



May 5, 2022 District Informational Meeting

District Meeting Article 13: PFAS TREATMENT FOR BFD WELLS 2 & 5



Image credit: Wright Pierce

BARNSTABLE FIRE DISTRICT WATER SYSTEM

The Barnstable Fire District Water Department provides drinking water to nearly 2000 service connections. The population served is estimated to be about 4000 (winter). The water distribution system has two service pressure zones, four pressure-reducing vaults, three water storage tanks (standpipes), and about 50 miles of watermains ranging in diameter from 2-inch to 16-inch.

The Water Department has three wellfield areas which are made up of 5 groundwater pumping facilities. Wells 2 and 5 are located off Breed's Hill Road and adjacent to Flintrock Pond. Flintrock Pond abuts the Barnstable County Fire Training Academy.

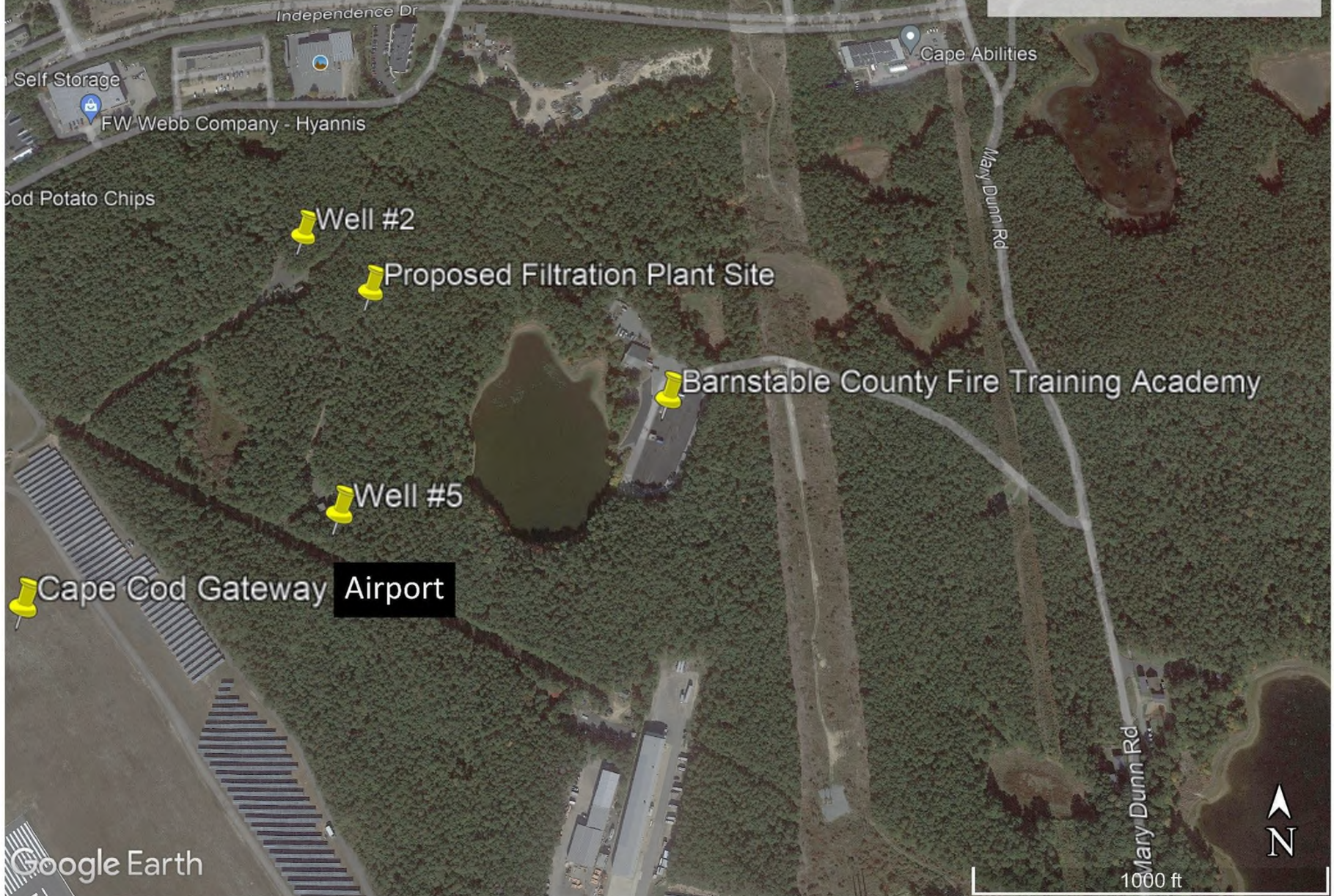
BFDWD Breeds Hill Wellfield

Write a description for your map.

Everleigh Cape Cod

Legend

- Feature 1
- FW Webb Company - Hyannis



Cape Cod Gateway Airport

Well #5

Proposed Filtration Plant Site

Well #2

Barnstable County Fire Training Academy

This part of the presentation will discuss:

- PFAS regulations
- Historic PFAS concentrations at the District's well supplies
- Costs to address PFAS and cost mitigations
- Water rates and annual expenditures
- Customer questions
- Design aspects of the water treatment plant
- Why it is the best choice to proceed with construction of the plant.

What is PFAS? “Per- and Polyfluoroalkyl Substances”

PFAS are a class of thousands of substances that have been produced since the 1940s, and used in a broad range of consumer products and industrial applications PFAS in products, for example in apparel, building materials, hydraulic fluids, engine oils, impregnation sprays, fire-fighting foams, food packaging materials, or various other consumer products. They are compounds with a strongly-bonded chain of carbon-fluorine-carbon structures, which makes them very persistent in the environment. More than 3500 different PFAS compounds have been made over time.

There are currently 120 MA public water systems with PFAS compounds above the MA drinking water limit, of 1028 systems tested. The Clean Water Trust is funding 17 PFAS projects thus far, and another 12 indicated by the Clean Water Trust 2022 Intended Use Plan

TOXICOLOGY - Some people who drink water over a prolonged period containing these PFAS in excess of the 20 ppt maximum containment level may experience certain adverse effects. These include effects on the liver, blood, immune system, thyroid, and fetal development. PFAS may also elevate the risk of certain forms of cancer

PFAS is ubiquitous in the environment and present in our blood.

YES = If yes, select all that apply:

- MB** = Military base
- FT** = Firefighting training school
- AO** = Airport operations
- CW** = Car wash or industrial launderers
- PS** = Public safety activities (e.g., fire and rescue services)
- WM** = Waste management
- HW** = Hazardous waste collection, treatment, and disposal
- UW** = Underground injection well
- SC** = Solid waste collection, combustors, incinerators
- MF** = Manufacturing
- FP** = Food packaging
- TA** = Textile and apparel (e.g., stain- and water-resistant, fiber/thread, carpet, house furnishings, leather)
- PP** = Paper

- CC** = Chemical
- PR** = Plastics and rubber products
- MM** = Machinery
- CE** = Computer and electronic products
- FM** = Fabricated metal products (e.g., nonstick cookware)
- PC** = Petroleum and coal products
- FF** = Furniture
- OG** = Oil and gas production
- UT** = Utilities (e.g., sewage treatment facilities)
- CT** = Construction (e.g., wood floor finishing, electrostatic painting)
- OT** = Other

NO = Not aware of any potential current and/or historical sources

DK = Do not know

REGULATION OF PFAS

In October 2020, MassDEP regulated 6 PFAS compounds (**PFAS6**) to a maximum contaminant level (MCL) of 20 parts per trillion (ppt). **PFAS6** are comprised of six compounds: perfluorooctane sulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorohexane sulfonic acid (PFHxS), perfluorononanoic acid (PFNA), perfluoroheptanoic acid (PFHpA), and perfluorodecanoic acid (PFDA).

MassDEP also requires reporting of an additional 12 unregulated PFAS compounds detect by the same laboratory method.

