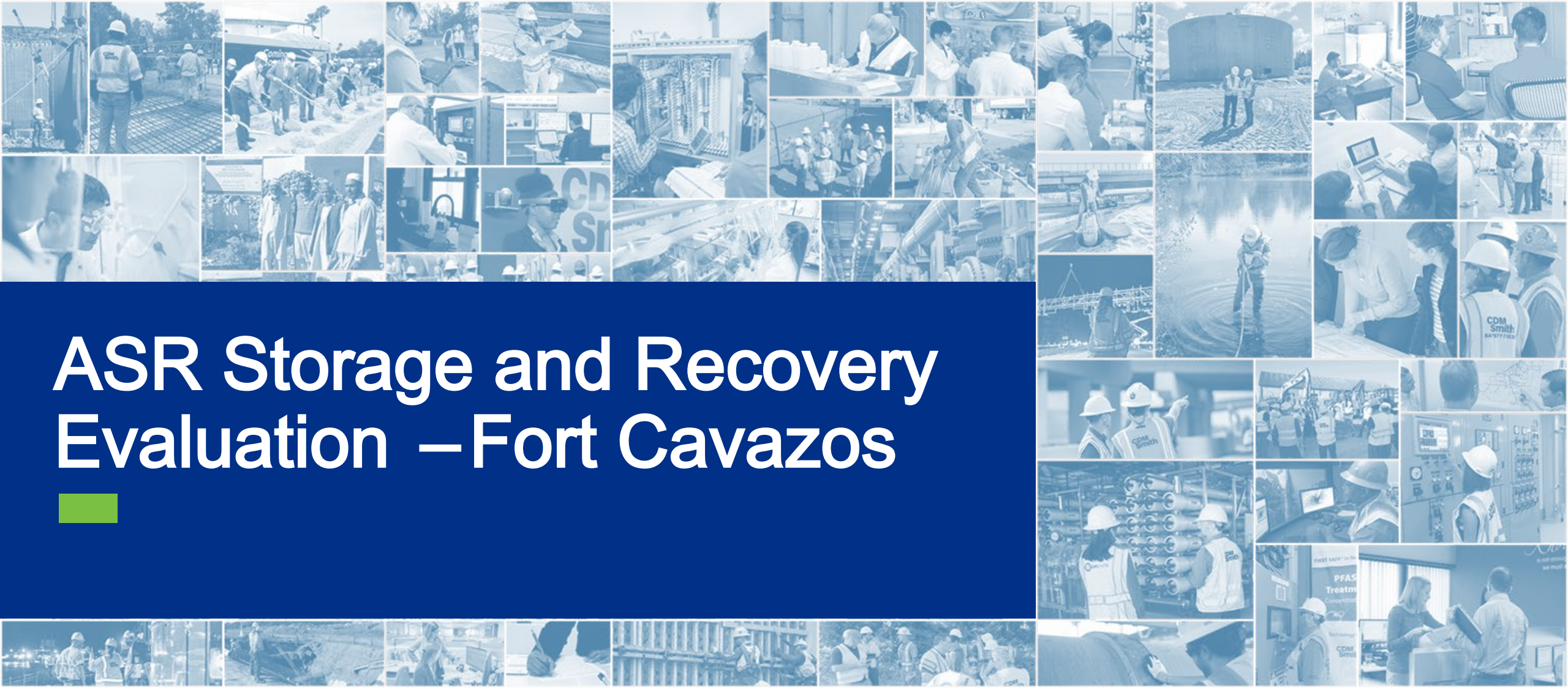


ASR Storage and Recovery Evaluation – Fort Cavazos

Neil Deeds, Intera Allen Woelke, CDM Smith

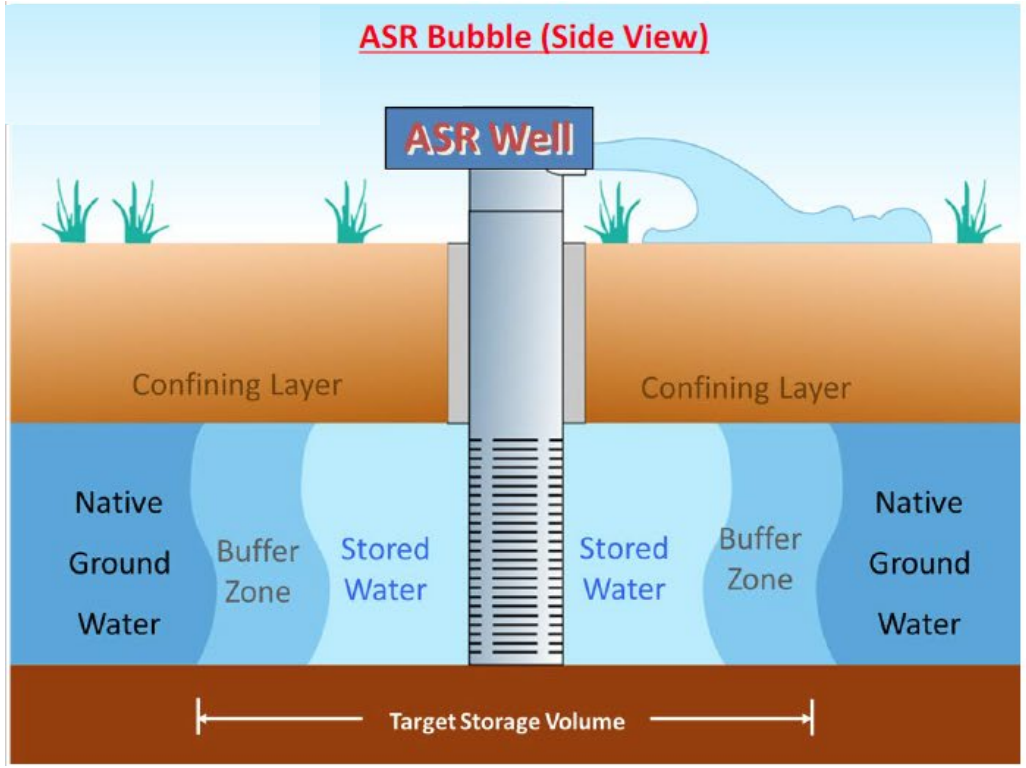
9/12/2024

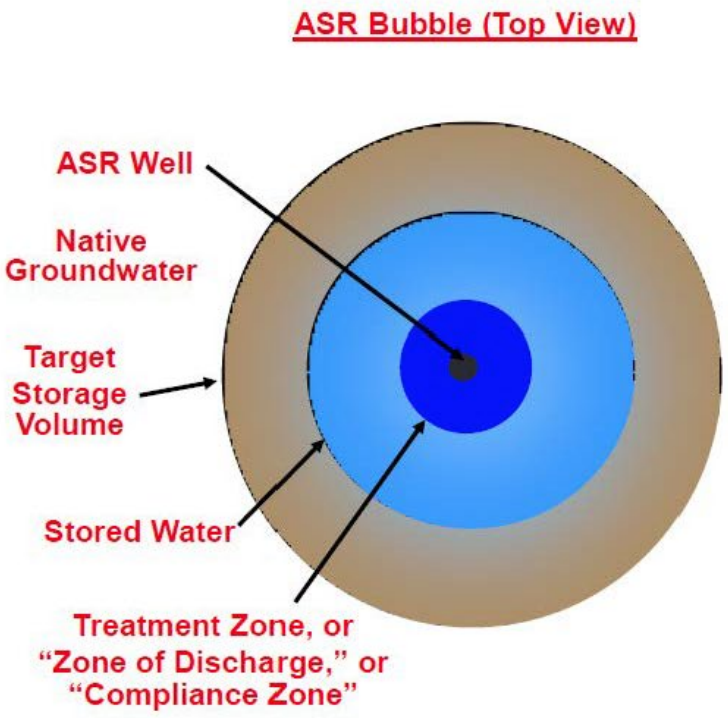
Outline

- Bell County ASR Study
- Fort Cavazos characterization study
  - Drill a test well and monitor well on the eastern edge of Fort Cavazos
  - Modeling to determine if the hydrogeology is suitable for an aquifer storage and recovery (ASR) wellfield
