

WATER UTILITY BOARD MEETING

WELL 15 PFAS TREATMENT PROJECT

OCTOBER 26, 2022

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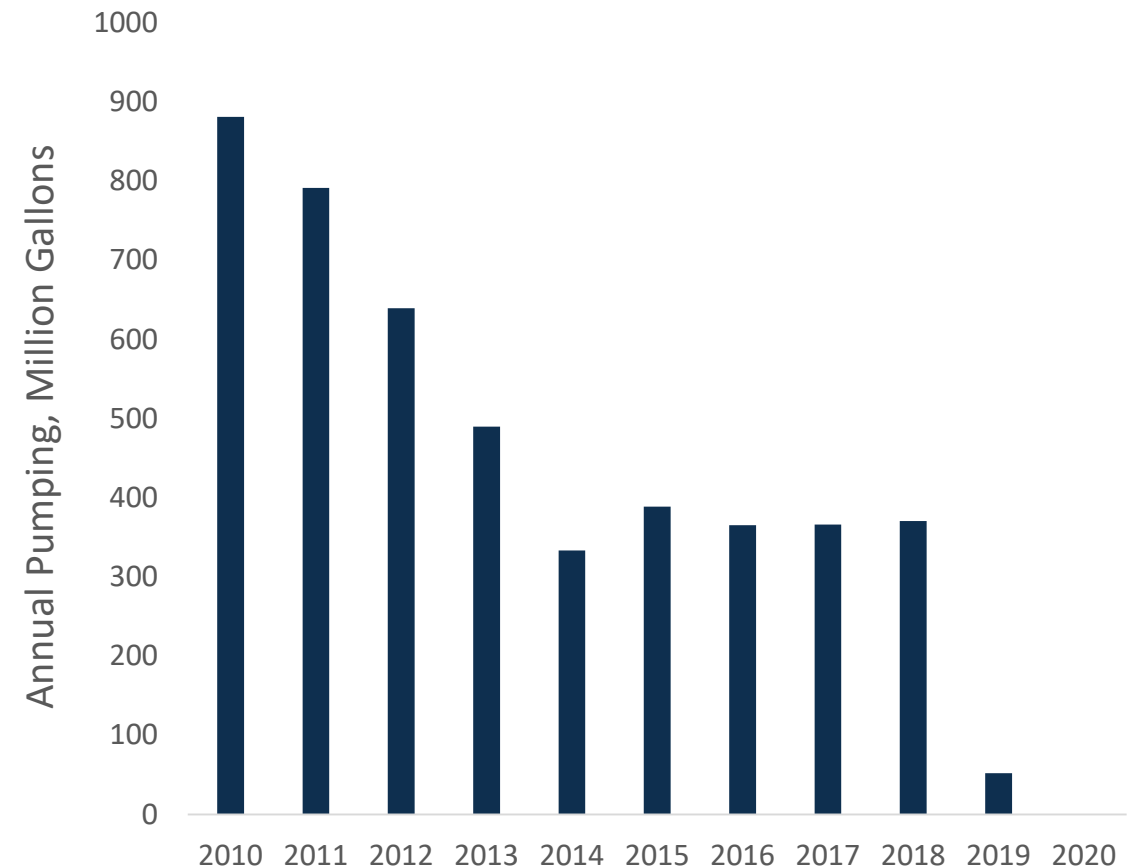


