Project Update:

Wells 3 Through 6
PFAS Treatment Feasibility / And Alternatives Analysis

KLEINFELDER
Bright People. Right Solutions.

Kirsten Ryan, Senior Project Manager
Kleinfelder
Boston

MILLIS
INCORPORATED FEB. 24 1885
DEPARTMENT OF PUBLIC WORKS

Project Purpose and Benefit

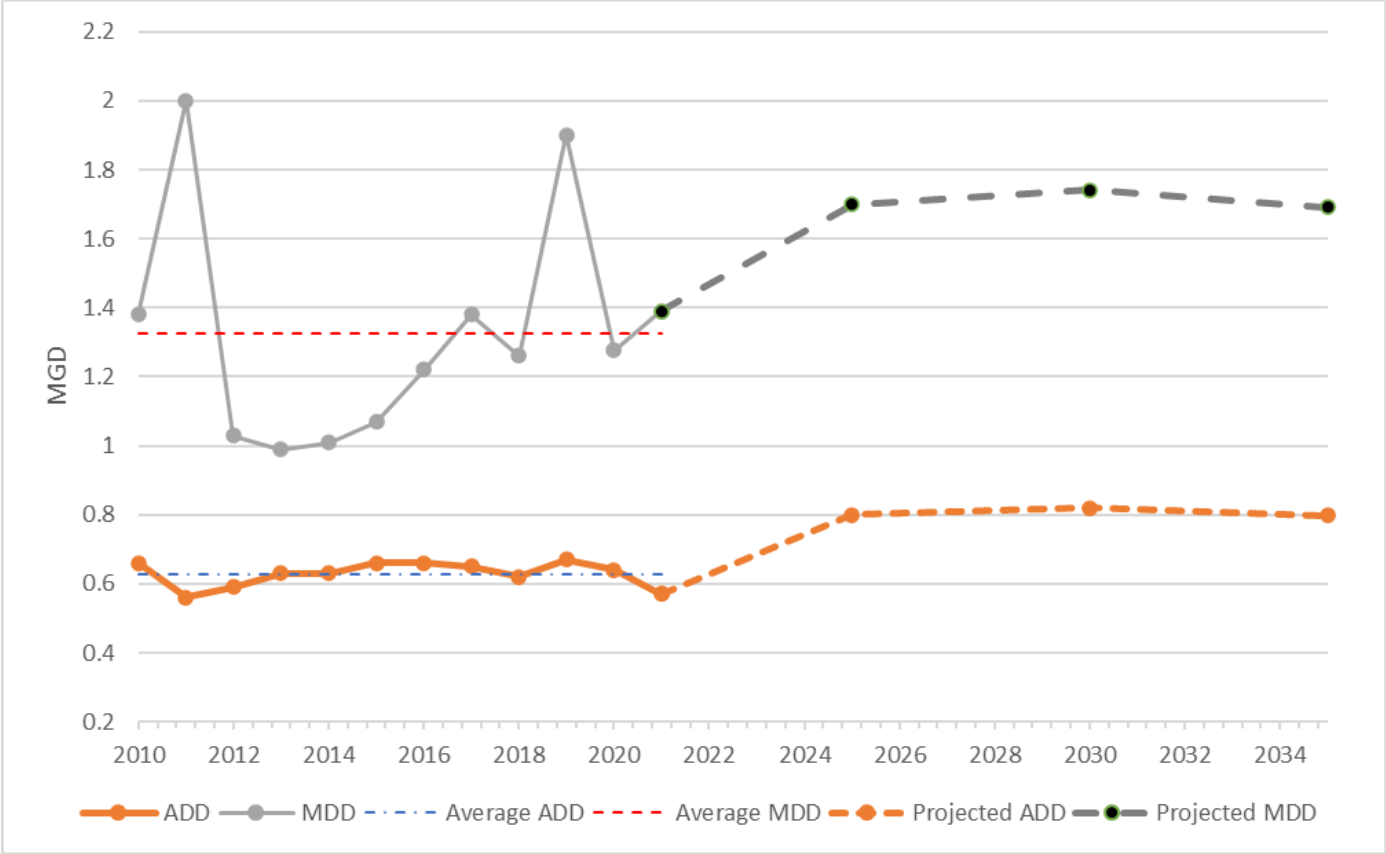
- ➢ Wells 3, 4, 5, and 6 all have PFAS detections
- ✓ Assessment of Existing Conditions each Well site.
- ✓ Recommendation for most PFAS-free supply capacity for the lowest cost and quickest timeline.
- ✓ Concept plan & budget for Millis to pursue design & construction funding.