- ASR Wellfield Design Objectives
- ASR Wellfield Layout
- Next Steps

Idealized Diagram of Stored ASR Water

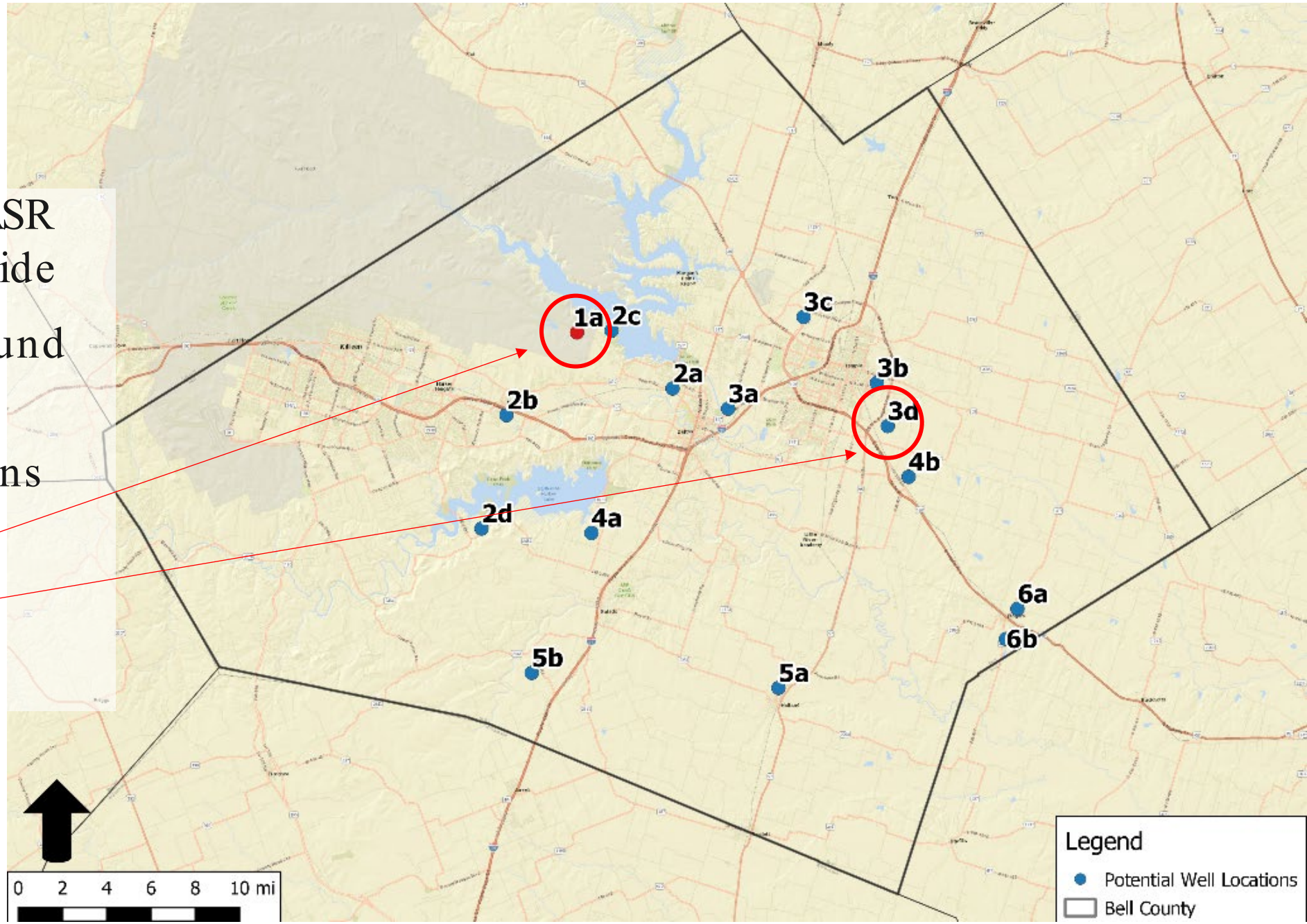
- **Aquifer Storage and Recovery** [30 TAC §331.2(8)]: "The injection ofwater into a geologic formation, group of formations, or part of aformation that is capable of underground storage of water for laterretrieval and beneficial use."





