O&M Cost	**$60,250**	**$60,250**	**$46,279**	**$46,279**

1.4 Recommended Alternative

Well 6 is one of six wells located in the Mill Road wellfield that supplies the system through the Mill Road WTP. Well 6 currently has concentrations of PFOA that exceed the NH MCL, individual blended water samples at the POE have exceeded the PFOA MCL, and the running annual average is currently above 80% of the MCL. Concentrations have also been increasing in two other wells (Well 9 and 11). To continue to meet the MCL at the Mill Road WTP POE, blending will require increasingly lower production volumes from Wells 6, 9 and 11. Absent the capacity to remove PFOA, the practical effect will be a substantial loss of production capacity in just a few years. Treatment of Well 6 water is required for managing PFAS concentrations at the POE and to reduce the potential for increasing PFAS concentration in Well 9 and 11.

Based on previous bench and pilot-scale testing, GAC is the most effective treatment alternative. Installing GAC treatment in the existing garage is the recommended approach to meet the goal of having treatment online by June 2021. In addition, construction within the existing garage allows for future expansion to treat the additional wells, if required in the future. It is recommended to install two pair of GAC vessels for lead/lag operation to provide additional protection again PFAS breakthrough, additional operational flexibility for scheduling media changeouts, and maximizing the GAC usage by allowing greater PFAS breakthrough prior to changeout.

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Town of Hampton

December 8, 2020

N.H. DWG Trust Fund
Ms. Erin Holmes, P.E.
Trust Fund Administrator

Dear Ms. Holmes,

I write in support of Aquarion Water Company's application for funding from the New Hampshire Drinking Water and Groundwater Trust Fund (DWGTF) for the Company's proposed PFAS treatment facility at its Mill Road Wellfield.

Aquarion provides drinking water to 9,500 homes and businesses in Hampton, North Hampton, and Rye. Water is provided from numerous wells, including from the Company's Mill Road Wellfield. Aquarion has detected per- and polyfluoroalkyl substances (PFAS) in the groundwater at the Mill Road Wellfield since 2016, with one well (Well #6) exhibiting higher PFAS levels than the other wells in the wellfield. To ensure continued compliance with New Hampshire's newly adopted PFAS MCLs, Aquarion is planning to construct a treatment facility in 2021 to remove PFAS from the water from Well #6. The facility would be designed so that the treatment capacity could be expanded to allow for treatment of other wells, if that becomes necessary in the future.

Funding from the DWGTF would help defray the cost of this project, and thus reduce the impact that this project would have on water rates.

I strongly support Aquarion's application and urge your consideration of providing funding from the DWGTF for this important PFAS treatment project.

Sincerely,

James B. Sullivan
Town Manager

100 Winnacunnet Road, Hampton, New Hampshire 03842 Tel. 603-926-6766 Fax 603-926-6853

MICHAEL J. TULLY
TOWN ADMINISTRATOR

mtully@northhampton-nh.gov

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233 ATLANTIC AVENUE
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TEL: (603) 964-8087
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TOWN OF NORTH HAMPTON, NEW HAMPSHIRE
OFFICE *of the* TOWN ADMINISTRATOR

December 9, 2020

New Hampshire Department of Environmental Services
Drinking Water and Groundwater Trust Fund
29 Hazen Drive
Post Office Box 95
Concord, NH 03302-0095

Dear Administrator:

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Sincerely,

Michael J. Tully
Town Administrator

February 22, 2021

John Walsh
Aquarion Water Company of New Hampshire
835 Main Street
Bridgeport CT 06604

Subject: Mill Road Wellfield PFAS Treatment Project - PWS #1051010 Aquarion Water Company of NH

Dear Mr. Walsh,

On February 17, 2021, the NH Department of Environmental Services (NHDES) completed their review of the Eligibility Request received February 10, 2021 for the Per- and Polyfluoroalkyl Substances Remediation Loan Fund. The NHDES authorized an award of loan funds to Aquarion Water Company of New Hampshire for the following project:

Project Description	Funding Award Amount
Mill Road Wellfield PFAS Treatment	$1,284,750

The next step to move forward with project funding is to submit a final application. The documents are listed on the enclosed checklist and available online at Link to Final Application Forms. Please note, the interest rate for 5, 10, 15, 20, or 25 year loan terms is 1.55% until the first Thursday of August 2021. The final application is due by March 24, 2021.

Once the final application has been submitted, Aquarion Water Company will enter into a loan agreement, which must be approved by the Governor and Executive Council. Additionally, project related work that has been completed may be eligible for reimbursement once the funding agreements are in place and approved by the Governor and Executive Council.

We ask that you keep us informed of progress made toward seeking the authority to borrow. Should your project not move forward, please contact us as soon as possible. If you have any questions, please contact me at 603-848-1372 or at amy.rousseau@des.nh.gov.