D'Angelis PFAS Plant under construction

How much water does Millis need?

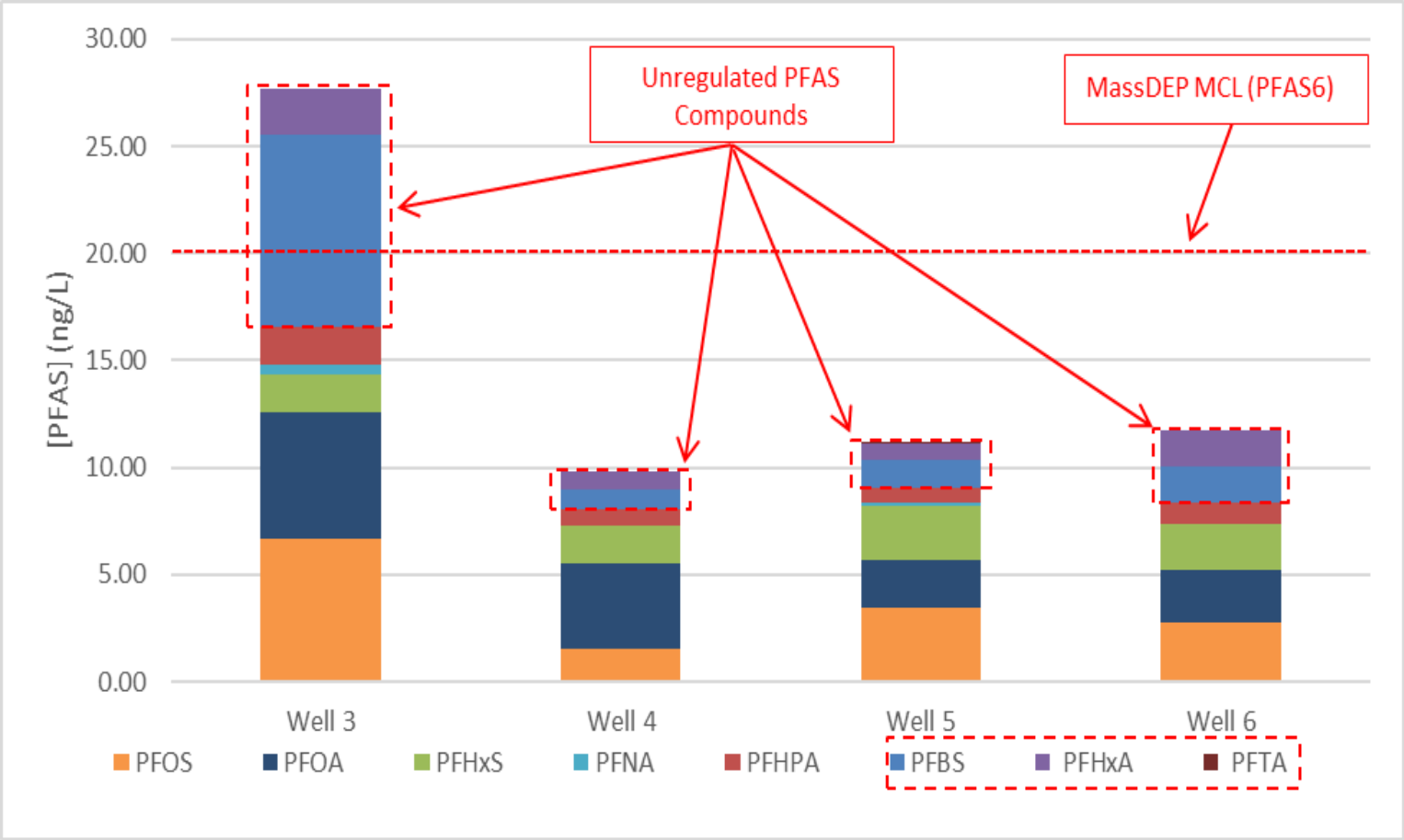
- Average Daily Demand (ADD)
  - 0.63 MGD current
  - 0.82 MGD projected 2035
- Max Daily Demand (MDD)
  - 1.33 MGD current
  - 1.69 projected 2035