Bell County ASR Study

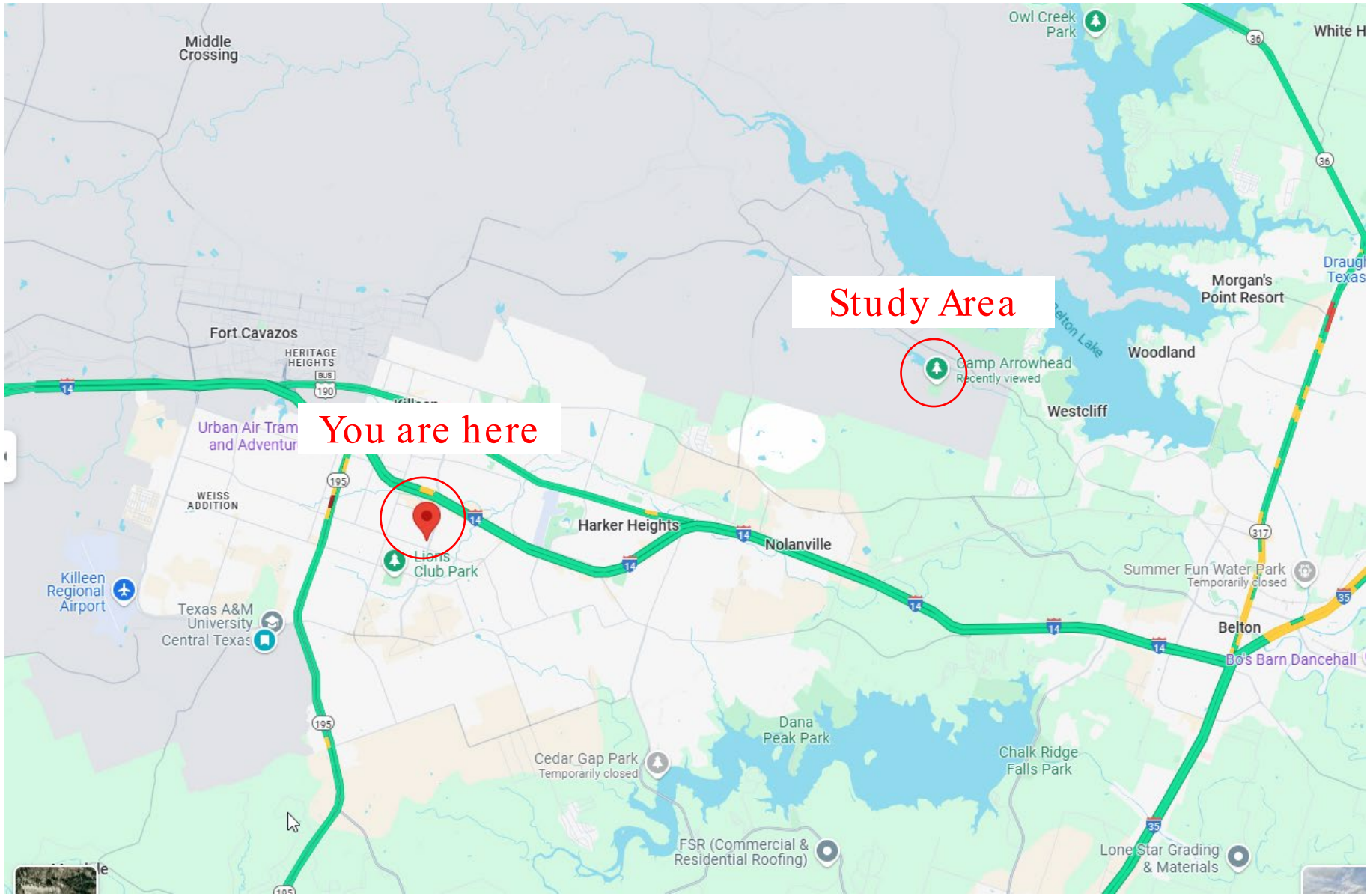
- Vetted potential ASR projects county-wide
- Many locations found to be feasible
- Two active locations
  - Fort Cavazos
  - Temple



Acknowledgements for ASR Characterization Study

- Fort Cavazos
- Bell County WCID#1
- Clearwater Underground Water Conservation District
- Killeen EDC
- City of Harker Heights
- City of Copperas Cove
- Copperas Cove Chamber

Fort Cavazos Study Area



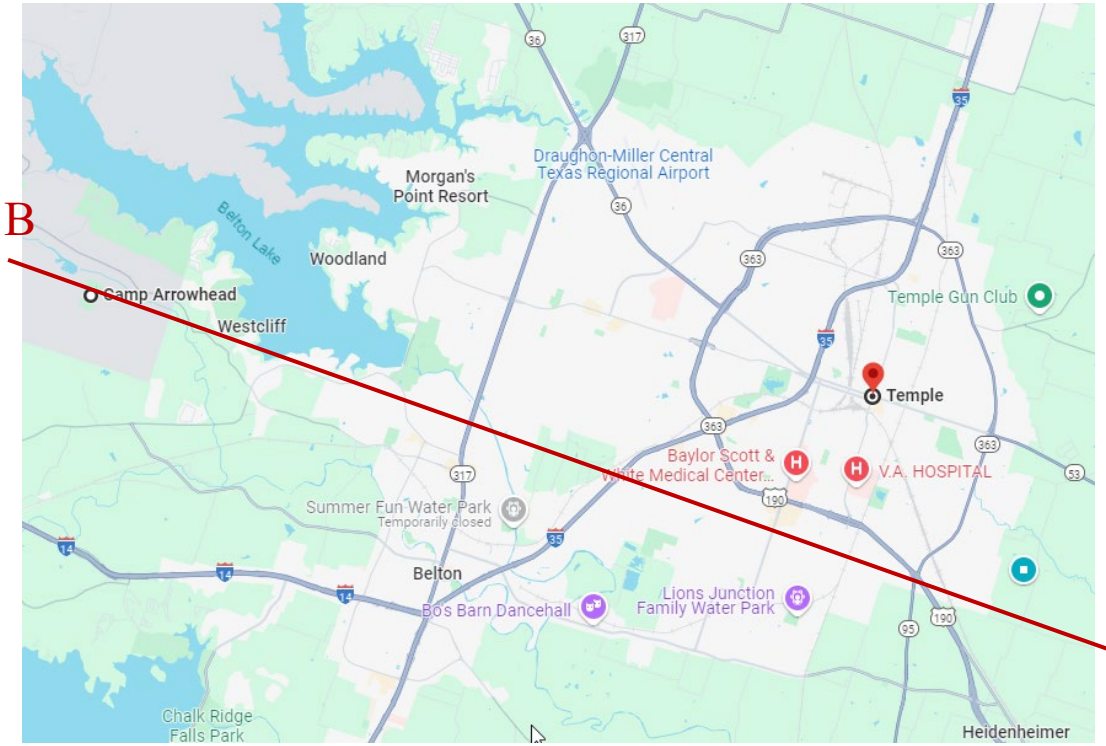
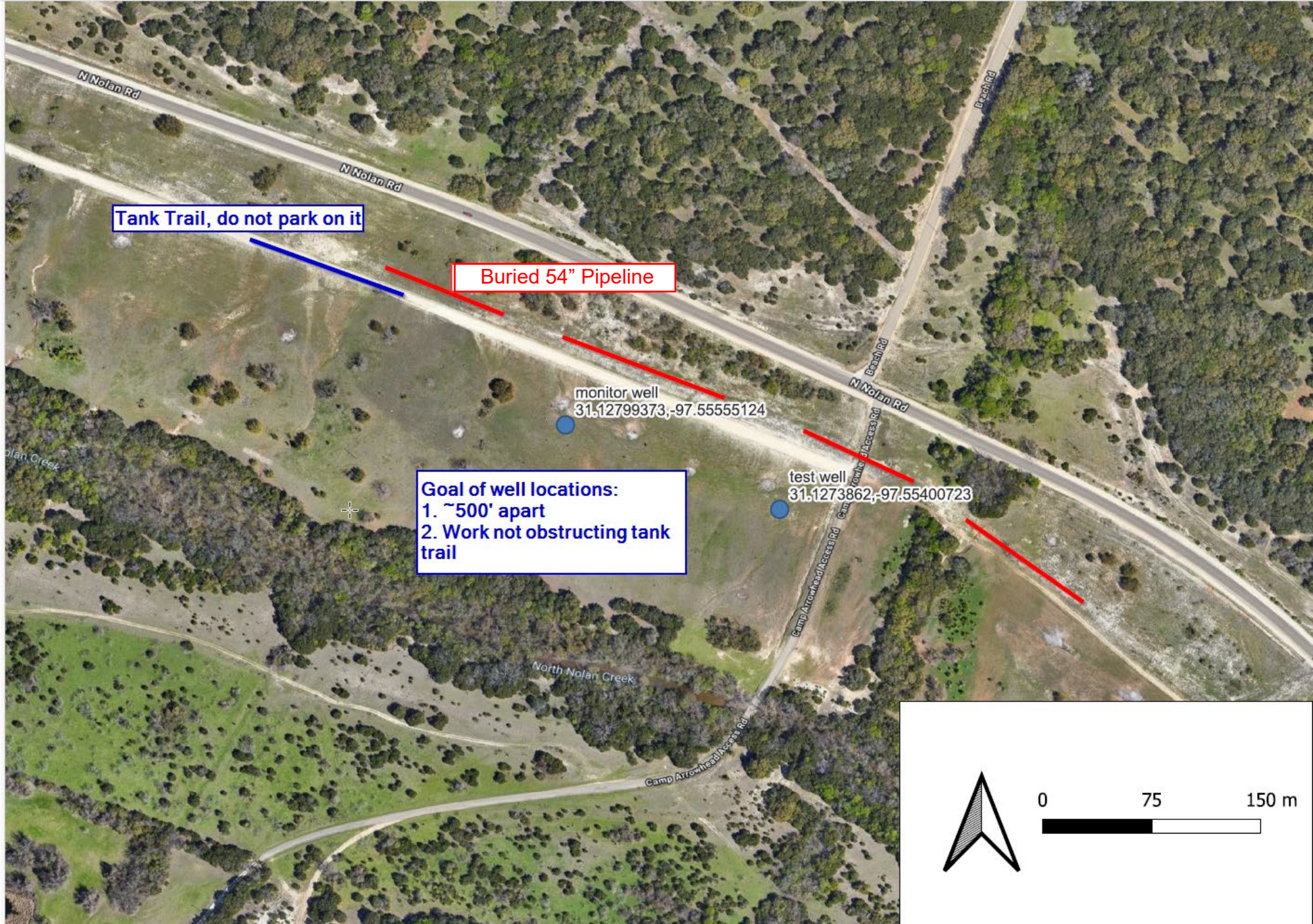