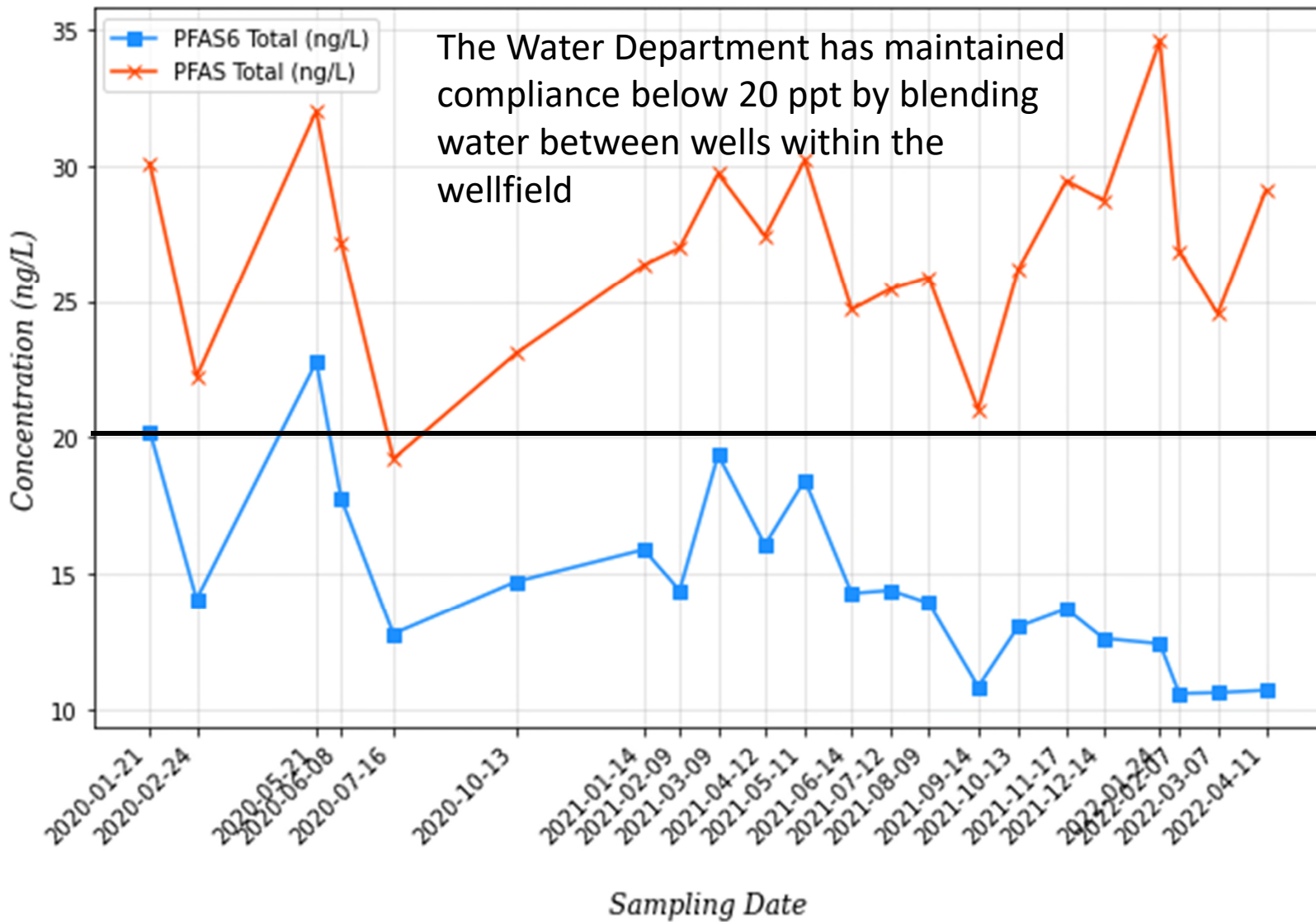
USEPA has similar intentions under their Unregulated Contaminant Monitoring Rule #5. Many systems will be required by EPA to monitor for 29 PFAS compounds beginning this year.

310 CMR 22.07G(3)e of the Massachusetts Drinking Water Regulations states:

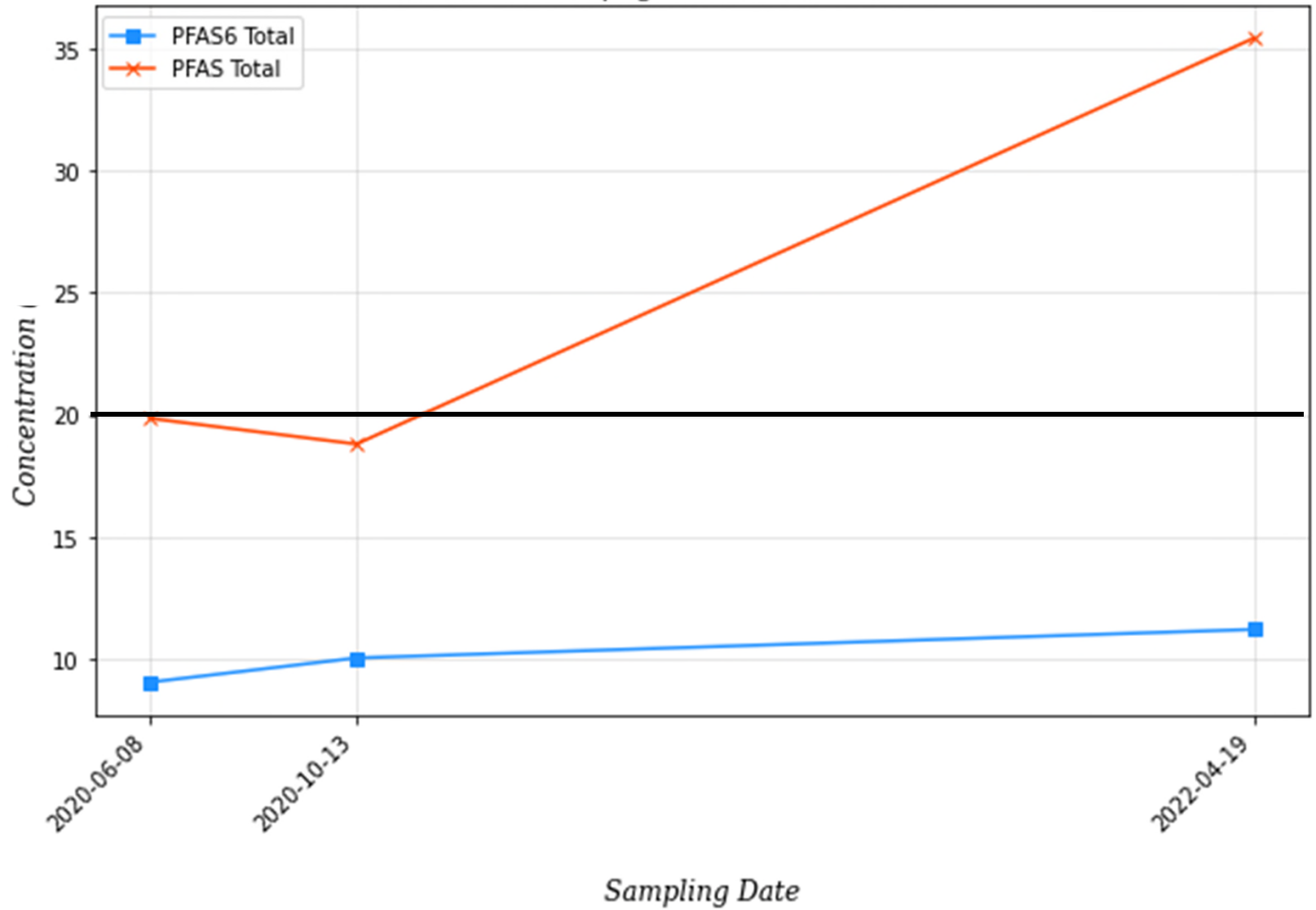
- (e) Review of PFAS and Drinking Water. Not later than December 31, 2023, and once every three years thereafter, the Department shall perform a review of relevant developments in the science, assessment and regulation of PFAS in drinking water for the purpose of evaluating whether to amend 310 CMR 22.07G(3) in light of any advancements in analytical or treatment technology, toxicology and/or any other relevant information. Information about this review shall be made available to the public.

MassDEP intends on evaluating additional PFAS compounds to be regulated in 2023. However, it is unlikely that the maximum contaminant level (MCL) will be raised if additional compounds are added, if the compounds have similar human toxicological effects.