➢ D'Angelis will supply 1.22 MGD;
  - Need an additional well with treatment



Water Quality

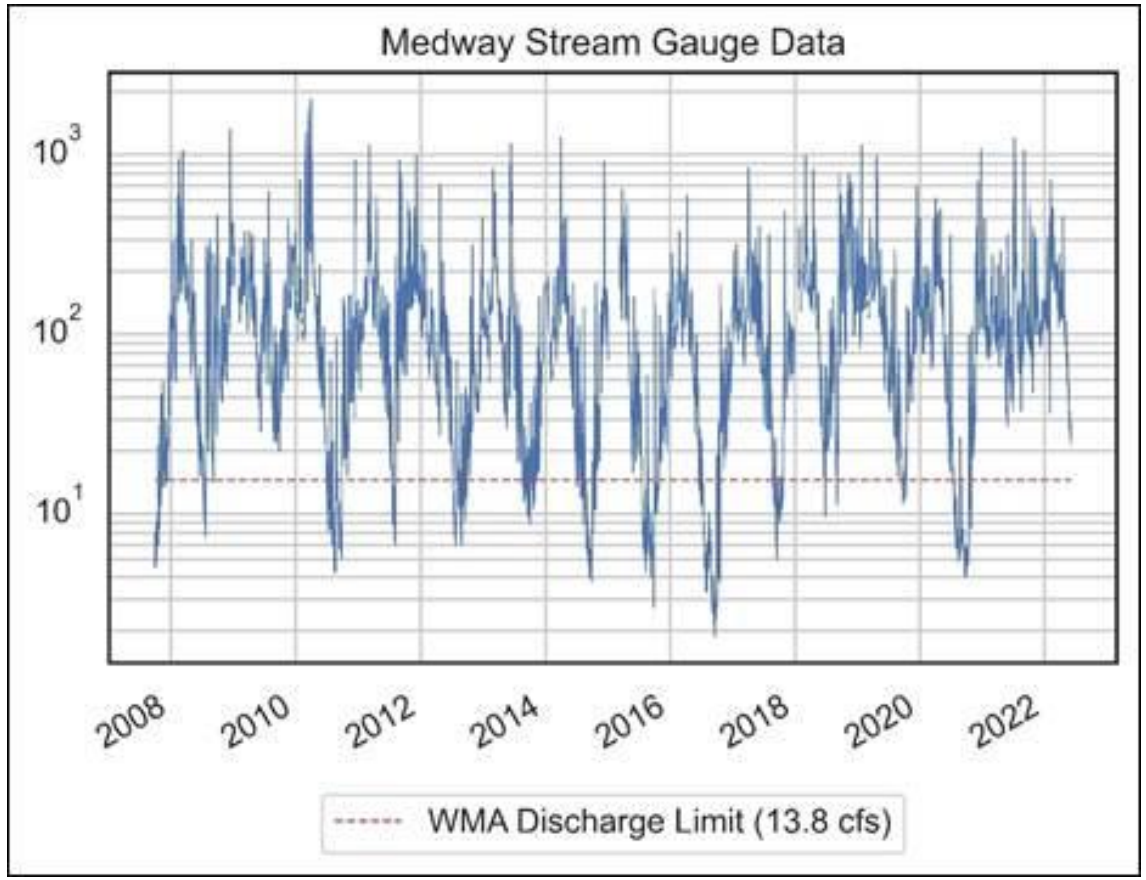
- Wells 3-6 all have detected PFAS6
- none currently exceeding the MassDEP MCL of 20 ppt
- EPA new Health Advisories (HA)
  - below current detectable levels
  - recommending install treatment if detected
  - Federal MCL expected in Fall 2023



Which well(s) do we invest in?