Figure 2.2.3 Cross sections of the stratigraphic units in the study area (after George and others, 2011; Bené and others, 2004; Nordstrom, 1982; Klemt and others, 1975).

Site Map: Fort Cavazos

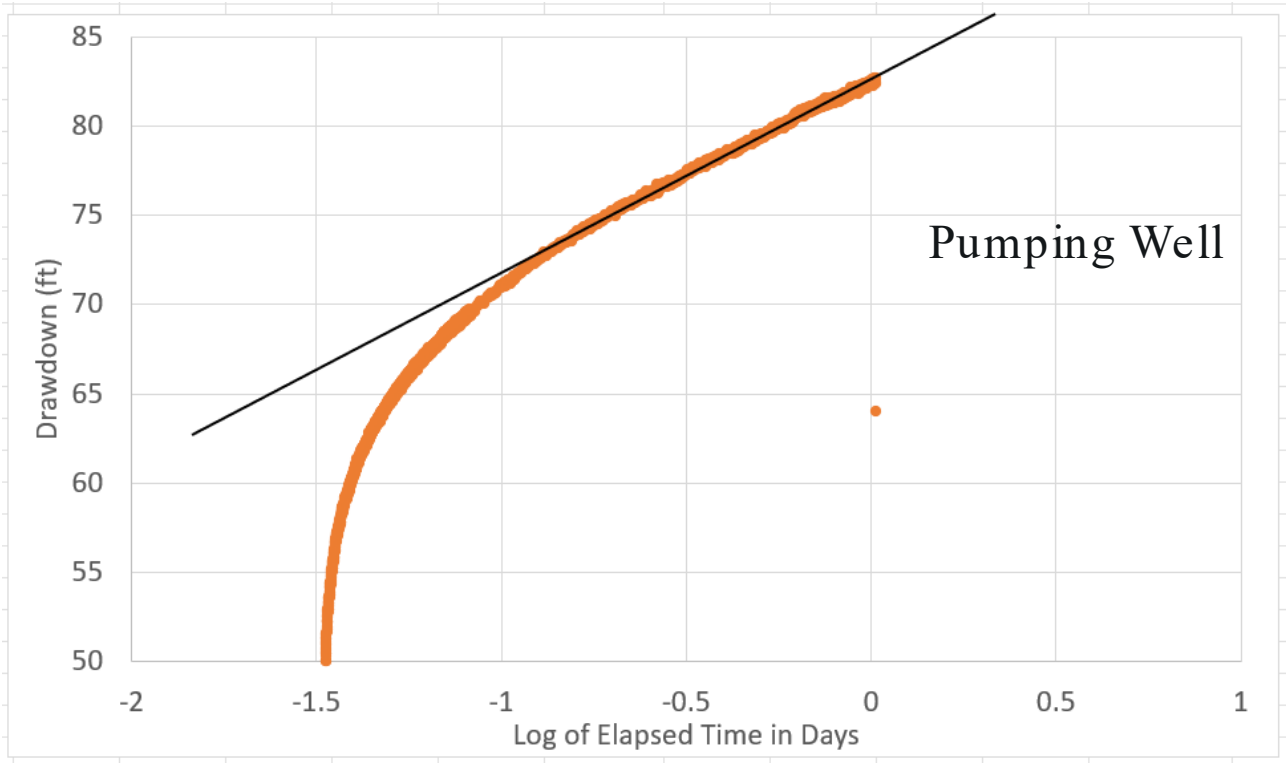


Lithologic Log from Monitor Well Bottom 100’