AECOM

BACKGROUND

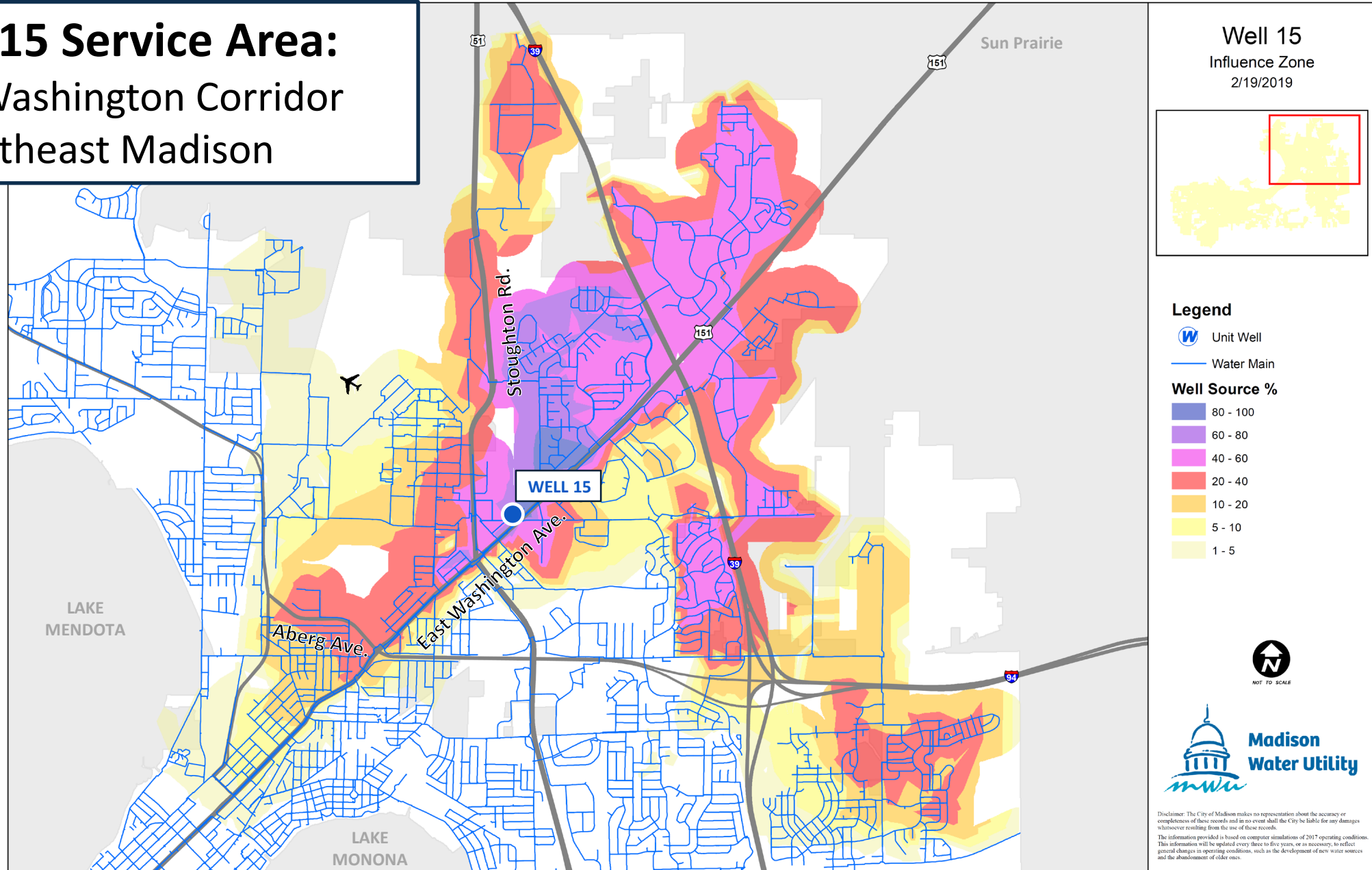


- Well constructed in **1965**
- Workhorse on Madison's East Side
 - Up to 1 billion gallons per year
- Air Stripper installed in **2013** (\$2.3M)
 - Removes VOC contaminants
- PFAS detected in **2017**
- Well shut down in early **2019**