Supply (Cont'd)

- Most water is pumped in the summertime (May – September) with
  - Well 3 ≈ 5.26MG per month
  - Wells 5&6 providing ≈5.64 MG month
  - Wells 5&6 has WMA restrictions tied to stream gauge and cannot pump when baseflow is below 13.8 cfs
- 13 of past 15 years, stream has fallen below and restricted use for an average of 44 days per year (June – November)



Conclusion: Treating Wells 5& 6 by expanding the Paine WTP is not sufficient to meet future summer MDD

Water Quality – Other Contaminants

- Wells 4 has elevated levels of Manganese
- Well 4 will need treatment for Fe/Mn in addition to PFAS
- This will increase cost compared to Well 3 treatment

Table 3-5: Water Quality Summary of Wells 3-6

Analyte	Unit	Regulatory Limit	Well 3	Well 4	Well 5	Well 6
Alkalinity, Total	mg/L as $CaCO_3$	-	80.67	119.00	63.88	68.75
Aluminum	mg/L	.05-2 *	0.01	0.02	0.03	0.01
Barium	mg/L	2 (1)	0.03	0.02	0.02	0.02
Calcium	mg/L	-	29.67	28.40	15.98	17.06
Chloride	mg/L	250*	122.57	17.58	44.25	44.52
Copper	mg/L	1.3 (1)	0.02	0.06	0.16	0.08
Fluoride	mg/L	4 (1)	0.80	0.61	0.93	0.81
Hardness, Total	mg/L as $CaCO_3$	-	98.70	108.33	80.70	68.43
Iron	mg/L	0.3*	0.00	0.15	0.00	0.00
Magnesium	mg/L	-	6.78	8.11	5.14	5.39
Manganese	mg/L	0.05*	0.00	0.15	0.00	0.01
Nitrate	mg/L	10 (1)	2.46	1.80	0.42	0.61
Nitrite	mg/L	10 (1)	0.00	0.00	0.00	0.00
Odor	c.u.	3*	0.82	0.83	0.75	0.75
Perchlorate	ug/L	2 (1)	0.06	0.08	0.08	0.08
PFAS6	ng/L	20*	13.59	5.19	6.96	4.24
pH	s.u.	6.5-8.5*	7.75	7.22	7.53	7.48
Potassium	mg/L	-	2.45	2.72	1.57	1.54
Sodium	mg/L	20*	70.91	27.17	34.73	29.94
Sulfate	mg/L	250*	12.13	9.10	10.31	10.99
Total Dissolved Solids	mg/L	500*	294.55	173.00	172.50	174.75
Turbidity	mg/L	-	0.03	0.50	0.11	0.05
Zinc	mg/L	5*	0.01	0.01	0.01	0.01
Volatile Organic Compounds (Total)						
1,1-Dichloroethane	ug/L	7 (2)	---	0.1	---	---
1,2-Dichloroethane	ug/L	5 (1)	0.06	0.075	---	---
Bromodichloromethane	ug/L	-	---	0.231	---	---
Bromoform	ug/L	-	---	0.277	---	---
Chlorodibromomethane	ug/L	-	0.042	0.392	0	0.102
Chloroform	ug/L	7 (2)	0.319	0.266	---	---
Cis-1,2-Dichloroethylene	ug/L	7 (1)	---	0.085	---	---
Dibromoethane	ug/L	-	---	0.142	---	---
Dichloromethane	ug/L	5 (1)	---	1.038	---	---
Methyl Tertiary Butyl Ether	ug/L	70 (2)	0.067	---	---	---
Tetrachloroethylene	ug/L	5 (1)	0.093	---	---	---
Trichloroethylene	ug/L	5 (1)		0.067	---	---
Vinyl Chloride	ug/L	2 (1)	0.00	0.00	0.00	0.00
Synthetic Organic Compounds (Total)						
Dinoseb	ug/L	7 (1)	---	0.2	---	---