Depth (ft bgs)	Lab Sample	Lithology	Lithologic Description	Depth (ft bgs)
800–990			SHALE; medium, Gley 1 4/2, no odor, massive, no HCL reaction	800–990
			SHALE; medium, Gley 1 4/1, no odor, massive, no HCL reaction	
			SHALE; medium, 5Y 3/1 (very dark gray), no odor, massive, weak HCL reaction	
			SANDSTONE; fine grained, hard, 5Y 5/1 (gray), no odor, massive, no HCL reaction, 30% shale, Gley1 4/3	
			(CL), medium plasticity; 10YR 4/1 (dark gray), no odor, weak HCl reaction, weak cementation	
			SHALE; medium, Gley 1 5/2, dry, no odor, massive, no HCL reaction	
			LIMESTONE; fine grained, hard, 5Y 7/1 (light gray), no odor, massive, strong HCL reaction, 30% shale, Gley1 4/3	
			SHALE; fine grained, hard, Gley 1 4/, no odor, massive, strong HCL reaction, 4/5, 30% shale 10yr 3/1, 30% limestone 5y 7/1	
			SHALE; medium, 5YR 3/3 (dark reddish brown), no odor, massive, no HCL reaction	
			SHALE; medium, 5YR 3/3 (dark reddish brown), no odor, massive, no HCL reaction, 50% sandstone, fine grained, subs, 5y 6/1	
			SANDSTONE; fine grained, hard, 5Y 7/1 (light gray) and Gley 1 4/2, no odor, no HCL reaction	
			CALCAREOUS SHALE; medium, 5Y 5/1 (gray), no odor, strong HCL reaction, Sandy shale, no hcl, massive, fine grained, same color	
			SANDSTONE; fine grained, medium, 5Y 6/2 (light olive gray) and 5Y 5/3 (olive), no odor, massive, no HCL reaction, 10% shale 5yr 3/3	
			Well-Graded SAND (SW), fine to coarse grained, subrounded to subangular; no odor, no HCl reaction, no cementation, grains are clear, brn, pink, orange, olive green, red, blk, max grain size 5 mm	
			Well-Graded SAND with Gravel (SW), fine to coarse grained, subrounded to subangular; trace (<5%) Gravel, fine grained; very loose, no odor, no HCl reaction, no cementation, grains are clear, brn, pink, orange, olive green, red, blk, max grain size 15 mm	

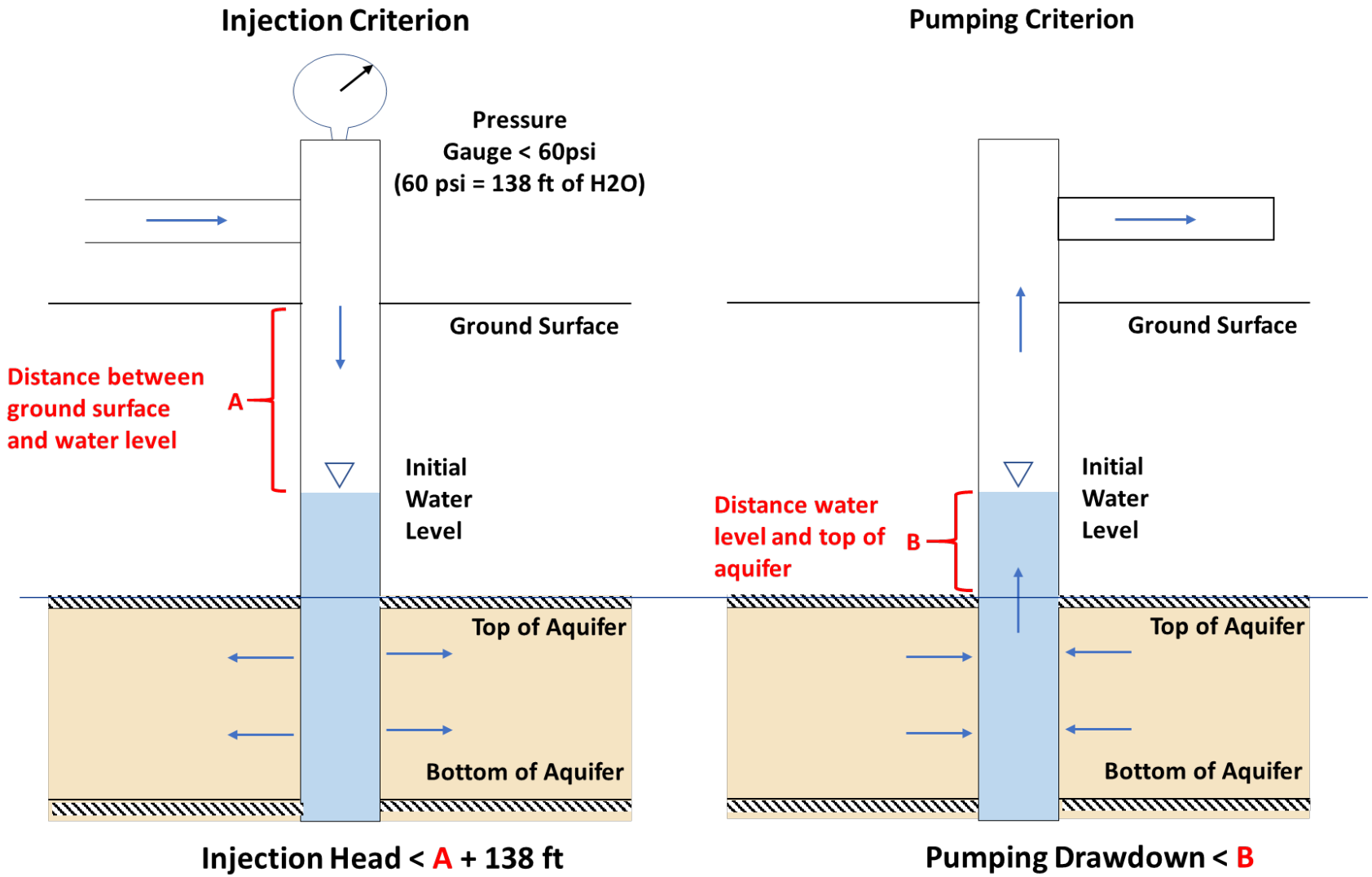
Production Well

- 8” production well, SDR-17 PVC
- Well produced 250 gpm, estimated maximum around 400 gpm
- Hydraulic Conductivity = 10 ft/d
- Storativity = 3.2x10-5



