

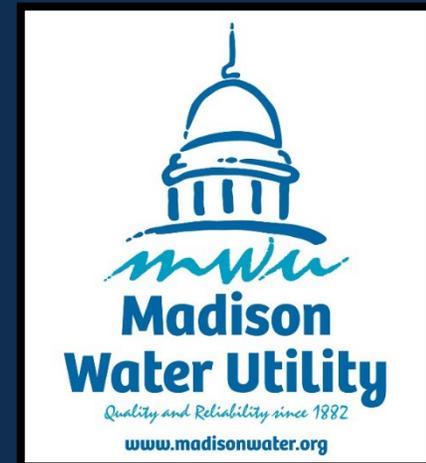
WATER UTILITY BOARD MEETING

WELL 15 PFAS TREATMENT PROJECT

OCTOBER 26, 2022

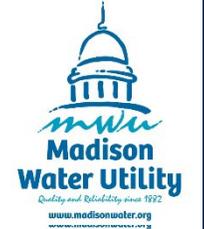
Joe Grande, MWU Project Manager

Angel Gebeau, AECOM Project Engineer

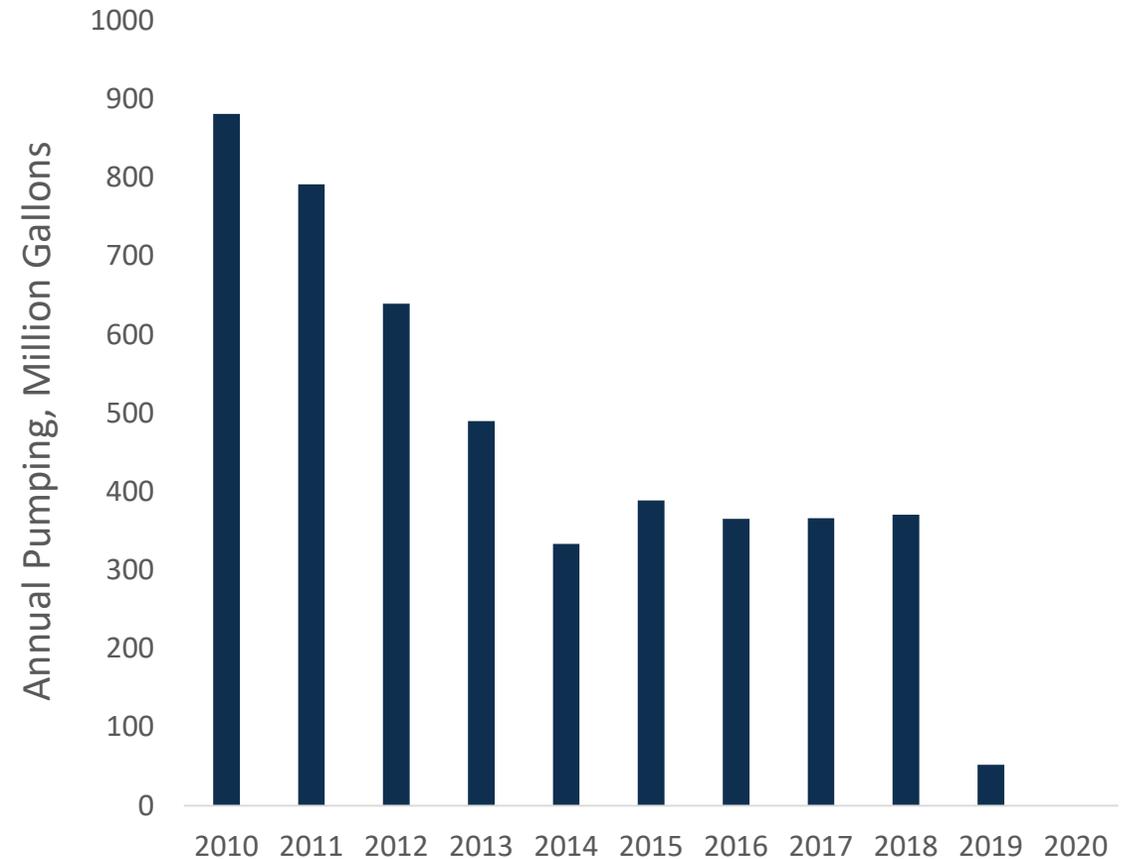


AECOM

BACKGROUND

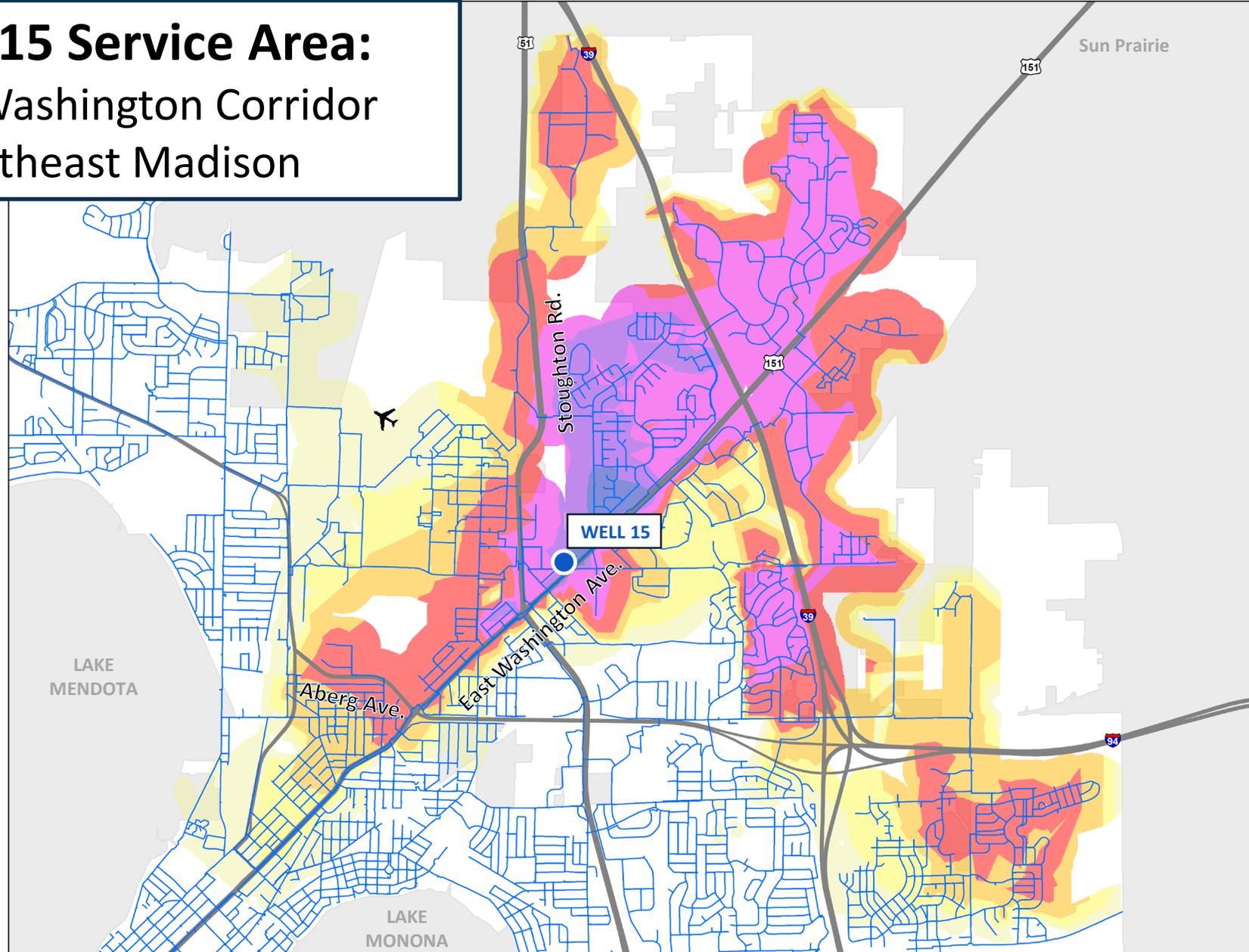


- Well constructed in **1965**
- Workhorse on Madison's East Side
 - Up to 1 billion gallons per year
- Air Stripper installed in **2013** (\$2.3M)
 - Removes VOC contaminants
- PFAS detected in **2017**
- Well shut down in early **2019**

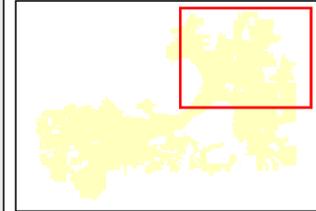


Well 15 Service Area:

- E. Washington Corridor
- Northeast Madison



Well 15
Influence Zone
2/19/2019



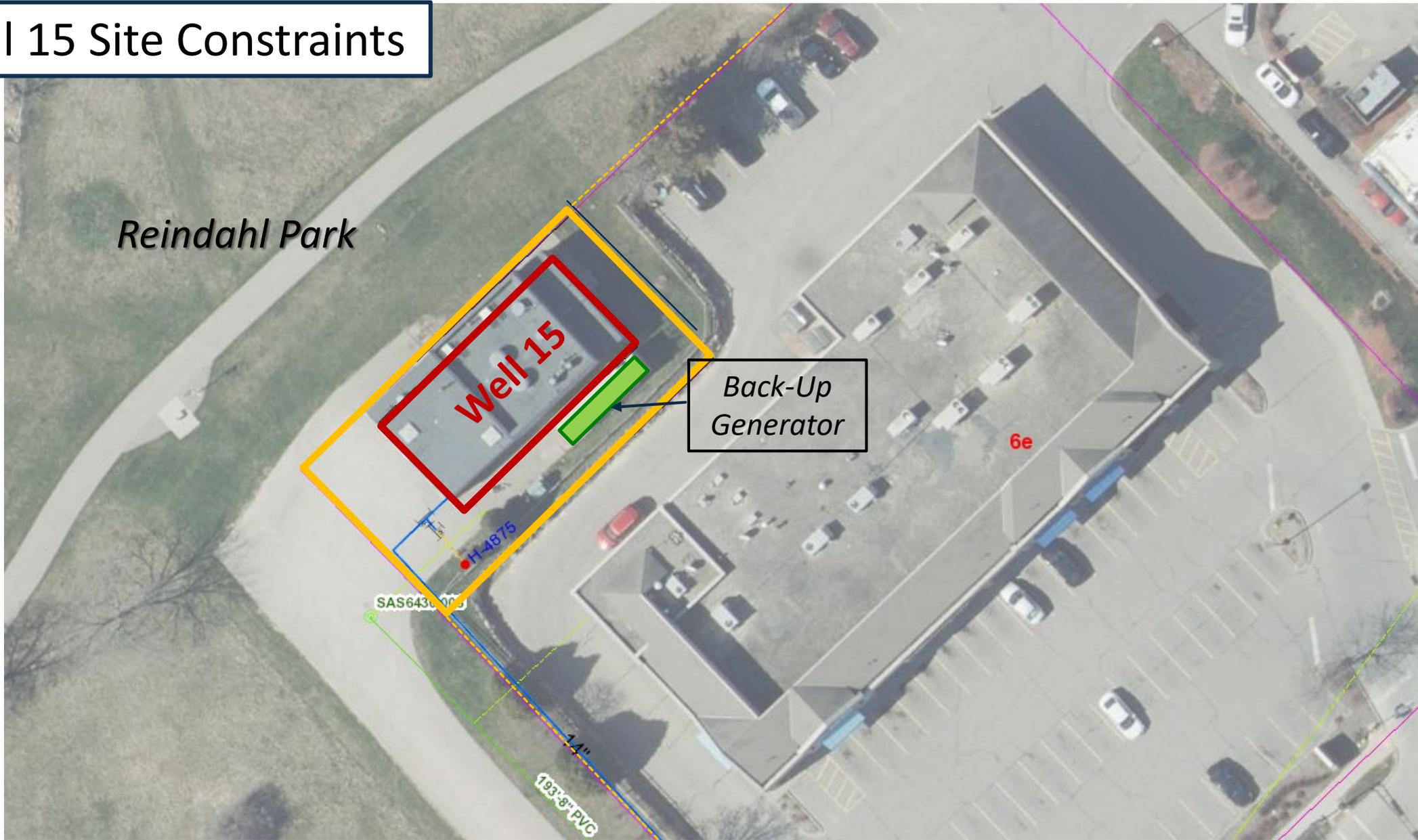
Legend

- Unit Well
- Water Main
- Well Source %**
 - 80 - 100
 - 60 - 80
 - 40 - 60
 - 20 - 40
 - 10 - 20
 - 5 - 10
 - 1 - 5