(1) - Massachusetts Maximum Contaminant Level
(2) - Office of Research and Standard Guidelines
** - Secondary Maximum Contaminant Level*

Alternatives Evaluation

Evaluated supply capacity, cost, O&M, resiliency, site suitability and constraints, permitting:

Alternatives:	Evaluation Findings
1. CENTRALIZED TREATMENT FACILITY	Projected Demand does not require all wells to be treated. Single property would be difficult to find, new transmission mains for multiple wells significant additional cost.
2. TREATMENT AT A SINGLE SELECTED WELL SITE	**a) Well 3 – least costly, no restrictions of flow due to WMA permitting** b) Well 4 – WQ suggests it would need additional treatment for Fe/Mn, beyond GAC for PFAS removal; wetlands at site limit available space c) Well 5/6 – largest combined source, but has restrictions on flow in summer when needed most
3. ~~INTERCONNECTION OR PURCHASE ALTERNATIVE~~	ELIMINATED - won't meet redundancy needs, may have water quality compatibility issues related to corrosion, ability of neighbors to supply is uncertain, more costly than Alt 2.
4. ~~NO ACTION~~	ELIMINATED - won't meet water quality and demand needs

Alternatives Evaluation - Estimated Costs

Preliminary/order of magnitude cost comparison of Alternative 2 individual Plants

- **Based upon cost of D'Angelis facility**

Treatment Facility	Permitted Capacity	Estimated Capital Cost
George D'Angelis (Wells 1&2)	*1.22 MGD*	*$6.2 Million*
Village Street (Well 3)	**0.75 MGD**	**$6-6.5 Million**
South End Pond (Well 4)	0.86 MGD	$7-7.5 Million
Paine (Well 5&6)	1.5 MGD	$9-9.5 Million