Sincerely,

Amy E. Rousseau

Amy Rousseau
PFAS Response Administrator | MtBE Remediation Bureau

Attachments: Final Application Checklist

cc: James Collins, Tighe & Bond
Randal Suozzo, P.E., NHDES DWGB
Erin Holmes, P.E., NHDES MtBERB

Aquarion Water Company of New Hampshire

Pro Forma Embedded Cost of Long Term Debt
to Reflect Issuance of New Financing

Issue	Issuance Date	Face Value	Financing Costs	Net Proceeds Ratio	Amount Outstanding	Coupon Rate	Annual Interest	Cost Rate	Annual Cost	Debt Weighting	Weighted Average Cost Rate
As Authorized in DW 12-085 Aquarion Water Company of New Hampshire Settlement Agreement Order No. 25,539, Dated June 28, 2013											
GM Bond 7.71% Series	Nov-93	3,000,000	55,296	98.2%	3,000,000	7.71%	231,300	7.87%	236,100	21.58%	1.70%
GM Bond 6.21% Series	Aug-05	5,900,000	200,891	96.6%	5,900,000	6.21%	366,390	6.47%	381,730	42.45%	2.75%
GM Bond 4.45% Series	Jun-12	5,000,000	97,507	98.0%	5,000,000	4.45%	222,500	4.70%	235,000	35.97%	1.69%
					13,900,000				852,830		6.14%
As of December 31, 2020 per Books											
GM Bond 7.71% Series	Nov-93	3,000,000	55,296	98.2%	3,000,000	7.71%	231,300	7.87%	236,100	21.58%	1.70%
GM Bond 6.21% Series	Aug-05	5,900,000	200,891	96.6%	5,900,000	6.21%	366,390	6.47%	381,730	42.45%	2.75%
GM Bond 4.45% Series	Jun-12	5,000,000	97,507	98.0%	5,000,000	4.45%	222,500	4.70%	235,000	35.97%	1.69%
					13,900,000				852,830		6.14%
As of December 31, 2020 Pro forma											
GM Bond 7.71% Series	Nov-93	3,000,000	55,296	98.2%	3,000,000	7.71%	231,300	7.87%	236,100	19.76%	1.55%
GM Bond 6.21% Series	Aug-05	5,900,000	200,891	96.6%	5,900,000	6.21%	366,390	6.47%	381,730	38.85%	2.51%
GM Bond 4.45% Series	Jun-12	5,000,000	97,507	98.0%	5,000,000	4.45%	222,500	4.70%	235,000	32.93%	1.55%
NHDES Loan Fund	Aug-21	1,284,750	-	100.0%	1,284,750	1.55%	19,914	1.55%	19,914	8.46%	0.13%
					15,184,750				872,744		5.75%
										Cost rate decrease	0.39%

Aquarion Water Company of New Hampshire
Balance Sheet

Actual and Pro Forma to Reflect Project Financing

Assets	December 31, 2020 Actual	Adjustments Debit	Adjustments Credit	December 31, 2020 Pro Forma	Exhibit 4 JE Reference
Net Utility Plant	$ 44,713,000	$ 1,713,000		$ 46,426,000	(1)
Cash	4,000			4,000	
Net Accounts Receivable	327,000			327,000	
Miscellaneous Receivables	33,000			33,000	
Notes from Associated Companies	-			-	
Accrued Revenues	265,000			265,000	
Materials and Supplies	162,000			162,000	
Prepayments	226,000			226,000	
Other investments	48,000			48,000	
Total Current Assets	1,065,000	-	-	1,065,000	
				-	
Unfunded Deferred Taxes	3,001,000			3,001,000	
Deferred Pension and OPEB regulatory asset	746,000			746,000	
Right of Use Assets	345,000			345,000	
Regulatory Assets	119,000			119,000	
Total Other Assets	4,211,000	-	-	4,211,000	
Total Assets	$ 49,989,000	$ 1,713,000	$ -	$ 51,702,000	