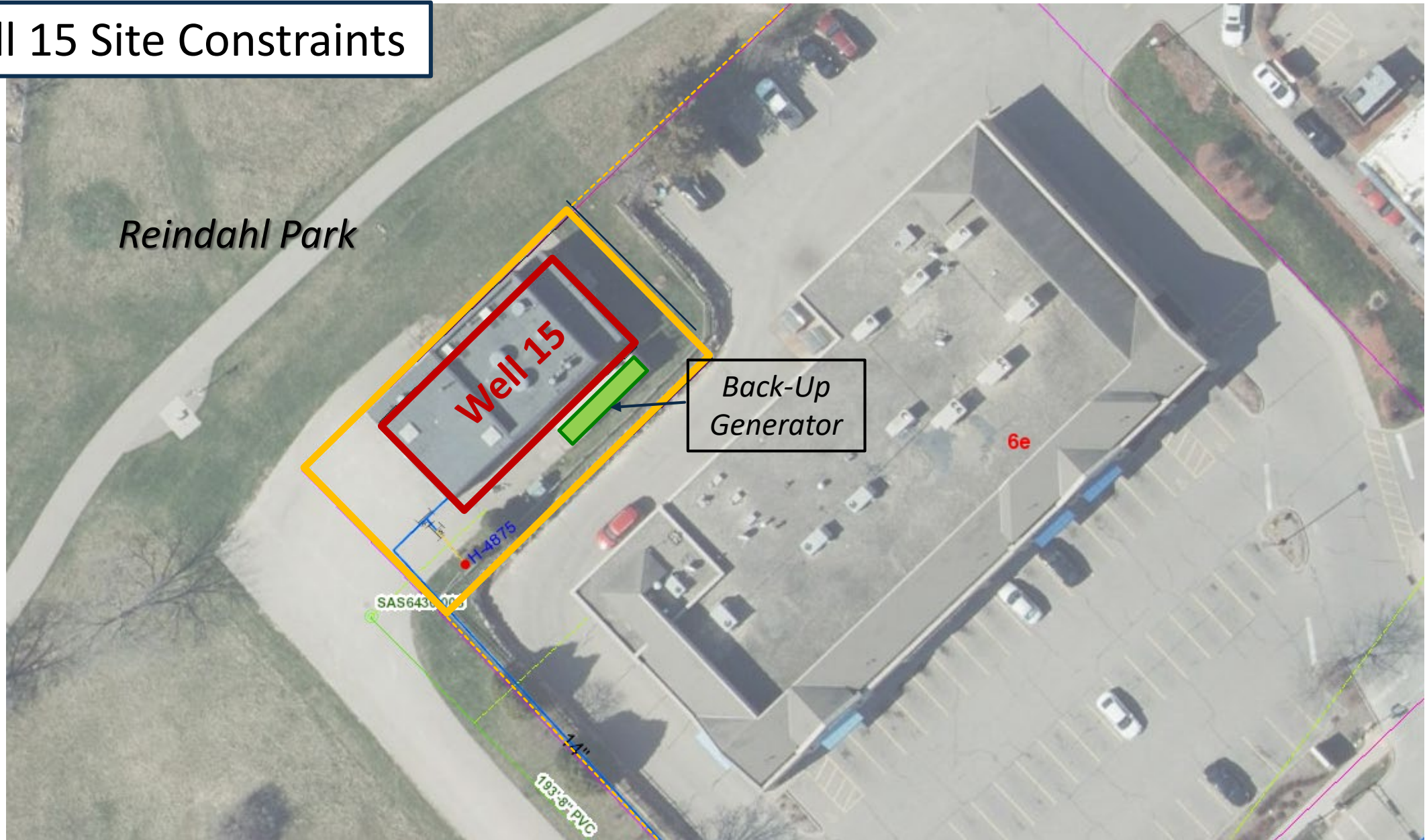


Well 15 Service Area:

- E. Washington Corridor
- Northeast Madison

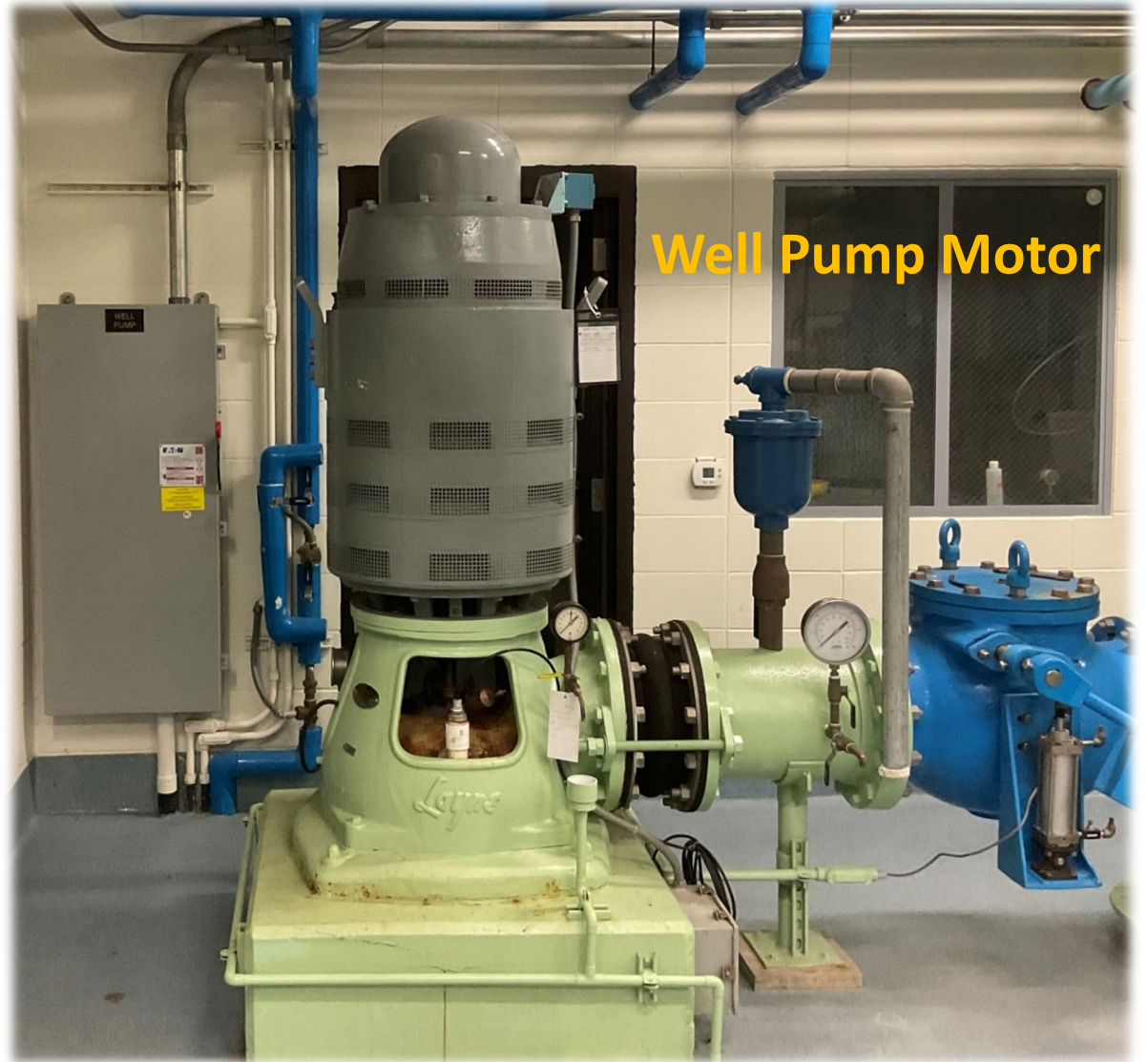


Well 15 Site Constraints





Madison Well 15

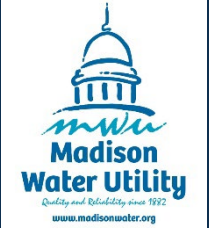


Well Pump Motor



Air Stripper

TREATMENT OBJECTIVES



■ Contaminants Targeted for Removal:

- Per and Polyfluoroalkyl Substances (PFAS) – PFOA & PFOS
- Volatile Organic Compounds (VOC) – PCE & TCE

■ Required Treatment Objectives:

- Non-detect for PFOA & PFOS and all other PFAS chemicals analyzed
- Non-detect for PCE & TCE (two VOCs)
- Meet all WI DHS PFAS guidance including a Hazard Index value that is <1
- Meet all federal and state drinking water regulations

VOC Removal Options

- Air Stripper [Existing]
- Granular Activated Carbon (GAC) media

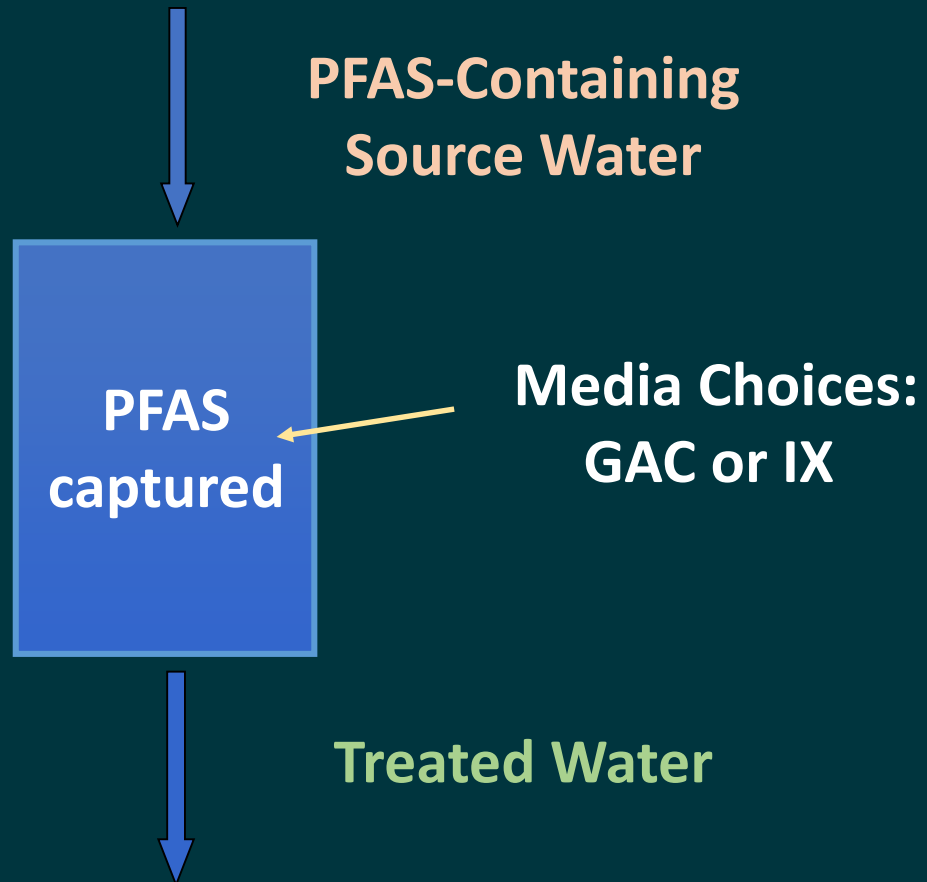


PFAS Removal Options

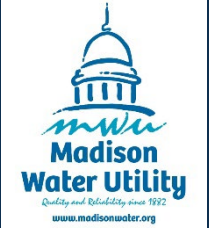
- Media
 - Granular Activated Carbon
 - Ion Exchange (IX) Resin
- Other Technologies
 - Membranes (Reverse Osmosis)
 - Other emerging technologies