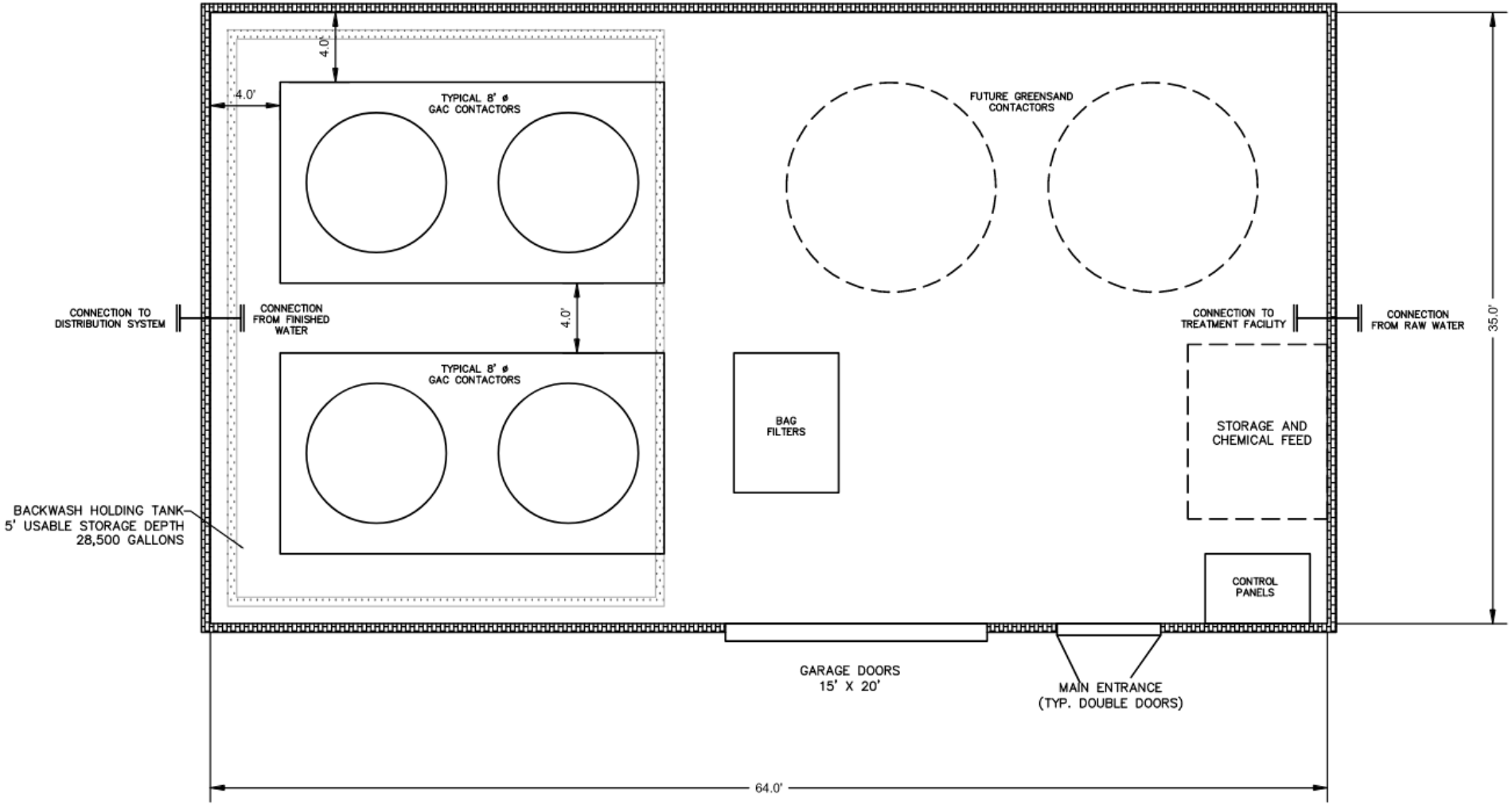
Costs are for comparison purposes only.
Not for budgeting.

Alternative Evaluation - Scoring

- Alternative Scoring – highest score is best alternative.

	Capital Cost	Water Supply Volume	O&M Costs	Resiliency	Site Suitability	Permitting and Environmental Impact	Score
Weight (%)	*35*	*30*	*20*	*5*	*5*	*5*	*100*
Alternative 1	9	30	5	5	1	1	52
Alternative 2a. Well 3	35	8	20	5	3	5	76
Alternative 2b. Well 4	27	15	10	5	2	5	64
Alternative 2c. Well 5&6	18	23	15	3	5	5	69