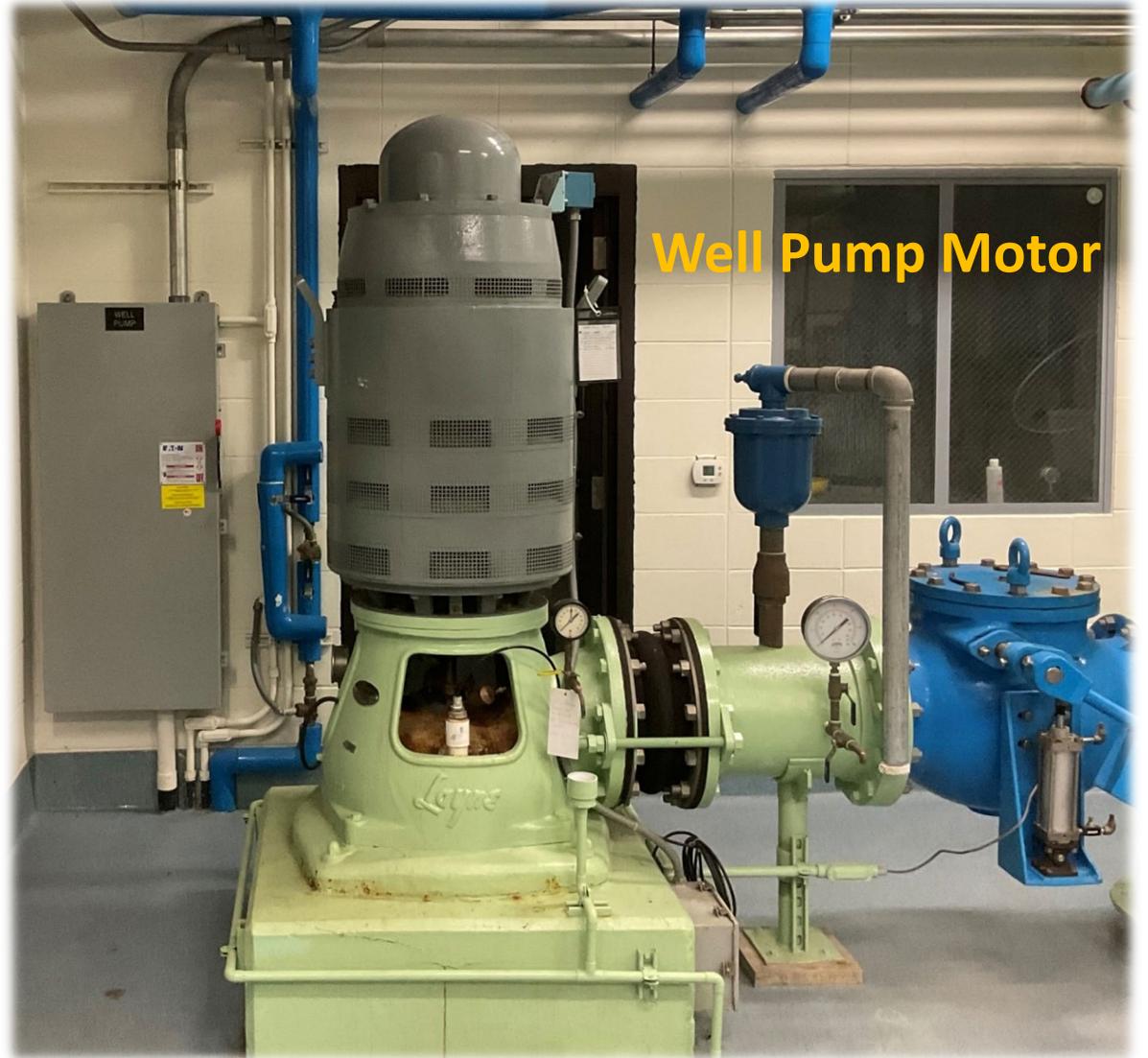
Disclaimer: The City of Madison makes no representation about the accuracy or completeness of these records and in no event shall the City be liable for any damages whatsoever resulting from the use of these records. The information provided is based on computer simulations of 2017 operating conditions. This information will be updated every three to five years, or as necessary, to reflect general changes in operating conditions, such as the development of new water sources and the abandonment of older ones.

Well 15 Site Constraints





Madison Well 15

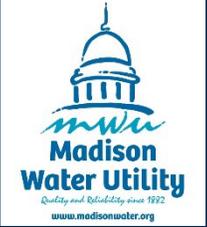


Well Pump Motor



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

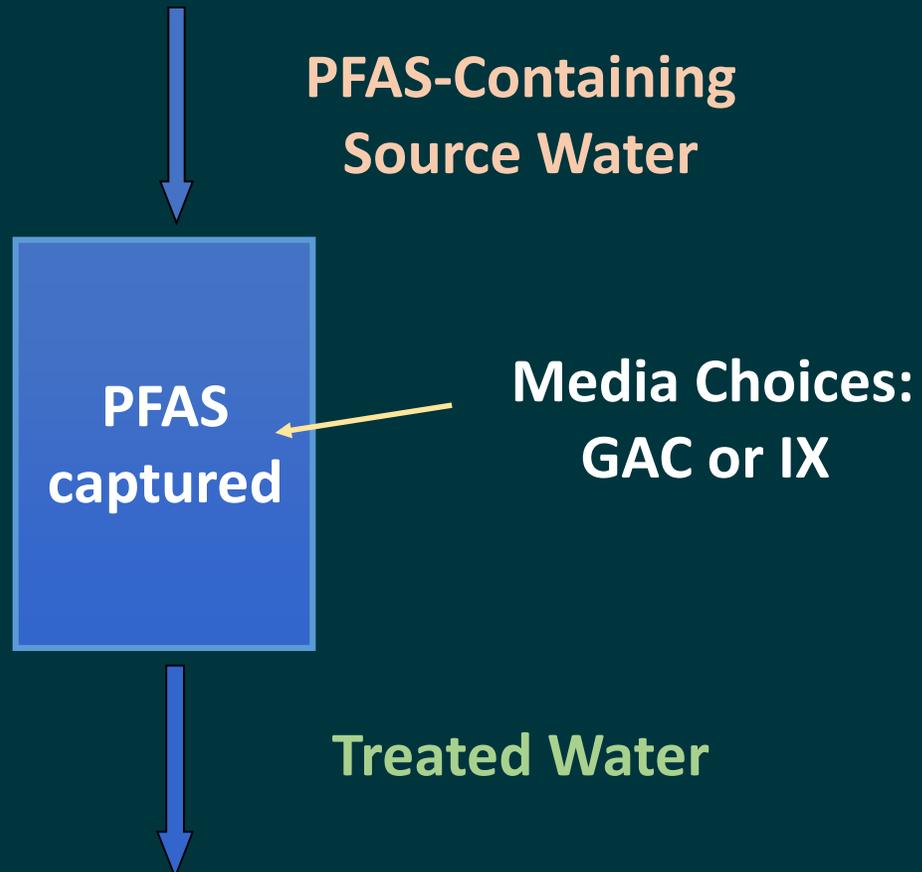
- Air Stripper [Existing]
- Granular Activated Carbon (GAC) media