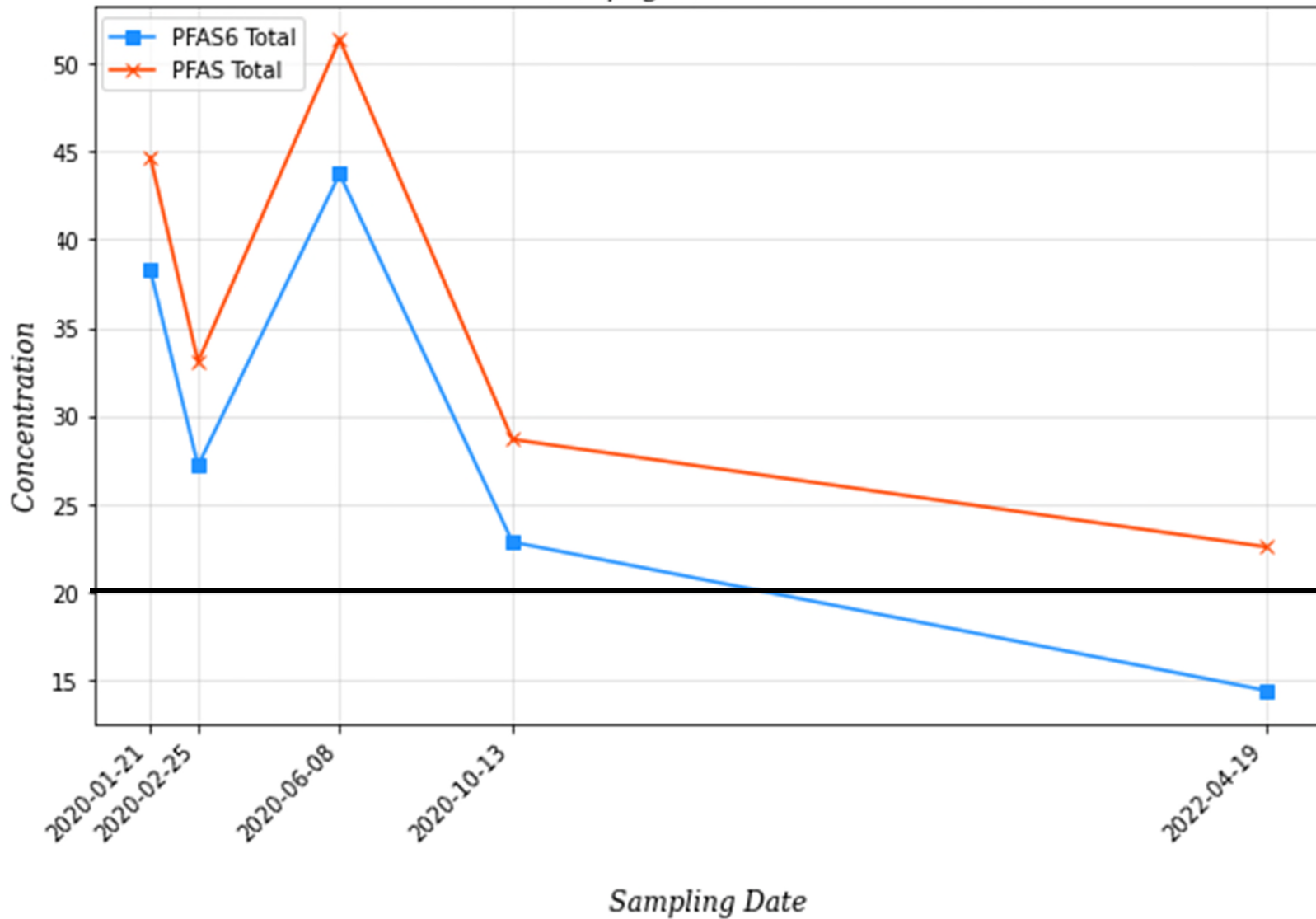
BFD Well 2 & 5 PFAS Concentrations



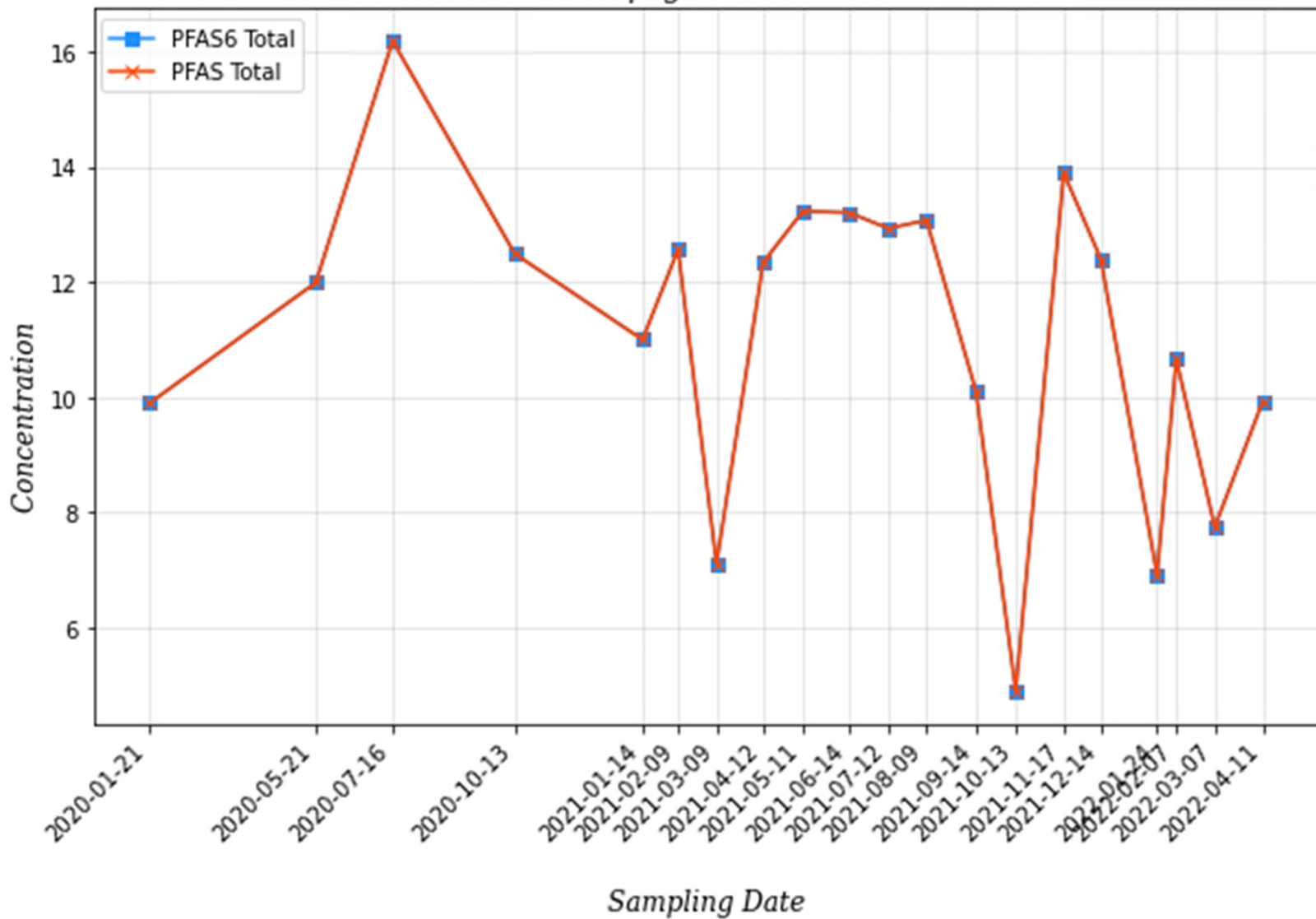
BFD Well#2 Pumpage and PFAS Concentrations



BFD Well#5 Pumpage and PFAS Concentrations



BFD Well 3 & 4 Pumpage and PFAS Concentrations



WATER DEPARTMENT RESPONSE:

FY2021 District Borrowing Authorization, \$2.8 mil.

Well 1 & Treatment 3 – Construction Cost	\$ 1,030,000
Well 1 & Treatment 3 - Engineering Des/Bid/Con	\$ 143,000
Well 1 Startup, DEP Report & Miscellaneous Items	\$ 70,000
WTP for Wells 2 & 5 - Pilot Testing & Report	\$ 190,000
WTP for Wells 2 & 5 - Preliminary Design	\$ 238,000
WTP for 2 & 5 - Final Engineering & Permitting	\$ 812,000

Expense Mitigation

CWT 0% SRF 6949 LOAN	\$1,458,000
MassDEP 2020 PFAS Grant	(\$ 200,000)
CWT 6.6% loan forgiveness	(\$ 96,000)
Depreciation of 0% loan principal with 3.5% inflation	(\$ 165,000)
Present value of loan principal borrowed	\$ 1,293,000
Yarmouth Emergency Interconnection	\$ 150,000
MassDEP 2021 PFAS Grant	(\$ 150,000)



FY2023 Borrowing Authorization Request, Article 13

WTP for Wells 2 & 5 – Construction Cost	\$ 18,500,000
WTP for Wells 2 & 5 – Engineering Con. Ph.	\$ 1,500,000
Total Probable Cost	\$ 20,000,000

Expense Mitigation

CWT 0% SRF 7128 30 YEAR LOAN	\$20,000,000
CWT 6.6% loan forgiveness	(\$ 1,320,000)
Depreciation of 0% loan principal with 3.5% inflation	(\$ 7,362,000)
Present value of loan principal to be borrowed	\$11,318,000

Other Potential Mitigation

- January 21, 2022 District letter to Barnstable County requesting share of 2022 ARPA funds
- Possible Action Item: Assessment and Pursuit of Potentially Responsible Parties for Contamination, Seek Compensation



Why not just use bottled water or pitcher filter forever?

MassDEP does not allow bottled water or pitcher filters as a permanent solution for public water systems. Water dept would not have control of maintenance of POE/POU/ pitcher filter systems.