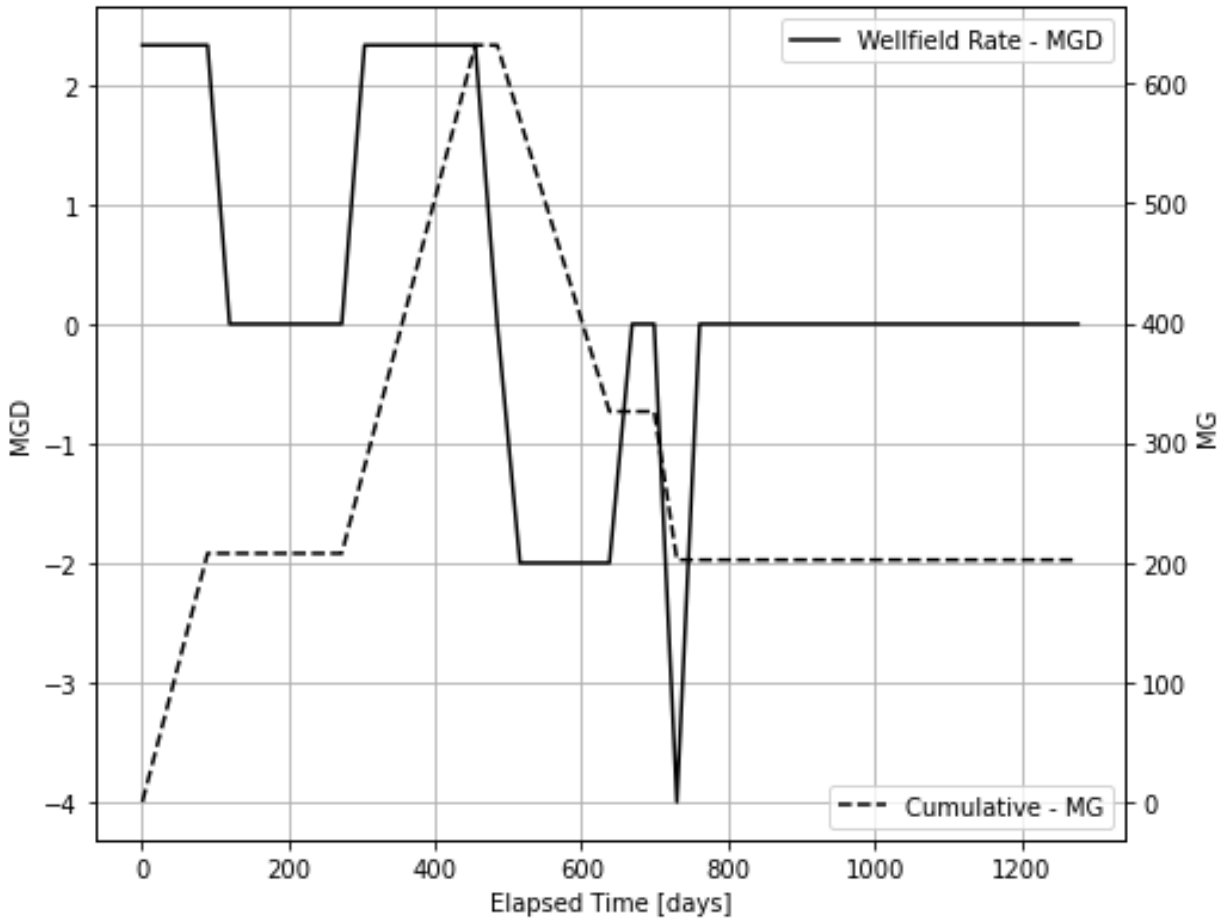
ASR Hydraulics

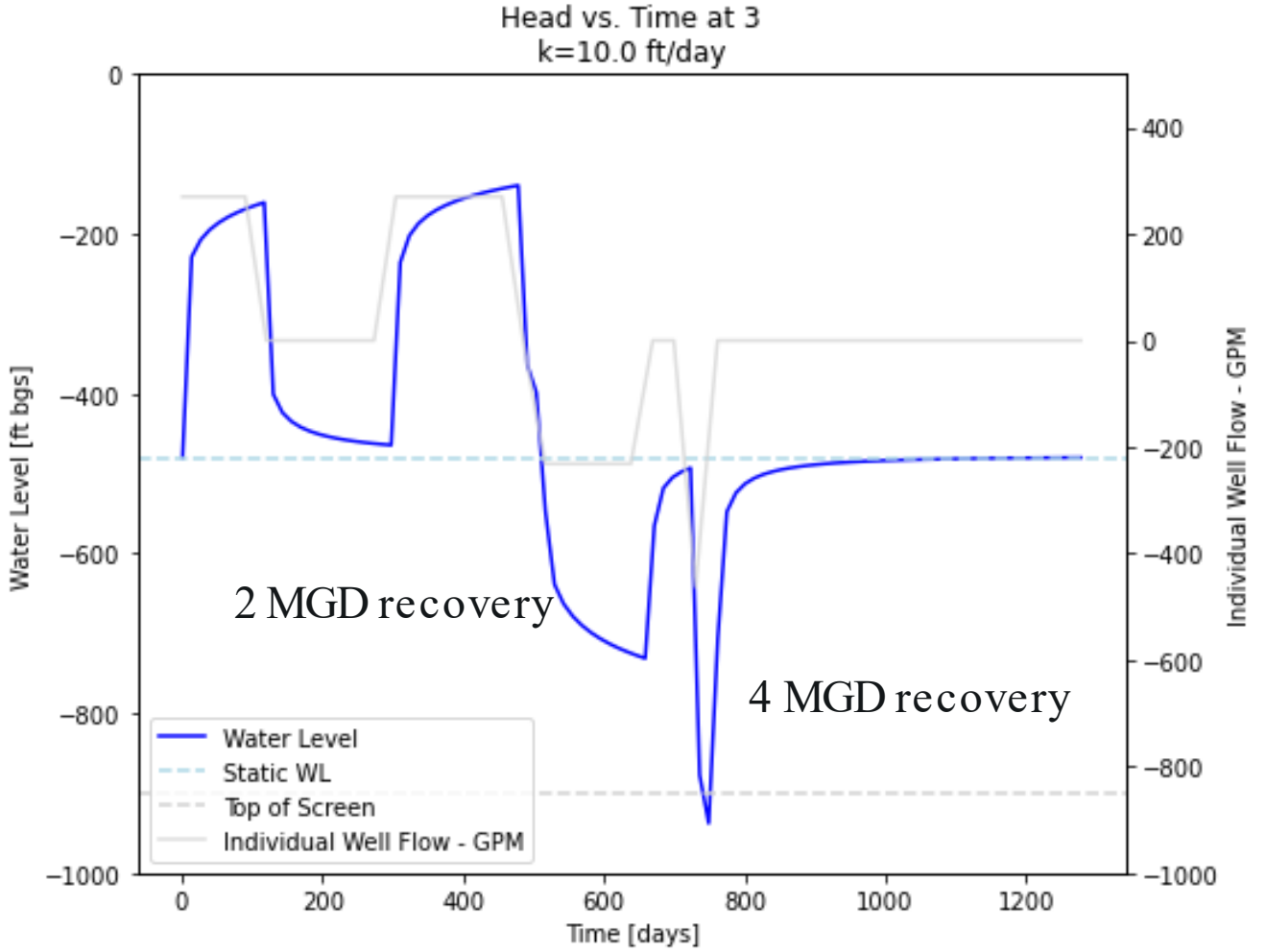
Lower Trinity top ~900 bgs



Preliminary Hydraulic Modeling

- Wellfield Objectives:
  - 2 MGD – 5 months (drought supplement)
  - 4 MGD – 15 days (emergency demand)





Design Objectives

Design Objectives

- Withdraw 2 MGD for up to 150 days
- Withdraw 4 MGD for up to 15 days
- Each well can produce approximately 350 GPM