Equity and Liabilities	December 31, 2020 Actual	Adjustments Debit	Adjustments Credit	December 31, 2020 Pro Forma	
Preferred Stock	$ 2,000.00			$ 2,000.00	
Common Stock	2,187,000			2,187,000	
Paid in Capital	3,558,000			3,558,000	
Contributed Capital	4,080,000			4,080,000	
Retained Earnings	10,023,000	130,504		9,892,496	(2) and (3)
Total Stockholder's Equity	19,850,000	130,504	-	19,719,496	
Term notes	13,900,000		1,284,750	15,184,750	(1)
Unamortized debt issuance costs	(81,000)			(81,000)	
Long-Term Debt	13,819,000	-	1,284,750	15,103,750	
Accounts Payable	697,000			697,000	
Accounts Payable to Associated Companies	2,800,000			2,800,000	
Accrued Bond Interest	229,000		19,914	248,914	(2)
Short-Term Lease obligation	91,000			91,000	
Miscellaneous Current and Accrued Liabilities	-		110,590	110,590	(3)
Total Current and Accrued Liabilities	3,817,000	-	130,504	3,947,504	
Deferred Taxes and Investment Tax Credits	5,106,000			5,106,000	
Contributions in Aid of and Customer Advances for Cor	3,455,000		428,250	3,883,250	(1)
Deferred Pension and OPEB	985,000			985,000	
Regulatory Liabilities	2,703,000			2,703,000	
Long-term Lease Obligations	254,000			254,000	
Total Deferred Credits	12,503,000	-	428,250	12,931,250	
Total Equity & Liabilities	$ 49,989,000	$ 130,504	$ 1,843,504	$ 51,702,000	

Aquarion Water Company of New Hampshire
Statement of Income

Income Statement for the Twelve Months Ended December 31, 2020
Actual and Pro Forma to Reflect Project Financing

	Twelve Months Ended December 31, 2020			
	Actual	Adjustments	Pro Forma	Exhibit 4 JE Reference
Operating Revenues	$ 7,622,000		$ 7,622,000	
Operating Expenses				
Operation & Maintenance	3,120,000		3,120,000	
Depreciation	1,081,000		1,081,000	
Taxes other than Federal Income Taxes	885,000		885,000	
Income Taxes	242,000	110,590	352,590	(3)
Total Operating Expenses	5,328,000	110,590	5,438,590	
Utility Operating Income	2,294,000	(110,590)	2,183,410	
Total Other Income and Deductions	213,000		213,000	
Income Before Interest Charges	2,507,000	(110,590)	2,396,410	
Deductions from Income:				
Interest Expense	857,000	19,914	876,914	(2)
Total Interest Charges	857,000	19,914	876,914	
Net Income	$ 1,650,000	(130,504)	$ 1,519,496	
Interest Coverage (Income before interest and taxes divided by interest)	3.21		3.13	

Aquarion Water Company of New Hampshire

Journal Entries to reflect the Project financing

1	CONSTRUCTION WORK IN PROGRESS		1,713,000	
	CONTRIBUTION IN AID OF CONSTRUCTION			428,250
	LONG TERM DEBT			1,284,750
	To record the issuance of $1,284,750 Bond to finance capital expenditures			
2	INTEREST EXPENSE		19,914	
	ACCRUED INTEREST PAYABLE			19,914
	To record additional interest expense on $1,284,750 Loan			
	$1,284,750 X 1.55% =	19,914		
	Less: $-0-	-		
		19,914		
3	INCOME TAX EXPENSE		110,590	
	INCOME TAX PAYABLE			110,590
	To record the state and federal income taxes to reflect grant of $428,250, offset by the increase in interest expense.			

Aquarion Water Company of New Hampshire

Statement of Capitalization, Actual and Pro Forma to Reflect Issuance of Long-Term Note

	December 31, 2020 Actual	Percent	December 31, 2020 Pro Forma	Percent
LONG TERM DEBT	$ 13,900,000	38.0%	$ 15,184,750	40.3%
SHORT TERM DEBT	2,800,000	7.7%	2,800,000	7.4%
PREFERRED EQUITY	2,000	0.0%	2,000	0.0%
COMMON EQUITY	19,848,000	54.3%	19,717,496	52.3%
TOTAL CAPITALIZATION	$ 36,550,000	100.0%	$ 37,704,246	100.0%

Aquarion Water Company of New Hampshire

Rate Base, Actual and Pro Forma AFTER Project Is Complete and Useful

Line No.	Description	12/31/2020		Pro Forma
1				
2				
3	Plant in Service	$ 57,573,255	$ 1,713,000	$ 59,286,255
4	Accumulated Depreciation	(14,018,441)		(14,018,441)
5	Net Plant in Service	43,554,814	1,713,000	45,267,814
6				
7				
8	Add:			
9	Materials & Supplies	160,694		160,694
10	Prepayments	226,563		226,563
11	Working Capital Allowance	239,520		239,520
12	Total Additions	626,777		626,777
13				
14				
15	Less:			
16	Customer Advances	(1,032,032)		(1,032,032)
17	Contributions in Aid of Constructions	(2,422,886)	(428,250)	(2,851,136)
18	Deferred Taxes	(3,859,831)		(3,859,831)
19	Total Deductions	(7,314,749)	(428,250)	(7,742,999)
20				
21				
22	**Total Rate Base**	**$ 36,866,842**	**$ 1,284,750**	**$ 38,151,592**
23				