Some bottled waters distributed in MA have been found to contain PFAS

22.23: Use of Non-centralized Treatment Devices and Bottled Water

(1) Public Water Systems shall not use bottled water to achieve compliance with an MCL, MRDL, Action Level or Treatment Technique established in 310 CMR 22.00 or any standards specific to an individual Public Water System established pursuant to a health assessment as provided in 310 CMR 22.03(8). Bottled water may be approved by the Department for use on a temporary basis to avoid any unreasonable risk to health.

Could the Water Department build seasonal facilities with outdoor filtration units to reduce costs?

No - The District is committed to providing safe reliable drinking water and fire protection to customers all year around. While a seasonal facility would be somewhat less expensive it would impact the District's ability to provide safe drinking water throughout the year and would impact the available fire flow volumes if Wells 2 & 5 were offline in the winter.

Why build the plant now, why not wait?

- BFDWD is ahead of 80+ other applications for CWT SRF funding. Loan forgiveness and 0% loans may cease after federal Bilateral Infrastructure Law funds are consumed over next five years. Additional systems \leq 20 ppt may also apply.
- The Water Department has maintained compliance below 20 ppt by blending water between wells within the wellfield, which substantially reduces the flow from Well 5, the most productive well. This impacts available fireflow.
- There is no certainty about ability to maintain future levels of PFAS from the wellfield.
- It is probable that additional PFAS compounds (some of which are already present in the wellfield) will become regulated, forcing treatment or non-use of the well(s).

- Treatment plant construction costs have been growing faster than the general inflation rate

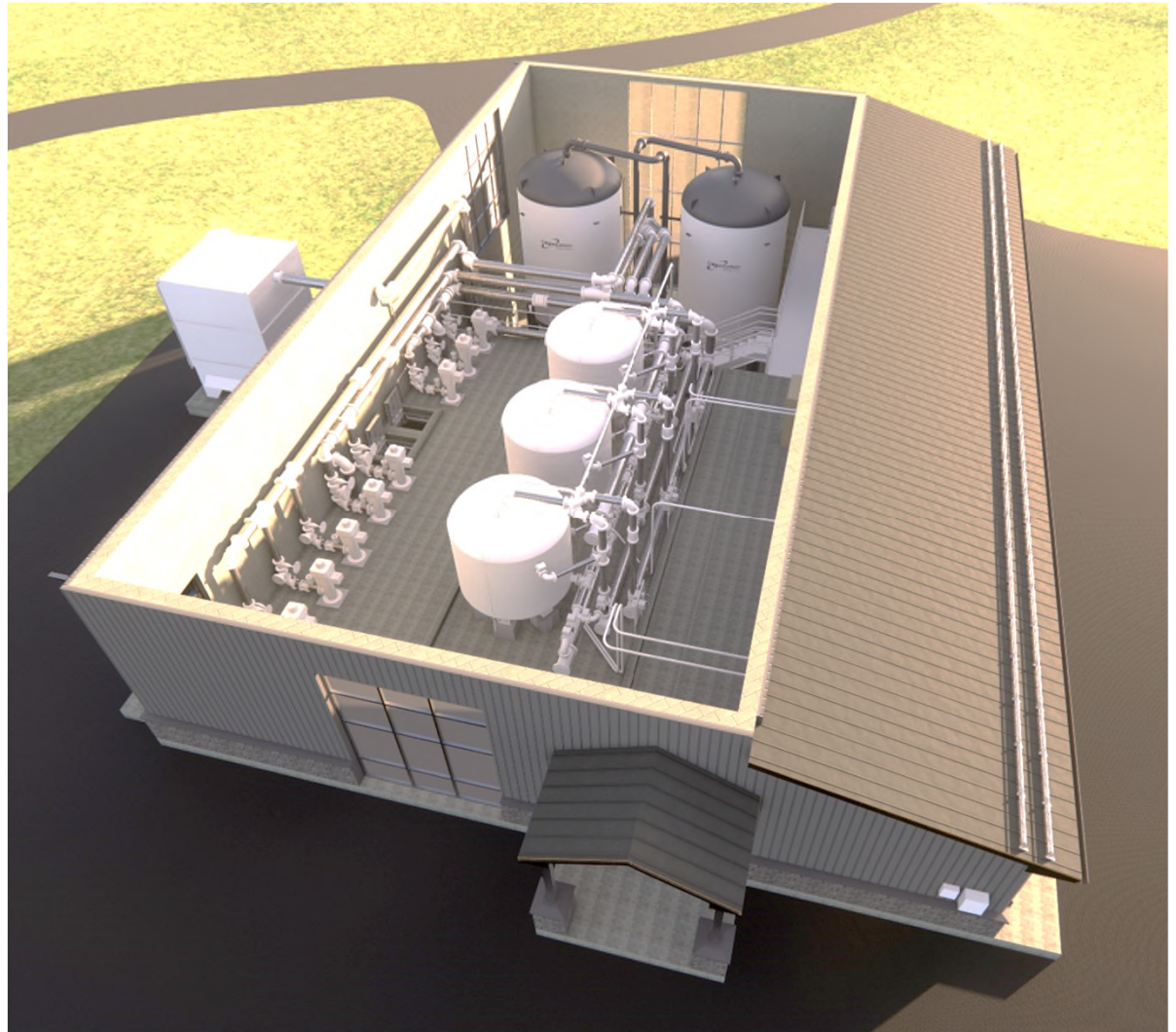


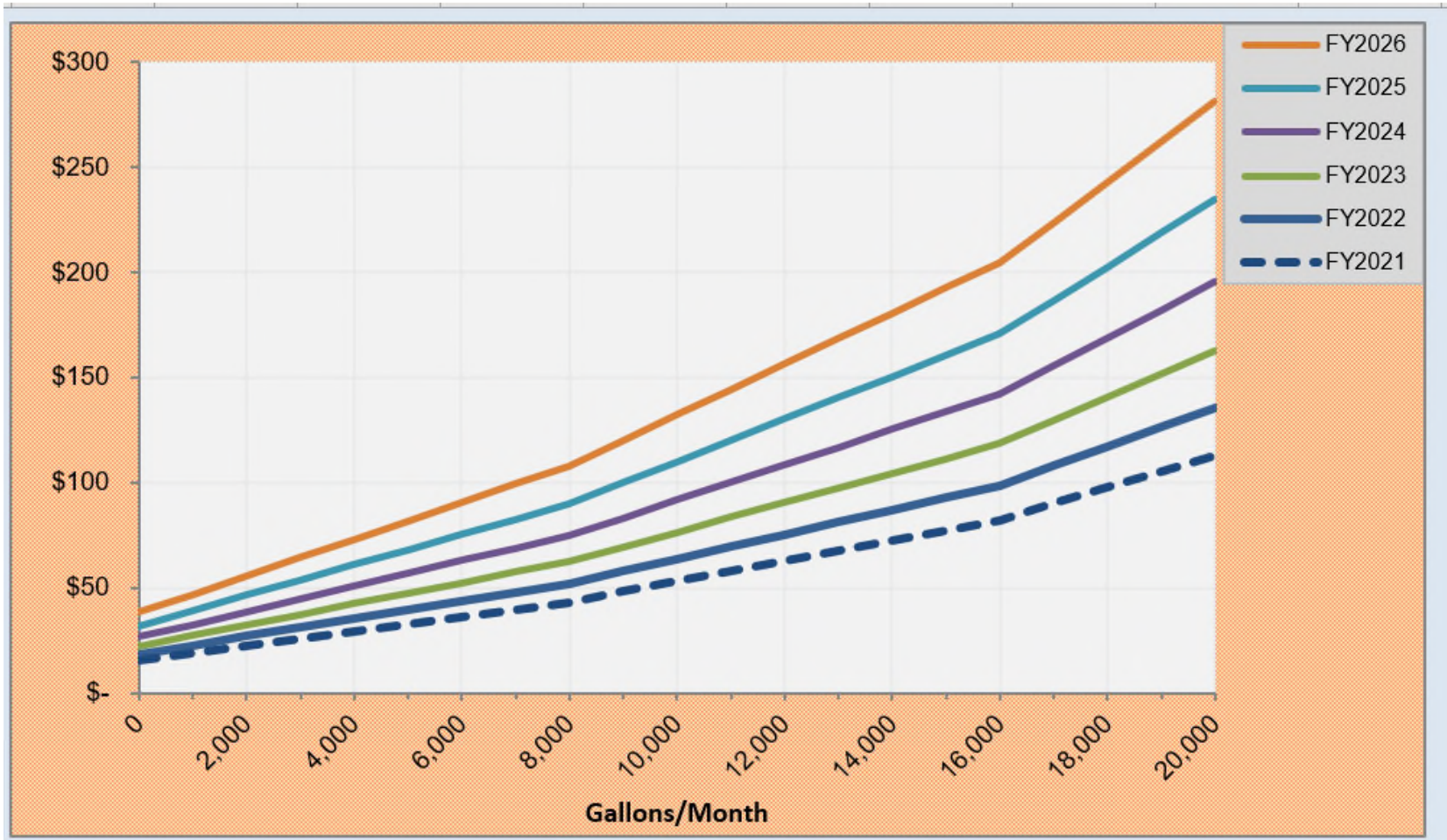
Image credit: Wright Pierce

Won't such a large project will preclude the District from affording other infrastructure improvements?