Infrastructure Required

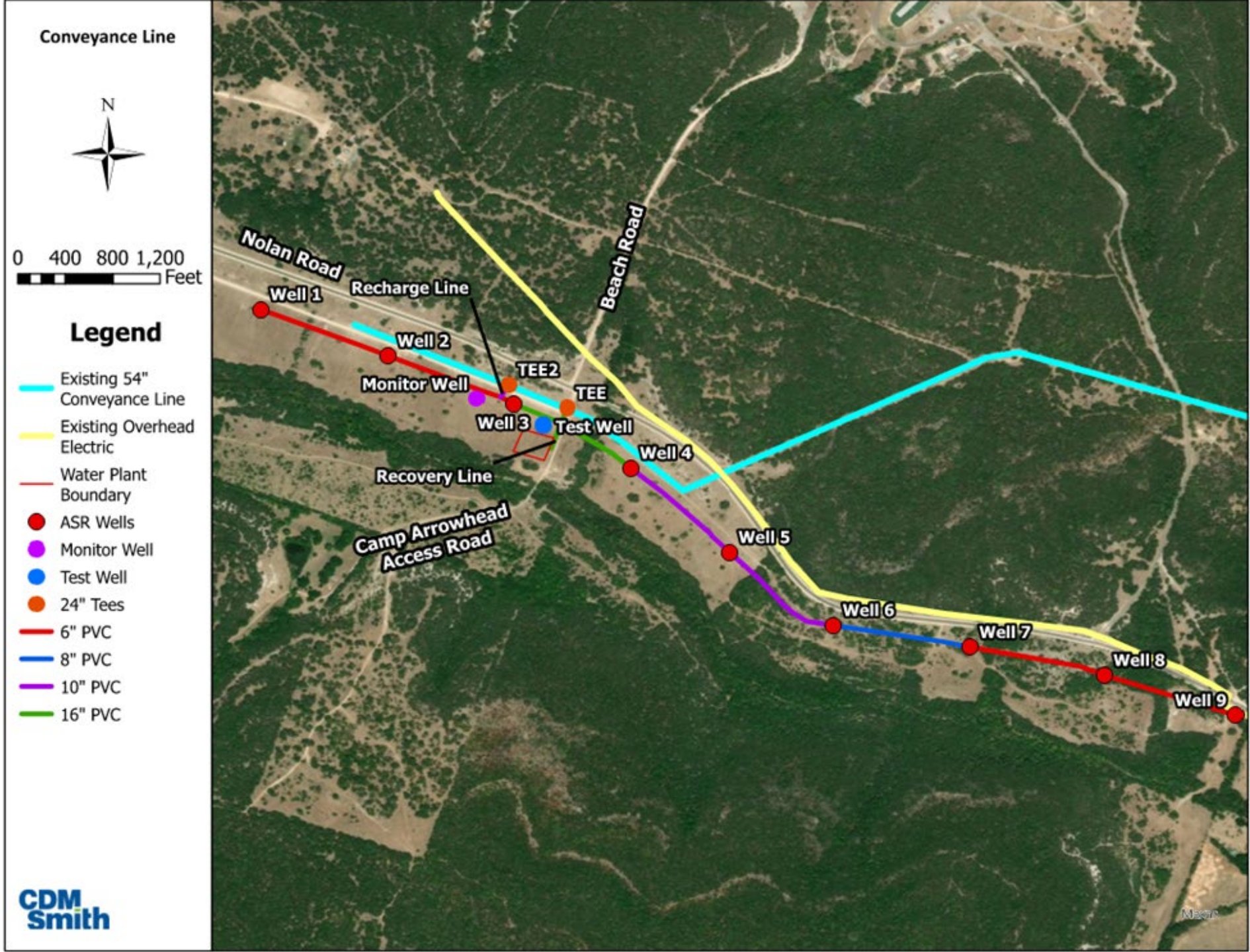
- Connections to water transmission pipeline
- 9 ASR wells (N + 1)
- Wellhead improvements including down-hole valve
- Distribution/ collection pipeline between wells
- Ground Storage Tank
- Booster Pump Station
- Disinfection chemical storage and feed facilities