PFAS Removal Options

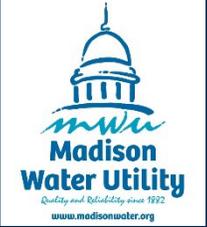
- Media
 - Granular Activated Carbon
 - Ion Exchange (IX) Resin
- Other Technologies
 - Membranes (Reverse Osmosis)
 - Other emerging technologies



PFAS Removal Process



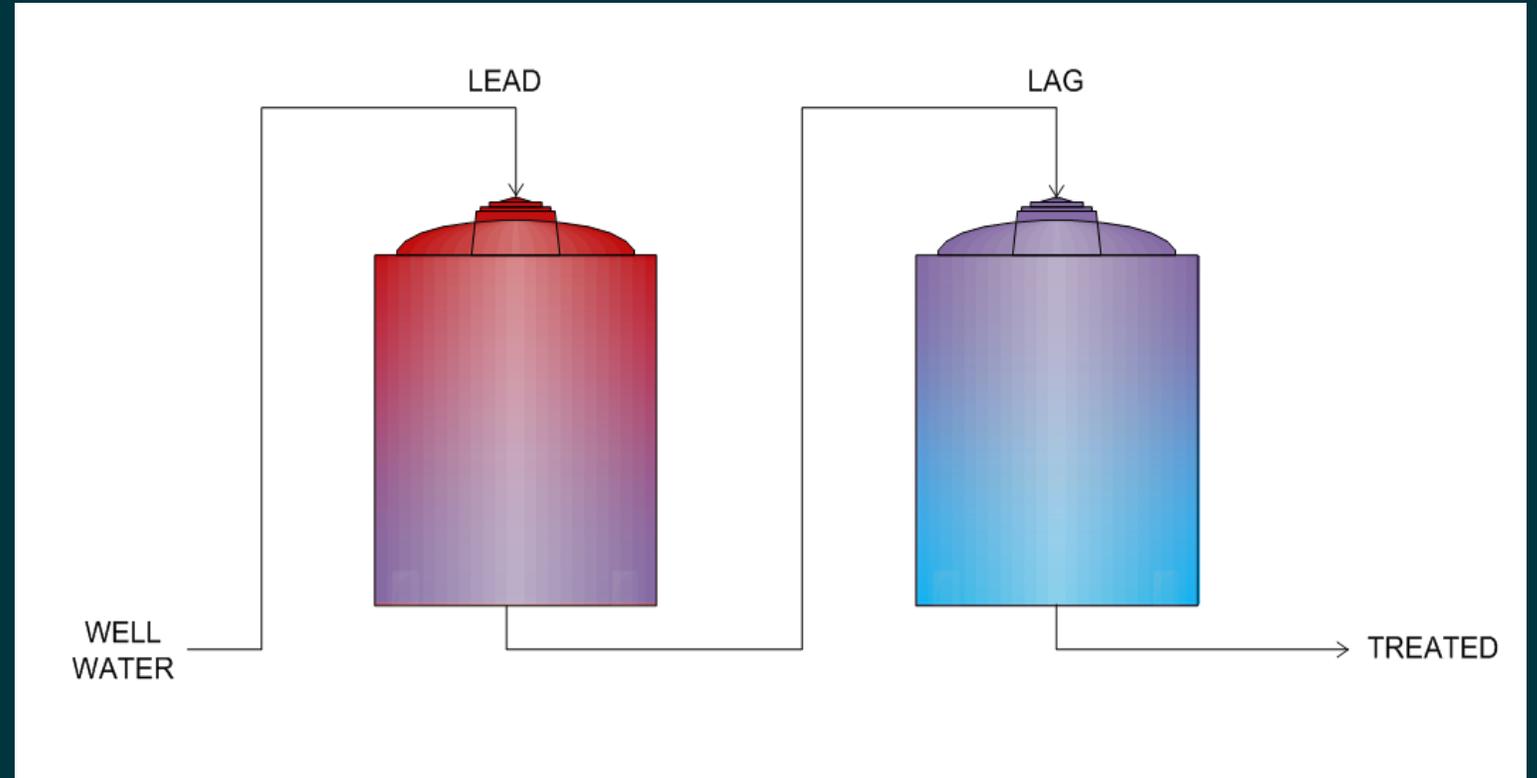
BENCH SCALE TEST RESULTS



- 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)