No. All costs of the water treatment plant construction , operation and maintenance costs will be paid for through increases in the water rates. An increase in District tax will not be required. Water rates will increase approximately 20 percent per year for the next four years (rates have already been increased this year).



Projected future total monthly water bill per customer service, with treatment plant:





CURRENT AVAILABLE DISTRICT BONDING CAPACITY IS \$71 MIL.

CURRENT & FUTURE ANTICIPATED WATER DEPT. DEBT SERVICE SCHEDULE:

Anticipated Loans/Debts	Amount Borrowed (Principal only)	Starting FY of Payments	Period of Loan/Debt (yrs.)	Annual Interest Rate	FY2022	FY2023	FY2024
Tank Repainting					\$ 110,000	\$ 115,000	\$ 115,000
2006 Water Bond					\$ 80,242	\$ 77,512	\$ 74,766
Well 1 & Engineering	\$ 1,465,736	FY2022	30	0.15%	\$ 50,002	\$ 50,002	\$ 50,002
Wells 2 & 5 WFP (1)	\$ 20,000,000	FY2024	30	0.15%	\$ -	\$ -	\$ 682,279
WFP Des. Engineering	\$ 824,556	FY2022	10	1.96%	\$ 91,603	\$ 91,603	\$ 91,603
Total					\$ 331,847	\$ 334,117	\$ 1,013,650

FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2031
\$ 115,000	\$ 115,000	\$ 115,000	\$ 115,000	\$ 120,000	\$ 120,000	\$ 120,000
\$ 72,003	\$ 69,225	\$ 66,412				
\$ 50,002	\$ 50,002	\$ 50,002	\$ 50,002	\$ 50,002	\$ 50,002	\$ 50,002
\$ 682,279	\$ 682,279	\$ 682,279	\$ 682,279	\$ 682,279	\$ 682,279	\$ 682,279
\$ 91,603	\$ 91,603	\$ 91,603	\$ 91,603	\$ 91,603	\$ 91,603	\$ 91,603
\$ 1,010,887	\$ 1,008,109	\$ 1,005,296	\$ 938,884	\$ 943,884	\$ 943,884	\$ 943,884

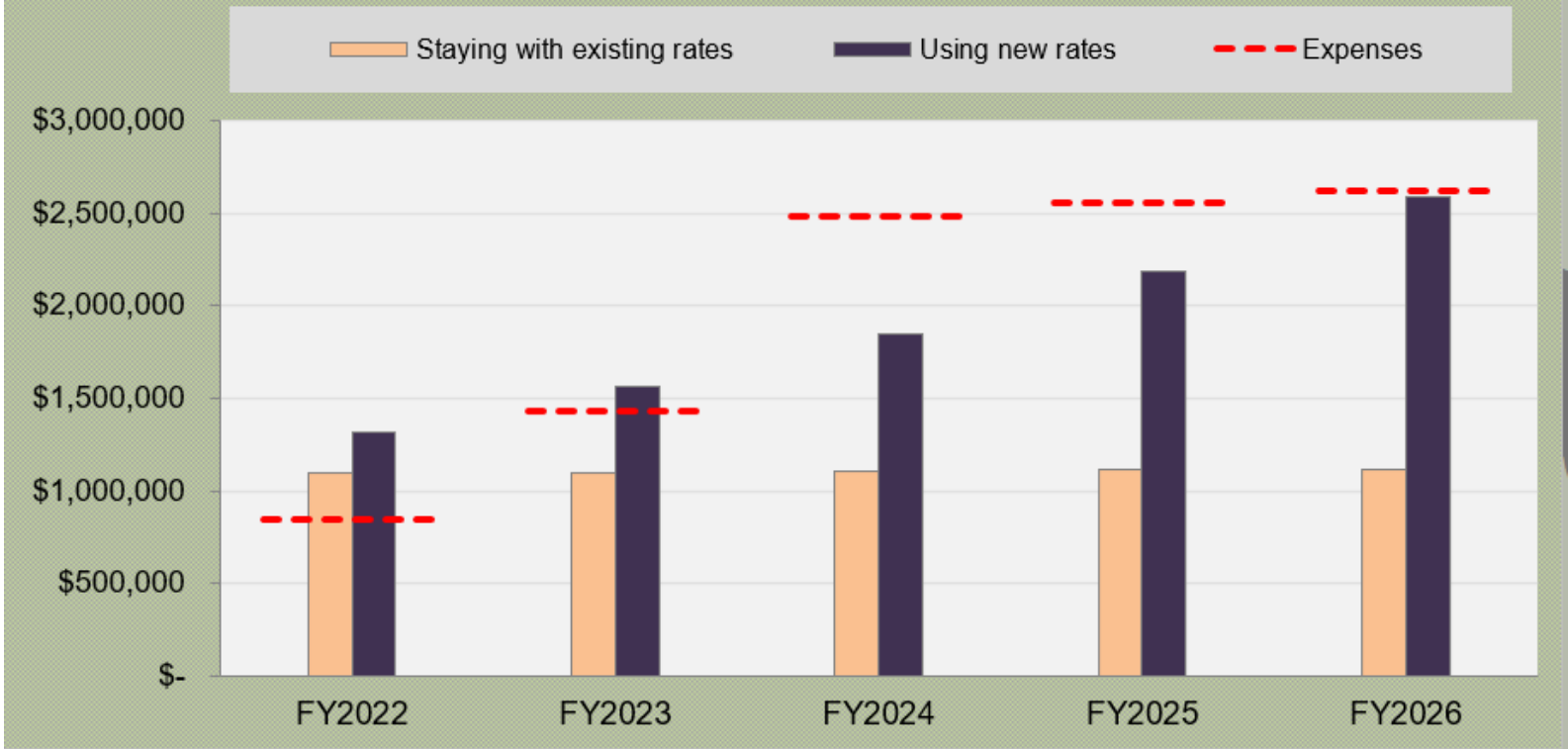


DEBT SERVICE + OPERATING EXPENSES:

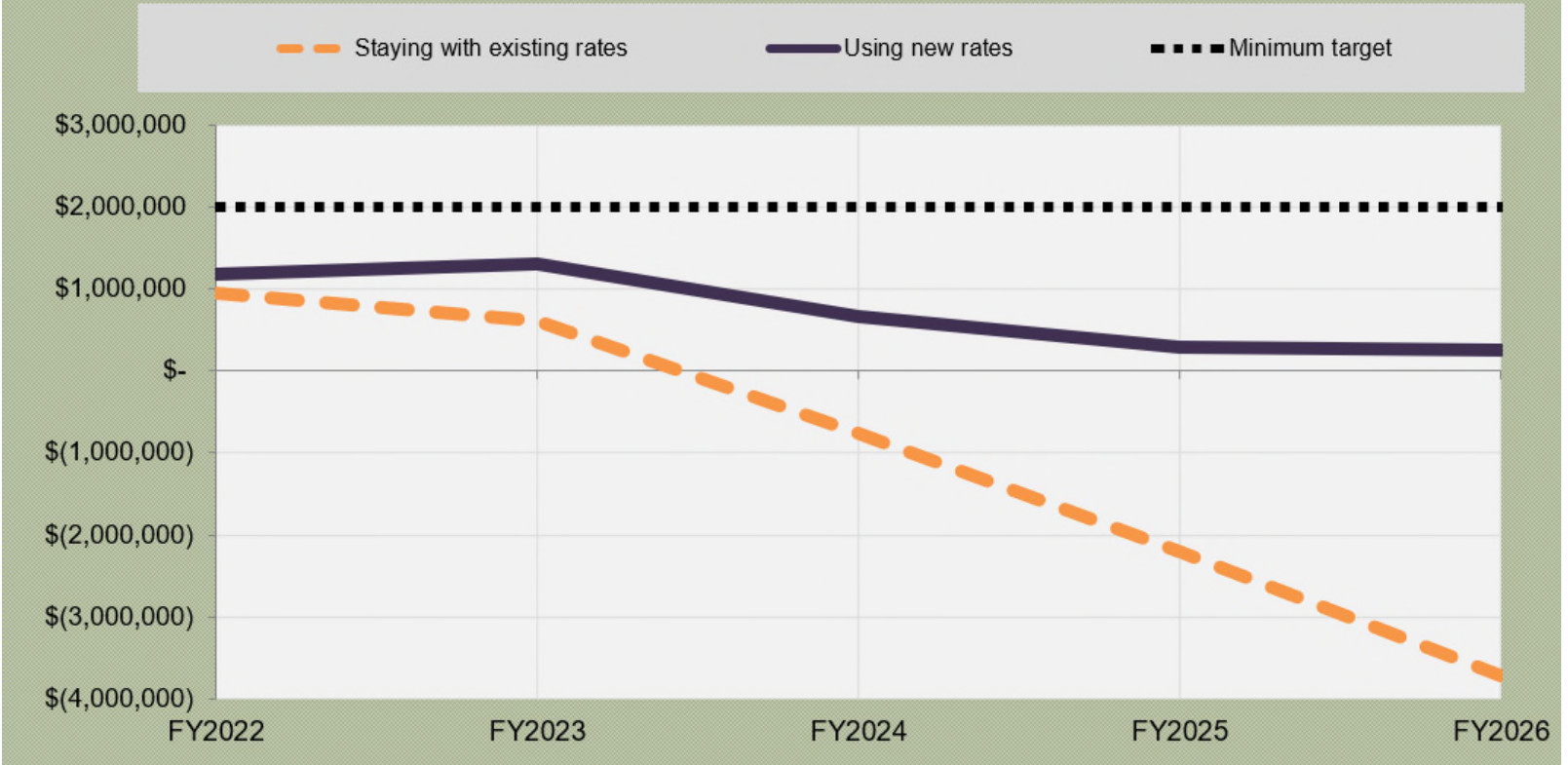
COSTS	Percent Annual Increase	FY2022	FY2023 (estimate)	FY2024 (estimate)
Other Costs	3.00%		\$ -	\$ -
Operational Direct & Indirect Costs	4.50%	\$ 1,051,351	\$ 1,098,662	\$ 1,148,102
WFP O&M (estim.)	4.50%			\$ 366,920
Debt Service, WTP added in 2024		\$ 331,847	\$ 334,117	\$ 1,013,650
Annual Capital Expenditures				
Savings into Capital Expense Fund				
Other - Add additional categories here if needed		\$ -	\$ -	\$ -
Total		\$ 1,383,198	\$ 1,432,779	\$ 2,528,672