AQUARION WATER COMPANY OF NEW HAMPSHIRE, INC.
(Directors Written Consent)
(Effective: March 10, 2021)

The undersigned, being all of the Directors of Aquarion Water Company of New Hampshire, Inc. (the "Company"), hereby consent to the following action, which consent shall have the same effect as a vote in favor of such action taken at a meeting of the Company's Directors:

AUTHORIZATION TO ENTER INTO DRINKING WATER AND GROUNDWATER TRUST FUND GRANT AGREEMENT AND PFAS REMEDIATION LOAN FUND PROGRAM LOAN AGREEMENT AND RELATED ACTIONS

RESOLVED, that Aquarion Water Company of New Hampshire, Inc. (the "Company") is hereby authorized to enter into a Drinking Water and Groundwater Trust Fund grant agreement between the Company and the New Hampshire Department of Environmental Services (the "Grant Agreement") to fund a water system improvement project (the "Project") to construct a treatment facility/system in North Hampton, New Hampshire to address per- and polyfluoroalkyl substances ("PFAS") levels in Well 6 located in Hampton, New Hampshire.

RESOLVED, that each of the President and Chief Operating Officer, the Senior Vice President-Finance and Regulatory and Treasurer, the Vice President, Operations and Utility Innovation, and the Vice President, Engineering and Real Estate of the Company (the "Authorized Officers"), acting singly, is hereby authorized to execute, deliver and perform, in the name and on behalf of the Company, any and all documents that may be necessary or desirable to effectuate the Grant Agreement.

RESOLVED, that each Authorized Officer, acting singly, is hereby authorized to enter into an agreement under the PFAS Remediation Loan Fund Program between the Company and the New Hampshire Department of Environmental Services in an amount up to $1,300,000.00, at an interest rate of 1.55%, and for a term of up to 25 years (the "Loan Agreement") for the purpose of securing the water system improvements loan (the "Loan") for the Project, and to grant a security interest in the Company's property to secure such Loan.

RESOLVED, that the Project is hereby approved, and each Authorized Officer is authorized to sign the loan application, loan agreements, promissory notes, security instruments and any and all papers necessary or appropriate to satisfy the conditions of and execute the obligations of the Loan Agreement on behalf of the Company.

RESOLVED, that if such Loan be made, the Company agrees to operate and maintain all facilities constructed or modified with the funds received in accordance with all applicable requirements.

AQUARION WATER COMPANY OF NEW HAMPSHIRE, INC.
(Directors Written Consent)
(Effective: March 10, 2021)

RESOLVED, that each Authorized Officer is hereby authorized, in the name and on behalf of the Company, to file with the New Hampshire Public Utilities Commission and any and all other applicable federal, state or local regulatory agencies, applications for all necessary approvals relating to the Grant Agreement and the Loan Agreement, and any transactions contemplated by the foregoing resolutions.

RESOLVED, that any and all actions heretofore taken, and any and all things heretofore done, by any officer of the Company in connection with or with respect to the Grant Agreement and the Loan Agreement or any related agreements to be entered into by the Company in connection therewith are hereby are approved, ratified and confirmed.

DocuSigned by:
Donald J. Morrissey
EE8FFCEC9035403...

Donald J. Morrissey

DocuSigned by:
A9810D6901C44A3...

John P. Walsh

March 3, 2021

Carl McMorran
Aquarion Water Company of NH
7 D Scott Road
Hampton, New Hampshire 03842

Subject: Aquarion Water/NH (1051010)
PFAS Treatment Project – Mill Road Wellfield

Dear Mr. McMorran:

We understand that you are in the process of presenting drinking water system upgrades to the Public Utilities Commission (PUC). These upgrades will provide Aquarion Water with the ability to continue to use all of the drinking water system wells through treatment of GPW 6 Whites Filed / Mill Rd (GPW 6). The ability to use all of the system's wells is critical to maintaining an adequate supply of safe drinking water to the community, especially during high demand conditions during the summer. GPW 6 contains levels of Per- and Polyfluorinoalkyl Substances (PFAS) that continue to rise, with one particular contaminant, PFOA, currently higher than the maximum contaminant level (MCL) set by the State of New Hampshire's Administrative Rules. Treatment for the removal of PFOA to below the MCL is necessary to maintain the continued use of GPW 6.

We are in support of and recommend system modifications which will maintain the required supply of safe drinking water and reduce the risk to public health.

If you have any questions, please do not hesitate to reach out to me at Randal.A.Suozzo@des.nh.gov or 271-1746.

Sincerely,

Randal A. Suozzo, P.E.
NHDES Drinking Water & Groundwater Bureau

ec: Thomas Gaidish, Aquarion Water Company
Amy Rousseau and Erin Holmes, NHDES