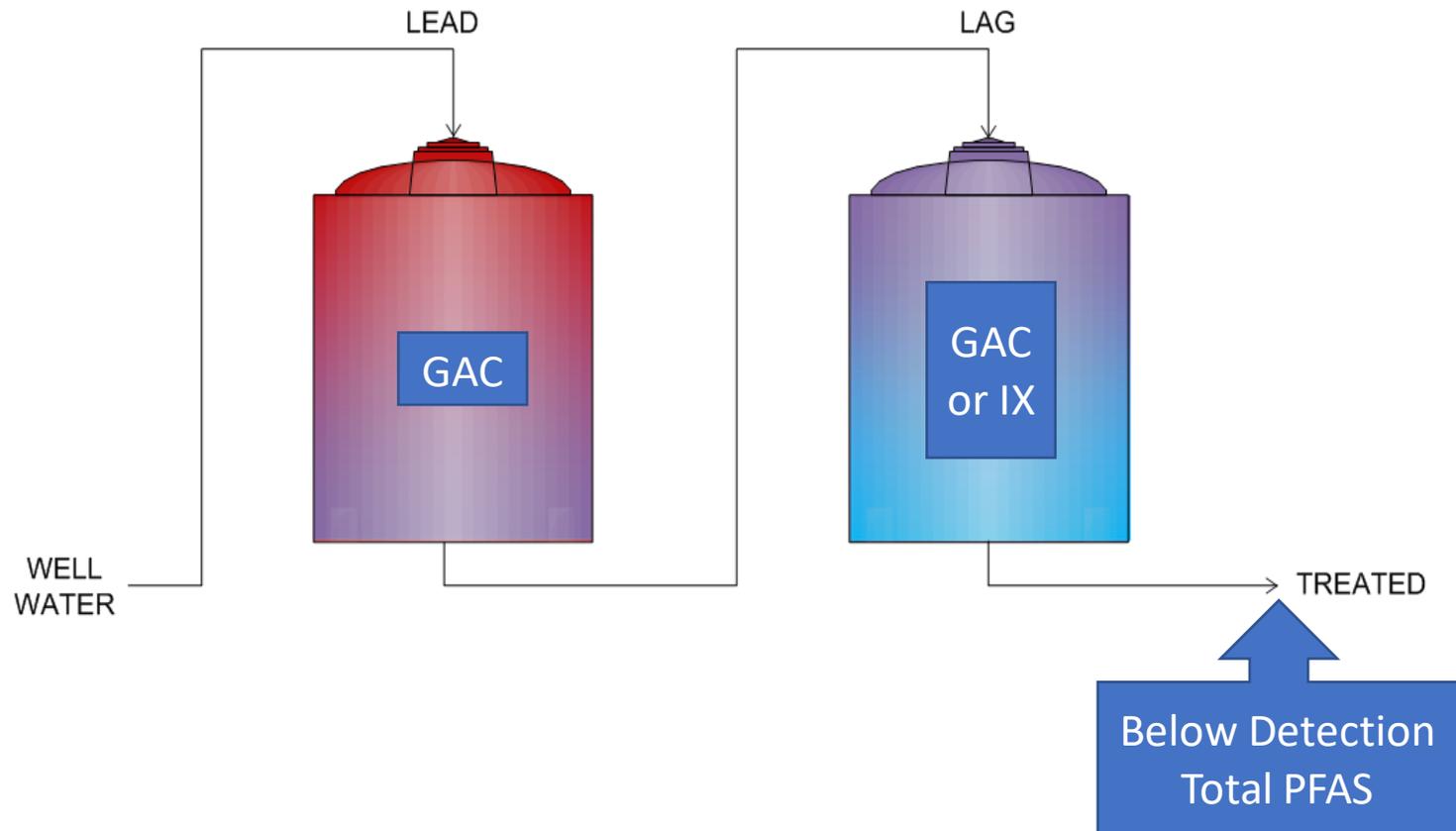
Footprint Expansion Would be Required:

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

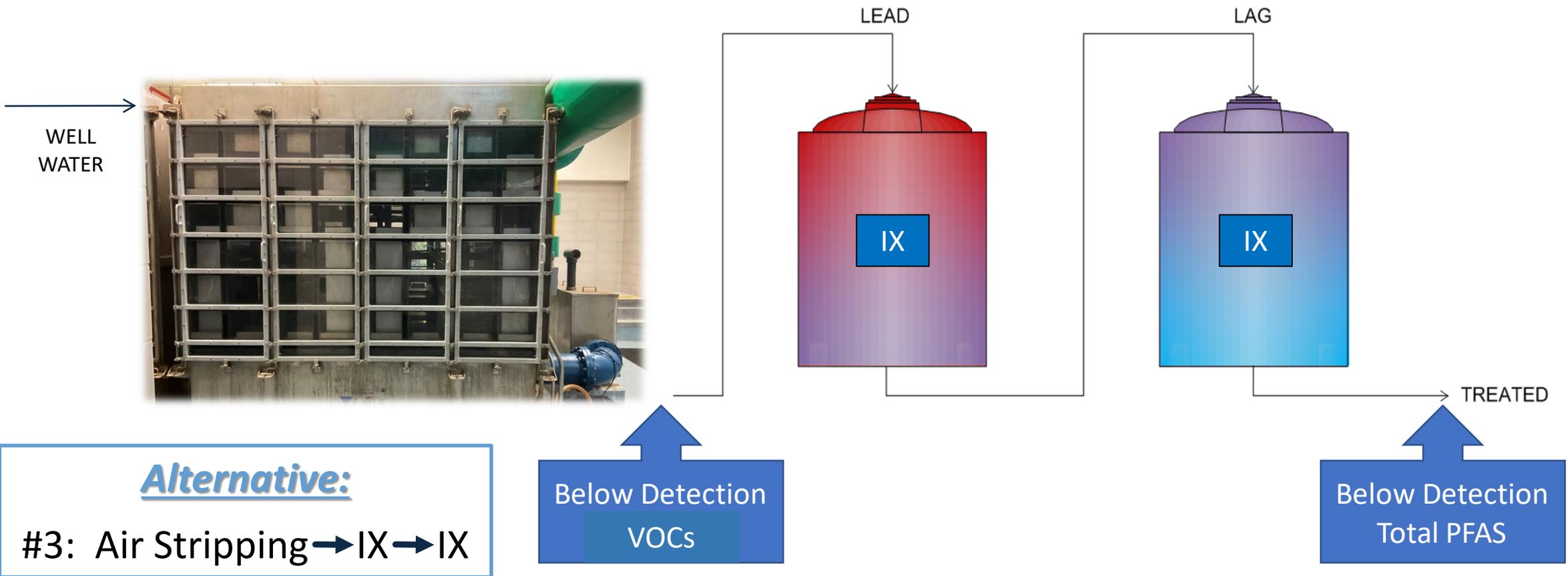


Alternatives:

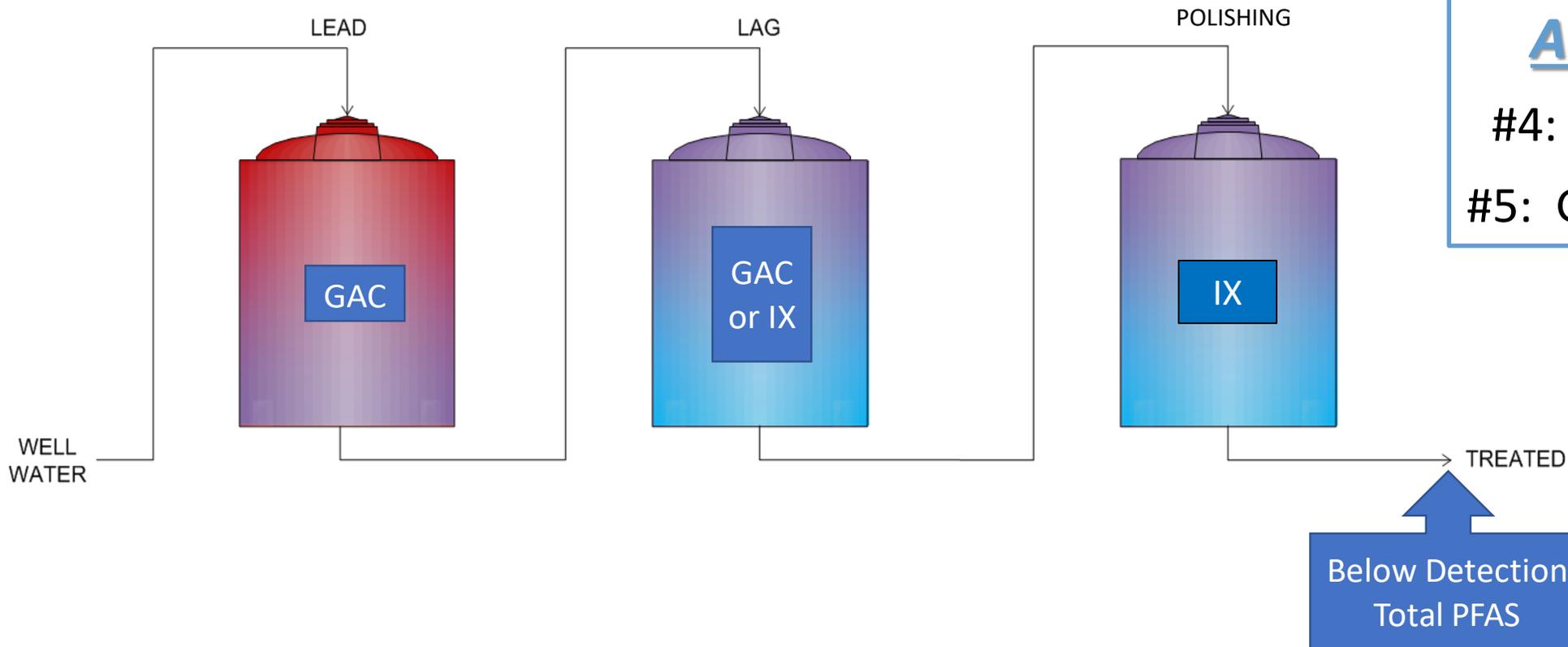
#1: GAC → GAC

#2: GAC → IX

TREATMENT ALTERNATIVE



TREATMENT ALTERNATIVES



Alternatives:

#4: GAC → IX → IX

#5: GAC → GAC → IX

ESTIMATED COST COMPARISON

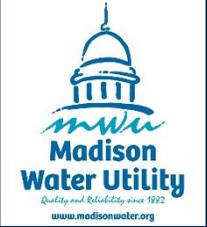


Treatment Alternative	<i>Within Existing Building Footprint</i>		<i>Footprint Expansion Would be Required</i>		
	#1	#2	#3	#4	#5
	GAC → GAC	GAC → IX	Air Stripping → IX → IX	GAC → IX → IX	GAC → GAC → IX
Estimated Capital Costs	\$5.0 M	\$4.6 M	\$5.0 M	\$5.7 M	\$6.1 M
Est Annual Operating Costs	\$0.3 M	\$0.3 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

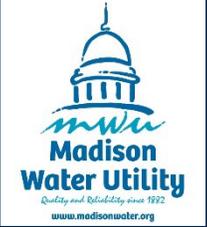
IX = Ion Exchange

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

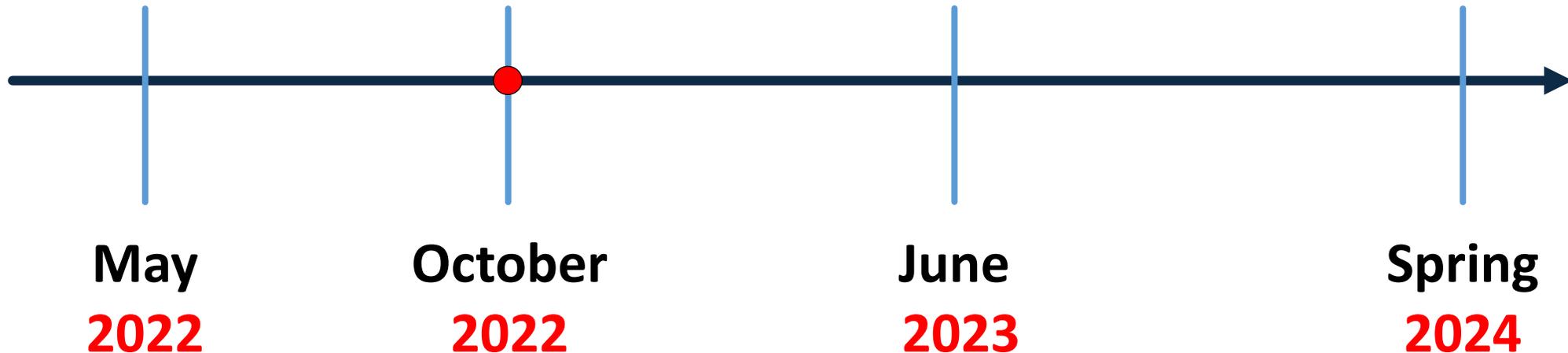


AECOM contract:
bench scale testing,
alternatives analysis,
construction design

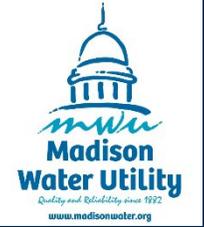
Bench scale test
and **preliminary
design report**

**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