FY2025 (estimate)	FY2026 (estimate)	FY2027 (estimate)	FY2028 (estimate)	FY2029 (estimate)	FY2030 (estimate)	FY2031 (estimate)
\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
\$ 1,199,766	\$ 1,253,756	\$ 1,310,175	\$ 1,369,132	\$ 1,430,743	\$ 1,495,127	\$ 1,562,408
\$ 383,432	\$ 400,686	\$ 418,717	\$ 437,559	\$ 457,250	\$ 477,826	\$ 499,328
\$ 1,010,887	\$ 1,008,109	\$ 1,005,296	\$ 938,884	\$ 943,884	\$ 943,884	\$ 943,884
\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
\$ 2,594,085	\$ 2,662,551	\$ 2,734,188	\$ 2,745,576	\$ 2,831,877	\$ 2,916,837	\$ 3,005,620

Projected Total Annual Revenues in the Next Five Fiscal Years



Projected End-of-Year Fund Balance in the Next Five Fiscal Years



Consultant Team: GZA (Site/Permits), Wright Pierce (WTP) & Stantec (OPM)

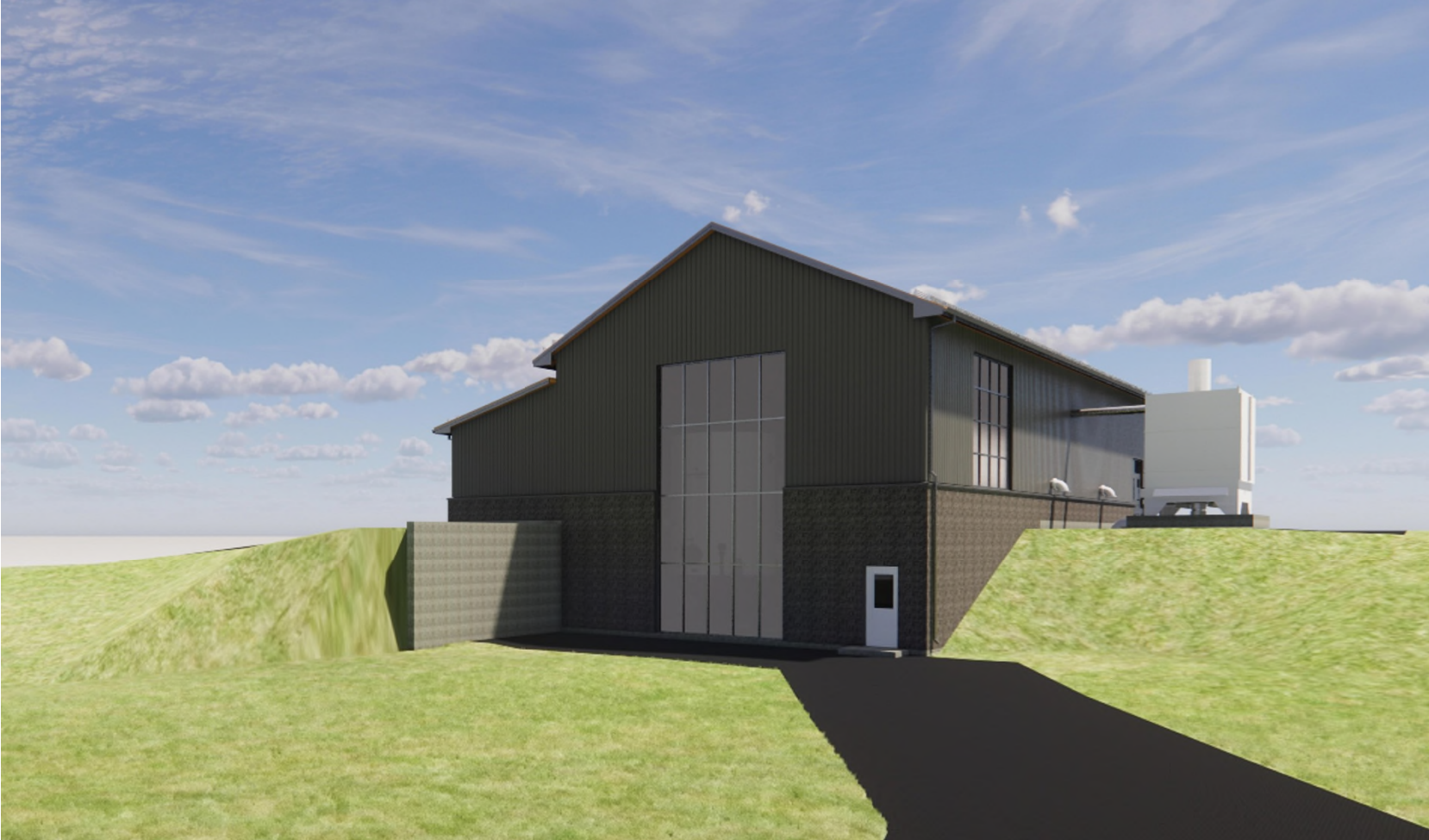


Image credit: Wright Pierce



BREED'S HILL ROAD
(OFF WIDE PUBLIC)

CONCRETE BOARD W/ BRICK CURB
ELEVATION = 21.25 (NAVD83)

CONCRETE BOARD CENTER
ELEVATION = 28.86 (NAVD83)