PFAS Removal Process



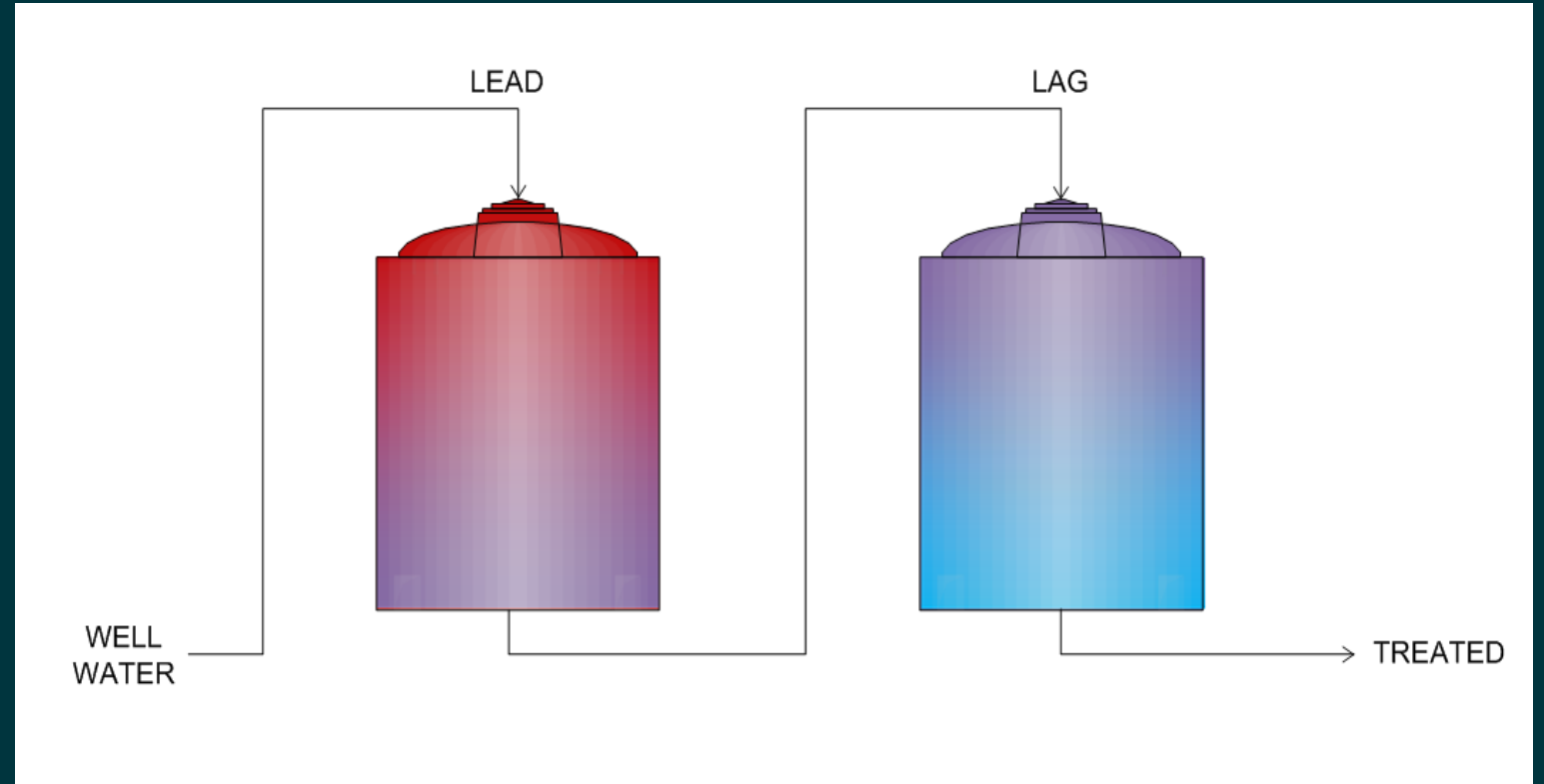
BENCH SCALE TEST RESULTS



- Four adsorbent media (2 GAC & 2 IX) reduced all PFAS chemicals to non-detectable levels
- GAC media will require earlier and more frequent replacement than IX resin
- Both GAC media removed VOCs for the entirety of the test

Typical PFAS Removal System Layout

- Two vessels in series
- Optimizes use of media
- Frequency of media change reduced



TREATMENT ALTERNATIVES



Installed Within Existing Building Footprint:

1. GAC → GAC (4 vessels)
2. GAC → IX (4 vessels)

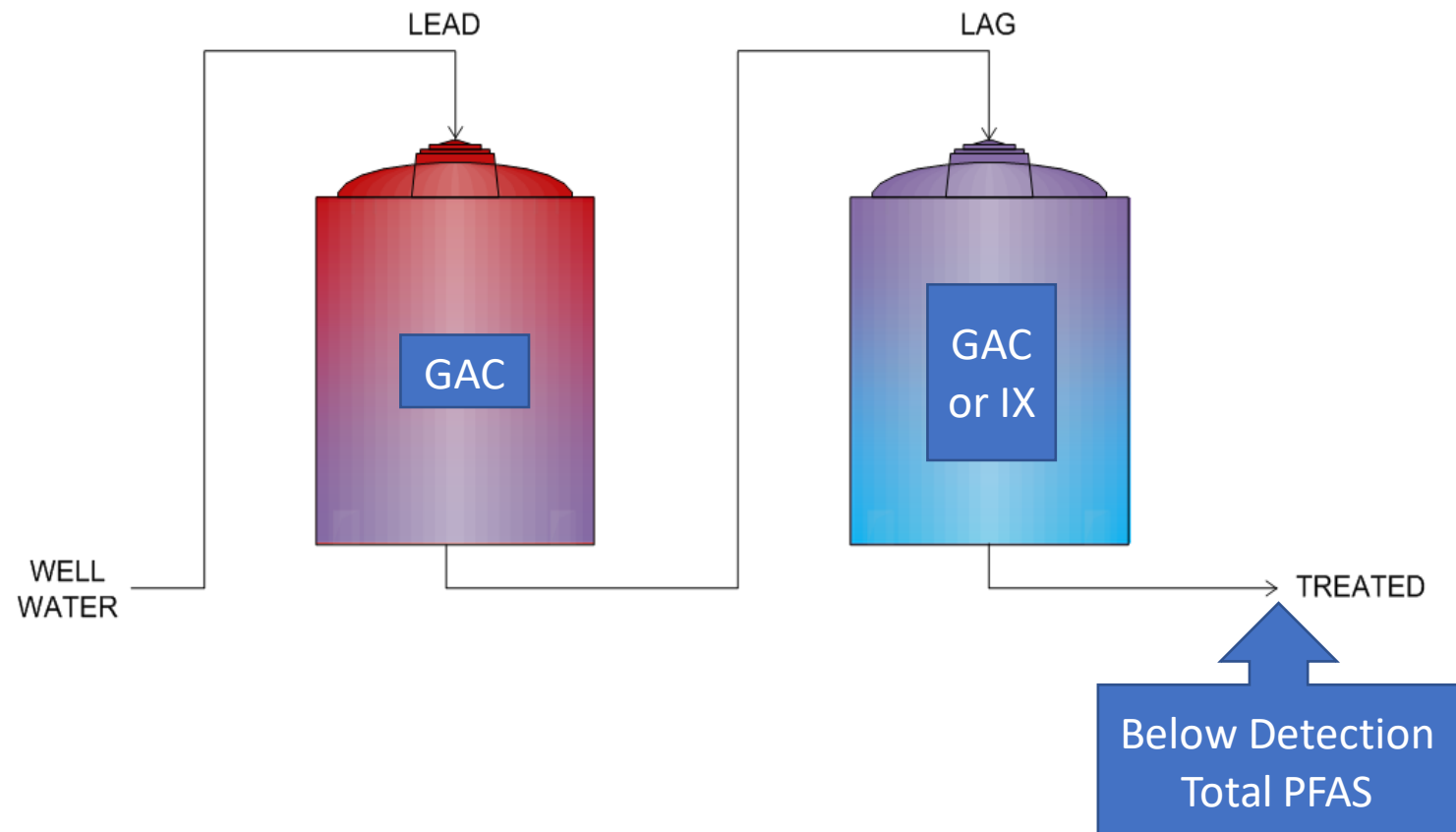
Footprint Expansion Would be Required:

3. Air Stripping → IX → IX (4 vessels)
4. GAC → IX → IX (6 vessels)
5. GAC → GAC → IX (6 vessels)

Media Types:

1. **GAC** = Granular Activated Carbon
2. **IX** = Ion Exchange

TREATMENT ALTERNATIVES

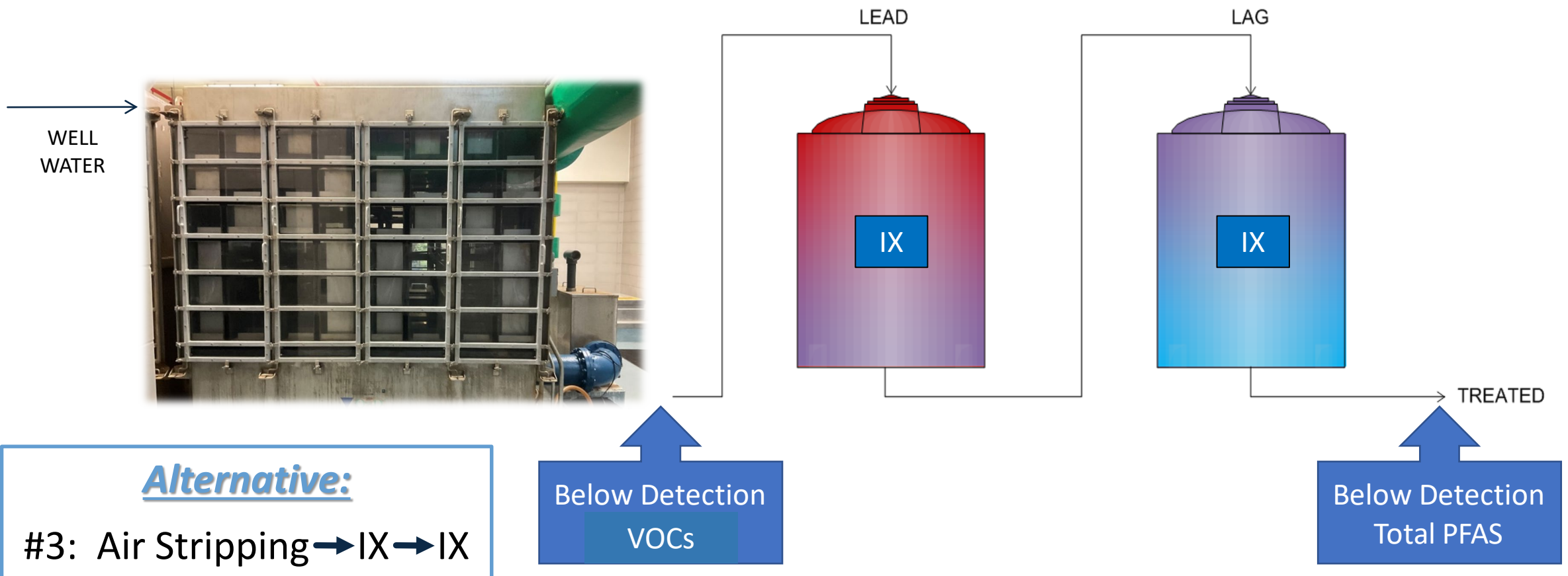


Alternatives:

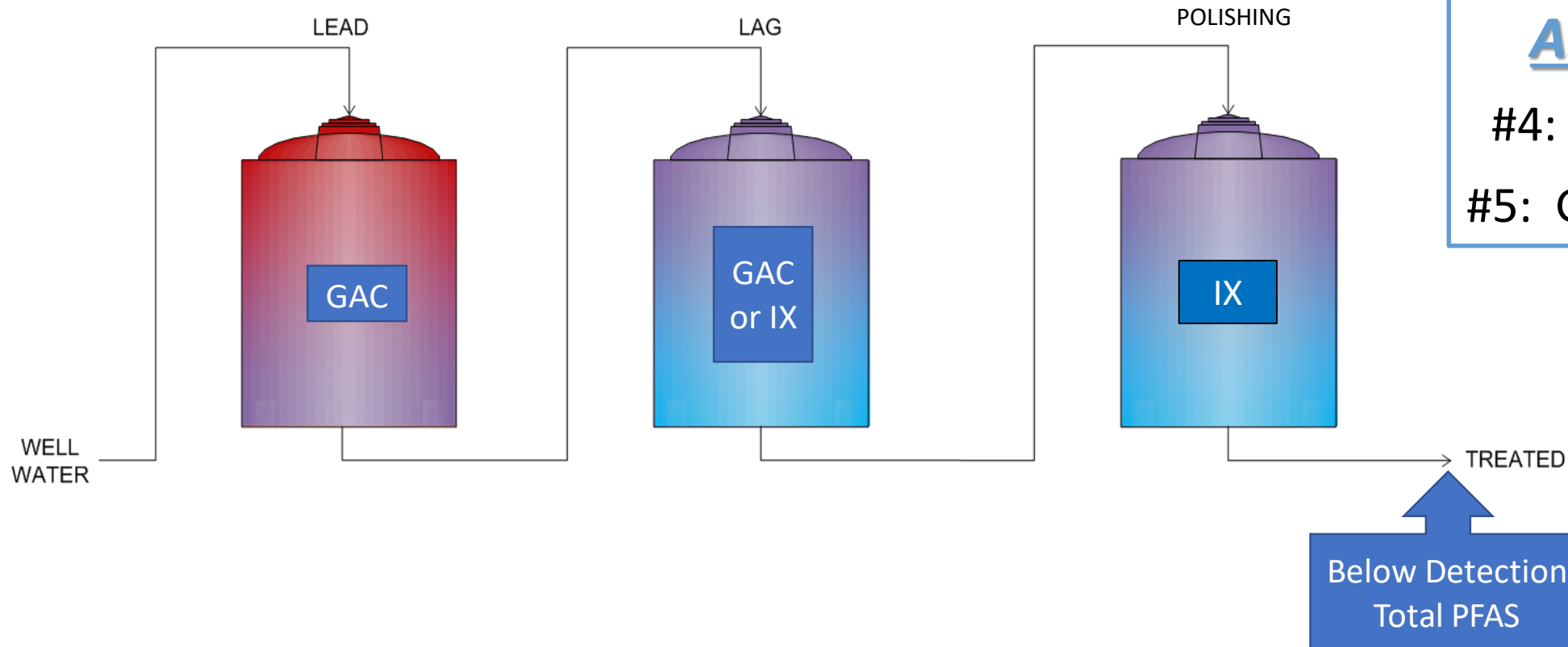
#1: GAC → GAC

#2: GAC → IX

TREATMENT ALTERNATIVE



TREATMENT ALTERNATIVES



Alternatives:

#4: GAC → IX → IX

#5: GAC → GAC → IX

ESTIMATED COST COMPARISON



	<i>Within Existing Building Footprint</i>		<i>Footprint Expansion Would be Required</i>		
Treatment Alternative	#1	#2	#3	#4	#5
	GAC → GAC	GAC → IX	Air Stripping → IX → IX	GAC → IX → IX	GAC → GAC → IX
Estimated Capital Costs	\$5.0 M	\$4.6 M	\$5.0 M	\$5.7 M	\$6.1 M
Est Annual Operating Costs	\$0.3 M	\$0.3 M	\$0.4 M	\$0.4 M	\$0.4 M
Net Present Value of 25 Years of Operating Costs	\$3.1 M	\$3.5 M	\$4.5 M	\$4.3 M	\$3.8 M
25-Year Life Cycle Cost	\$8.1 M	\$8.1 M	\$9.5 M	\$10.0 M	\$9.9 M

GAC = Granular Activated Carbon

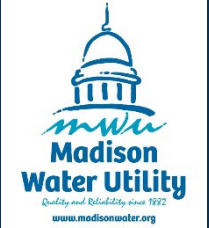
IX = Ion Exchange

ALTERNATIVE SELECTION DISCUSSION



- Bench-scale testing demonstrated the **exceptional performance of IX**; however, IX resins do not remove VOCs
- **GAC** was shown to remove VOCs and PFAS albeit for a smaller volume of water, resulting in **more waste generation** due to **frequent media replacement**
- **IX and GAC** in combination **leverages complementary benefits** that will:
 - Remove PFAS and VOCs for a longer duration
 - Avoid the need to expand building footprint
 - Reduce solid waste generation from treatment
 - Provide the most cost-effective treatment solution

PROJECT SCHEDULE

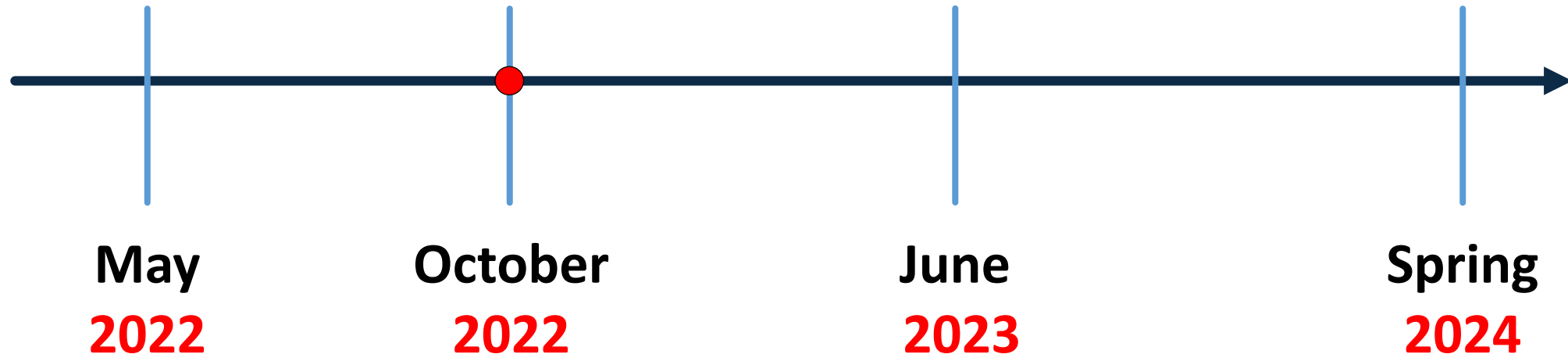


AECOM contract:
bench scale testing,
alternatives analysis,
construction design

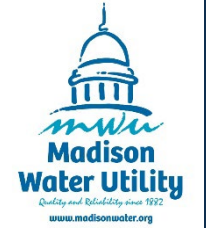
Bench scale test
and **preliminary
design report**

**Final construction
design:** detailed
plans and specs

Begin construction
of PFAS treatment
facility



STAFF RECOMMENDATION



Staff Recommendation:

Alternative #2 to be approved by the Board