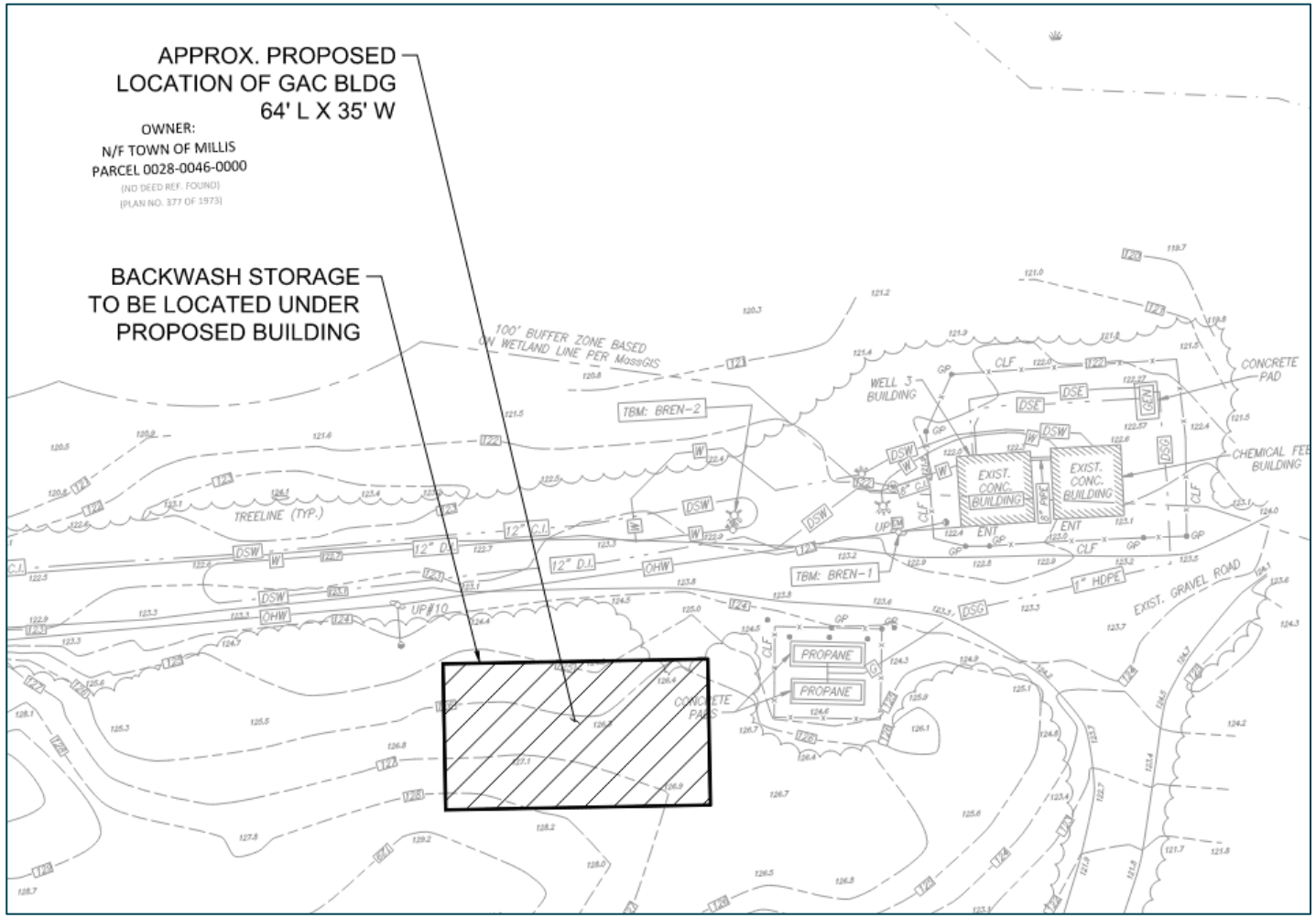
Well 3 – Proposed Equipment Layout



- Similar concept as for D'Angelis
- Bag filters for pre-treatment
- 4 x 8' diameter GAC contactors (2 trains)

- Upgrades to pumps, electrical, and chemical feed systems
- Leave space to add future filters for Fe, Mn if needed.

Well 3 – Proposed Site Layout



Well 3 - Next Steps & Schedule

Town Meeting Article for Piloting & Prelim Design: $165,000	Nov 2022
Pilot Testing & Preliminary Design Report	Dec ‘22-Mar 2023
Town Meeting Article for Final Design	May 2023
Final Design and Permitting (100%)	May-Oct 2023
Town Meeting Article for Construction Funds	Nov 2023
Bidding	Dec ‘22 -Feb 2023
Construction Start	Spring 2024
Plant Start up and Commissioning	Summer 2025

Currently this project is not eligible for PFAS subsidies for design via MassDEP State Revolving Funds.

Only sources exceeding 20ppt regulated PFAS6 compounds are currently eligible for SRF Emergency Financing with 0% loan.

This schedule <u>does not</u> assume SRF Funding sought. SRF Loan could potentially provide some principal forgiveness for PFAS projects, but the level of subsidy is currently unknown. Seeking SRF funding would extend the schedule by about 12 months and also add procurement complexity (e.g. BABA or waiver)