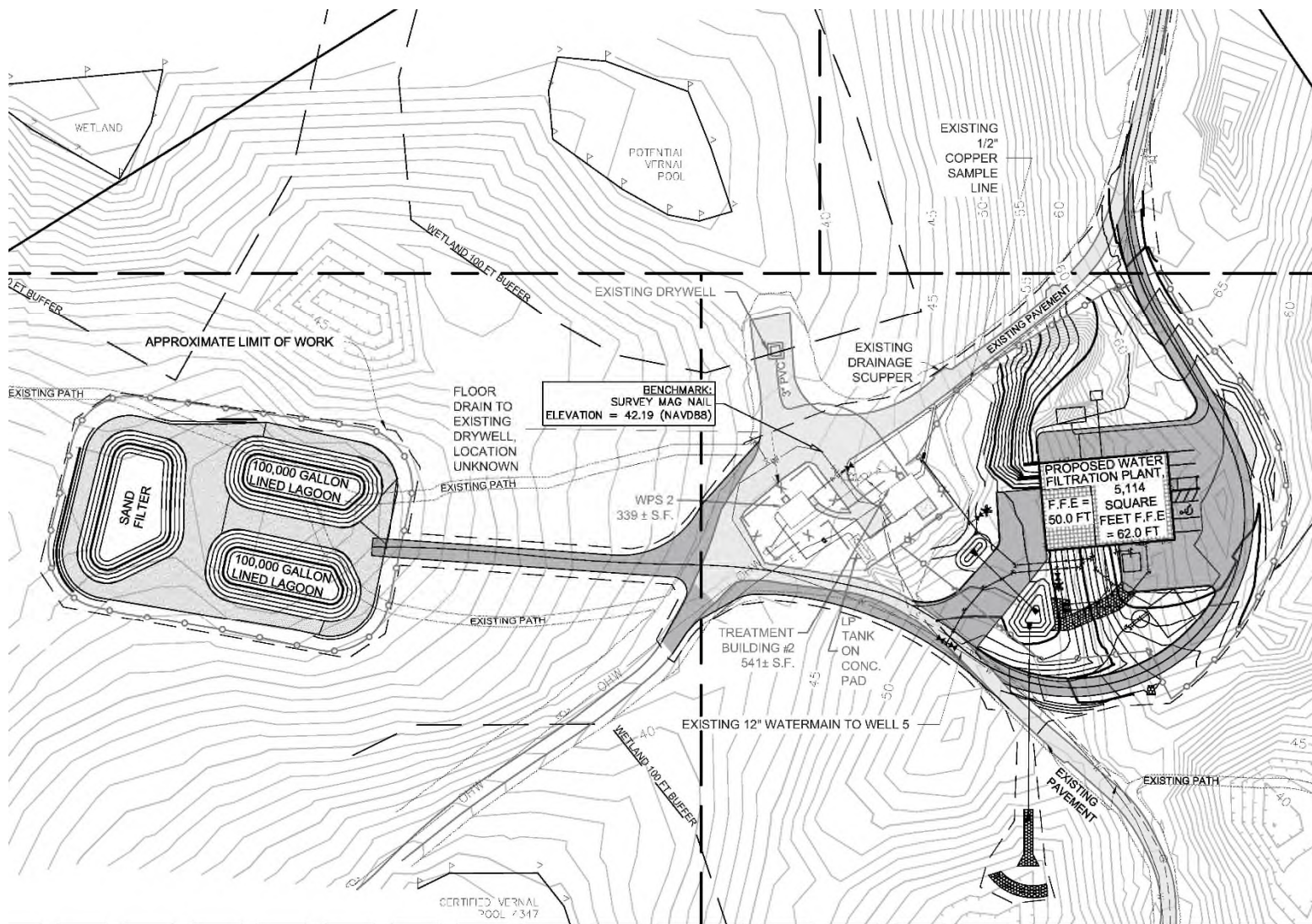
FOR CLIENT REVIEW ONLY
DRAFT COPY
60% DESIGN

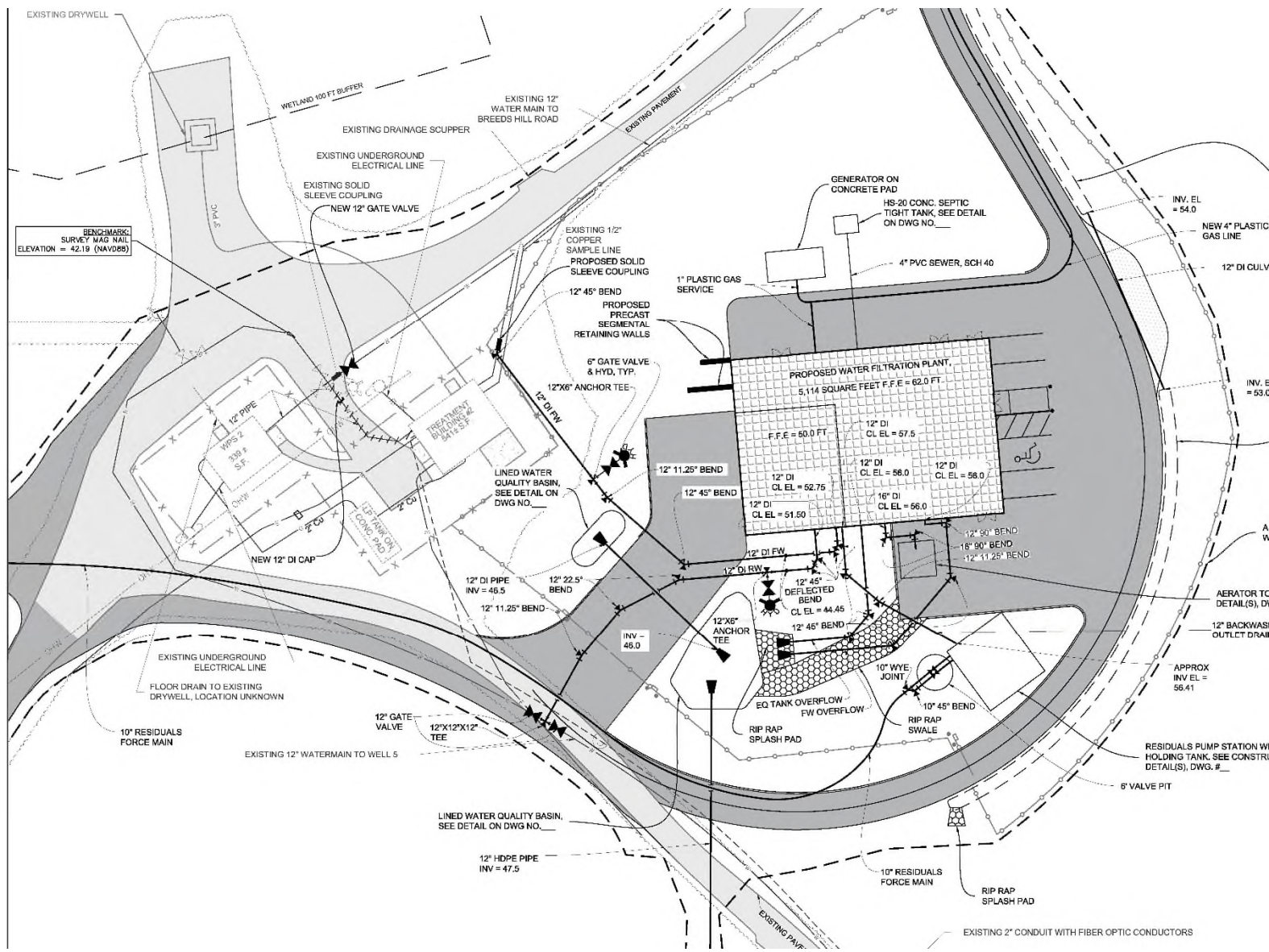
NO. 1		CONCRETE TO 12" & 16" DIA. VERTICAL LINES & PROVISION FOR NO. 1	DATE	06/25/2022		
NO. 2		SOIL CONDITION				
WELLS 2 & 5 WATER FILTRATION PLANT 223 BREEDS HILL ROAD BARNSTABLE, MASSACHUSETTS						
EXISTING CONDITIONS, DEMOLITION, & EROSION CONTROL PLAN						
PREPARED BY:	GEA GeoEnergy Technology, Inc. Engineers & Scientists www.gea.com	PREPARED FOR:	BARNSTABLE FIRE DISTRICT WATER DEPARTMENT			
PROJECT NO.:	1744	REVISION BY:	ITS	CHECKED BY:	SPC	DRAWING
DATE:	03/23/2022	PROJECT TO:	CON.	SCALE:	AS SHOWN	C-1
		PROJECT NO.:	01.0174688.00	REVISION NO.:	1	(BULLNO. 10.1)

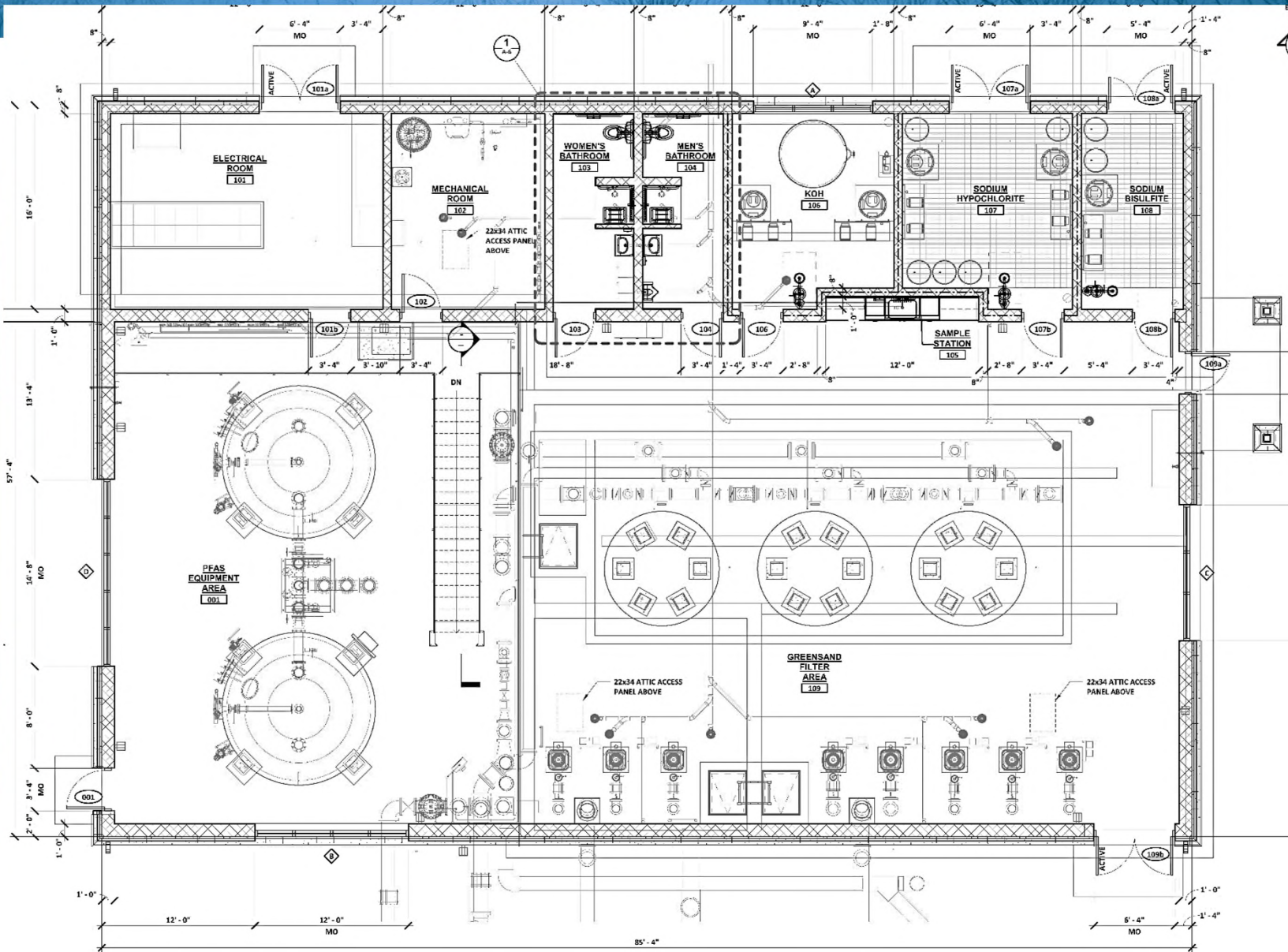


- 1. FOR FOUND AND ORIGINAL NOTES, SEE SHEET C-0
- 2. FOR CIVIL DETAILS, SEE SHEETS C-6 TO C-4

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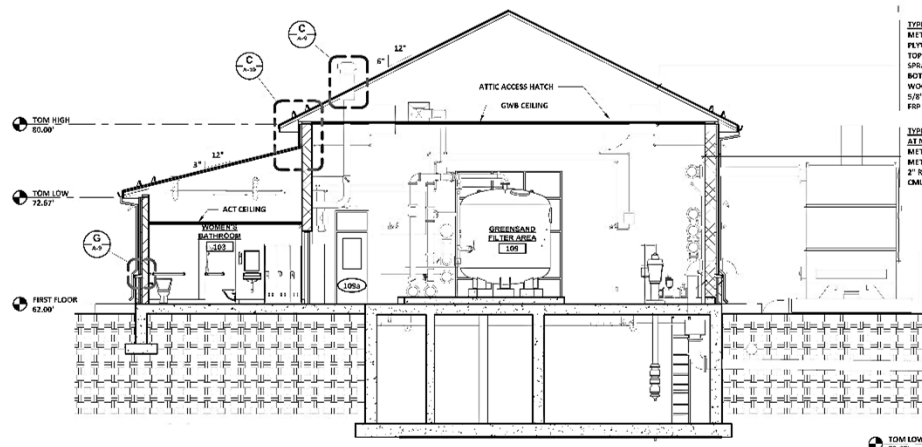
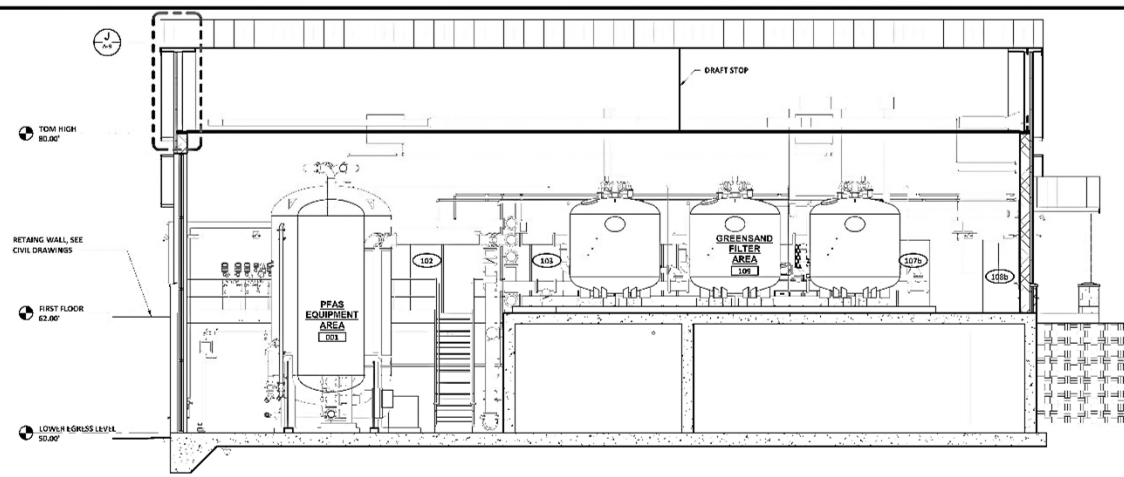








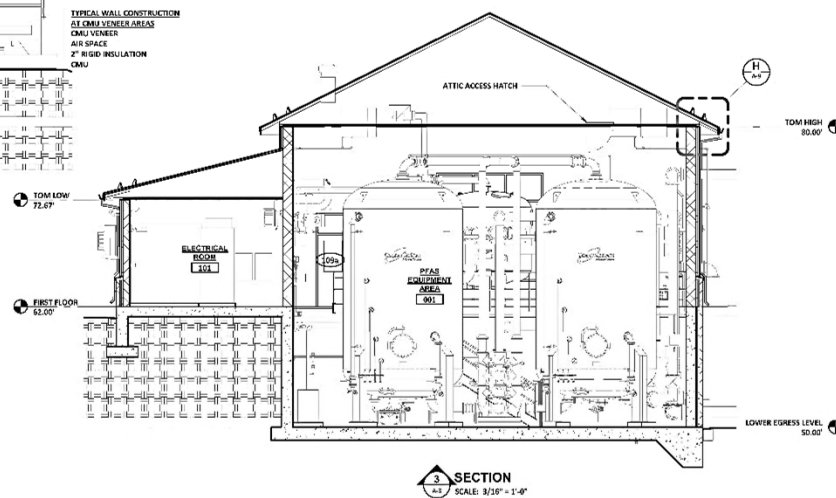
04/2022 215.54.04



TYPICAL ROOF CONSTRUCTION
 METAL ROOFING
 PLYWOOD SHEATHING
 TOP CHORD
 SPRAY FOAM INSULATION
 BOTTOM CHORD
 WOOD FURRING
 3/8" GWS
 FRP

TYPICAL WALL CONSTRUCTION AT METAL ROOF AREAS
 METAL SIDING
 METAL FURRING
 2" RIGID INSULATION
 CMU

TYPICAL WALL CONSTRUCTION AT CMU VENER AREAS
 CMU VENER
 AIR SPACE
 2" RIGID INSULATION
 CMU



REVISIONS		APPD. DATE	
NO.	DESCRIPTION	BY	DATE

PROJECT NO.	215.54.04
ISSUED FOR	BARNSTABLE
DATE	04/2022
SCALE	AS SHOWN
DESIGNER	WRIGHT-PIERCE
CHECKER	WRIGHT-PIERCE
DATE	04/2022
APPROVED	WRIGHT-PIERCE
DATE	04/2022

SECTION	A-5
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WRIGHT-PIERCE

**BARNSTABLE FIRE DISTRICT WATER DEPT
 WELL 2&5 WATER TREATMENT PLANT
 BARNSTABLE, MASSACHUSETTS**

DRAWING
A-5

We have identified:

- PFAS regulations
- Historic PFAS concentrations at the District's well supplies
- Costs to address PFAS and cost mitigations
- Water rates and annual expenditures
- Customer questions
- Design aspects of the water treatment plant

Therefore, the Water Department submits that:

Construction of a water treatment plant at Wells 2 & 5 will substantially improve water quality of drinking water for the health and safety of Barnstable Fire District customers.

Given many considerations, including tightening regulations on PFAS and growing funding demands, optimal timing to proceed is now.