Wellfield Layout

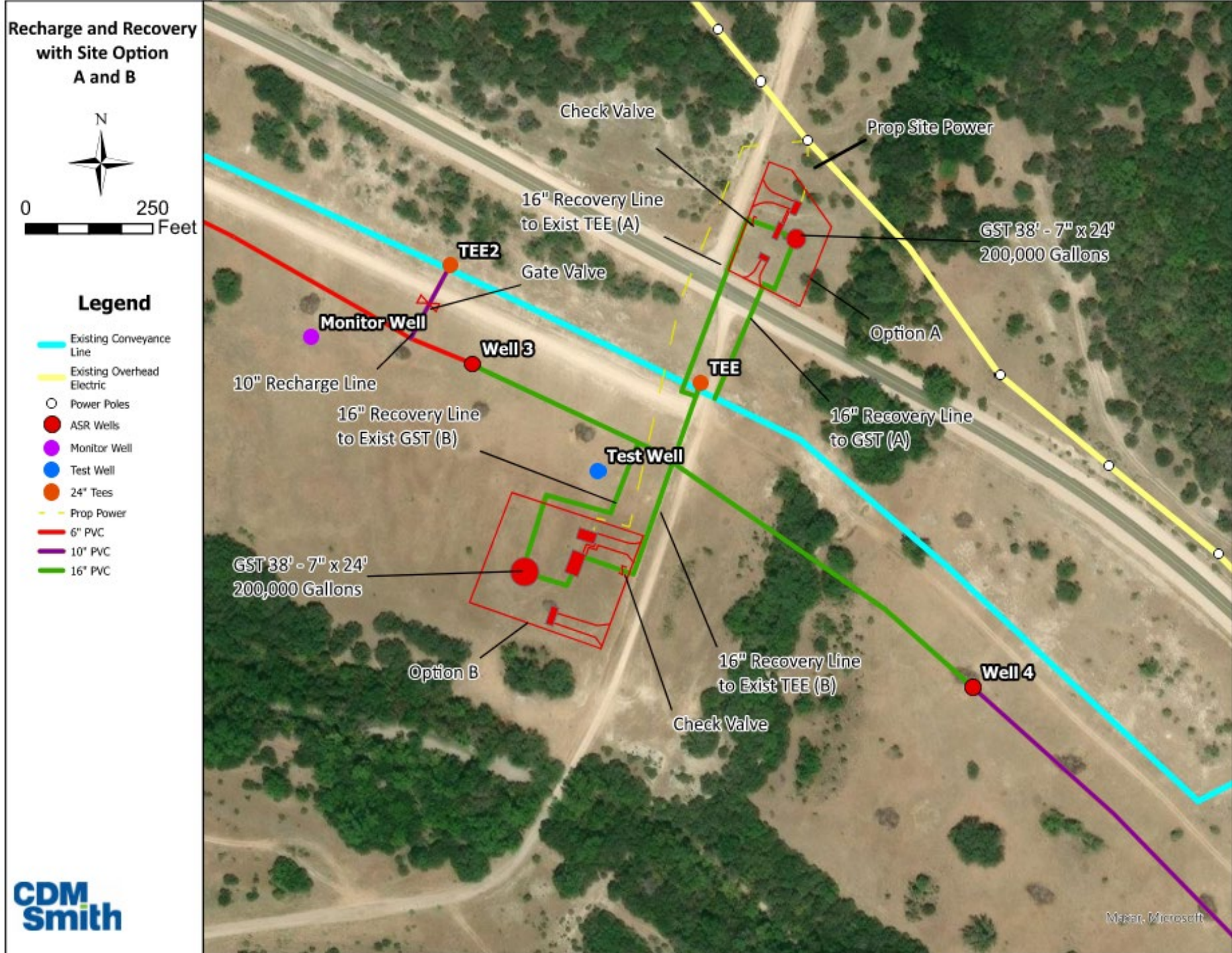
ASR Wells

- 9 wells spaced 1,000-ft apart

Conveyance Line



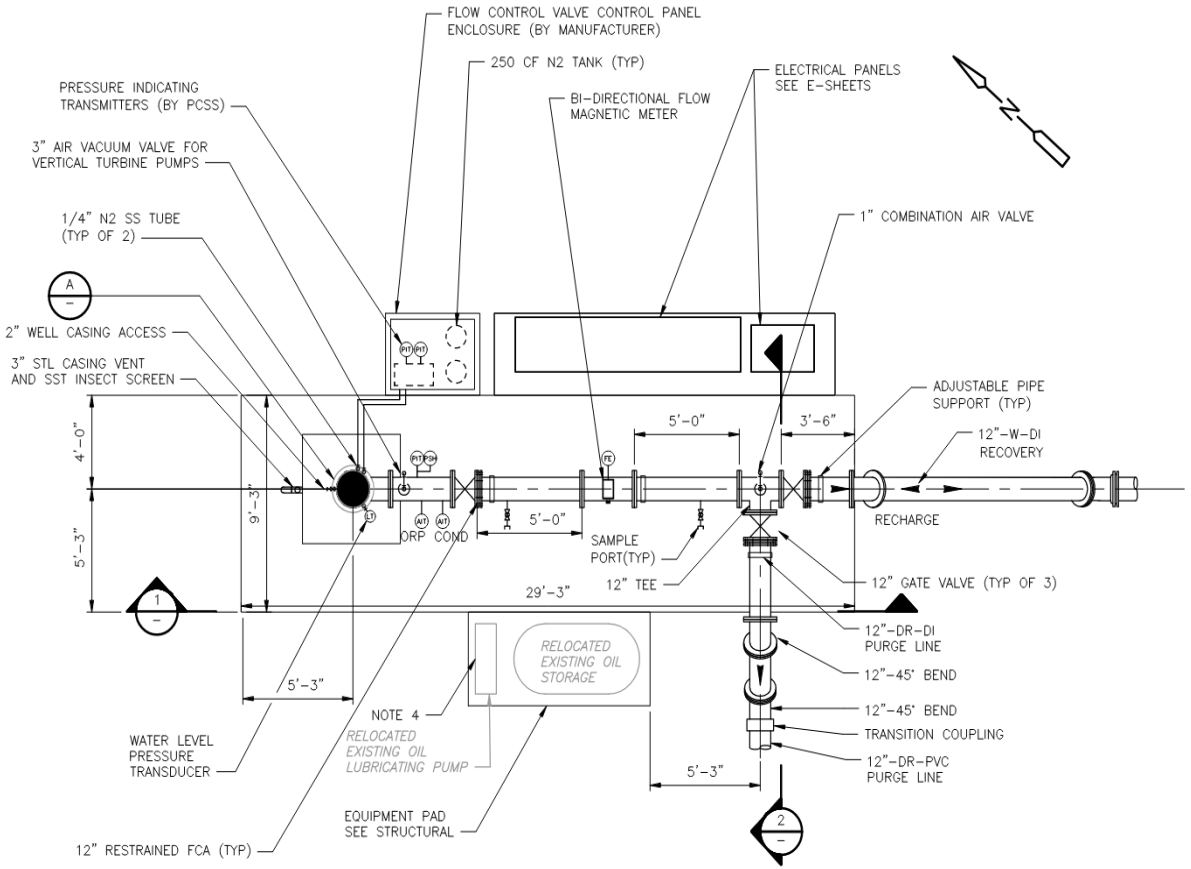
Conveyance Line – Recharge and Recovery Connections



Water Plant – Option A

Water Plant – Option B

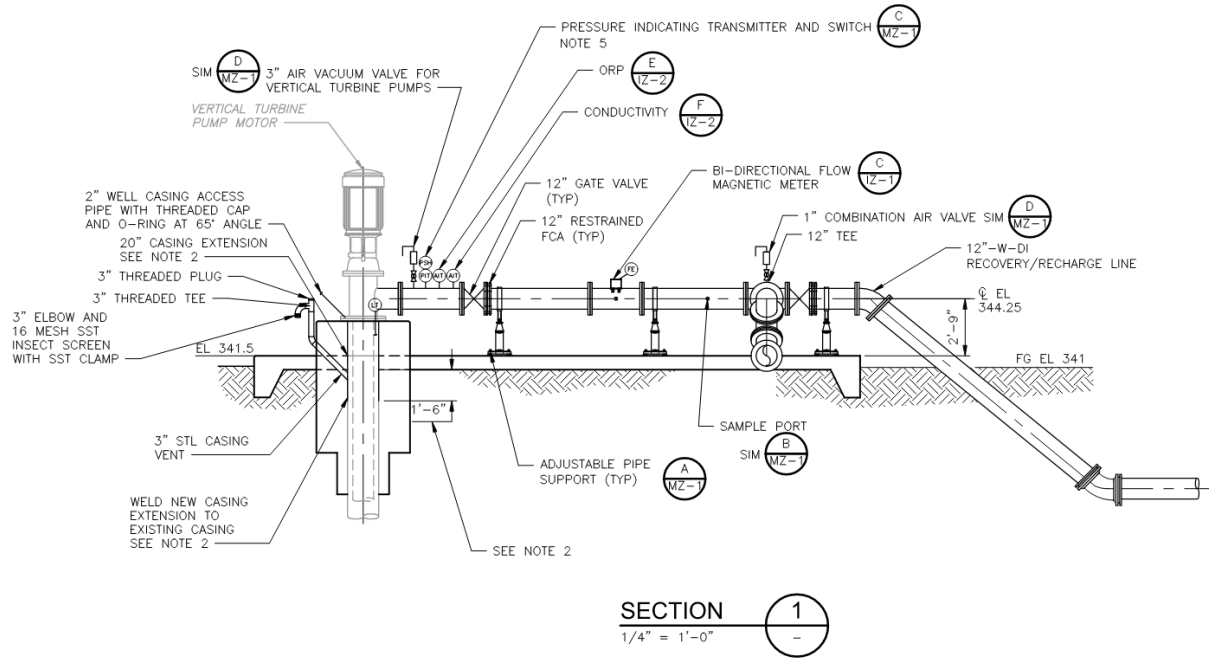
Wellhead Infrastructure



ASR VERTICAL TURBINE PUMP WELL PIPING

PLAN

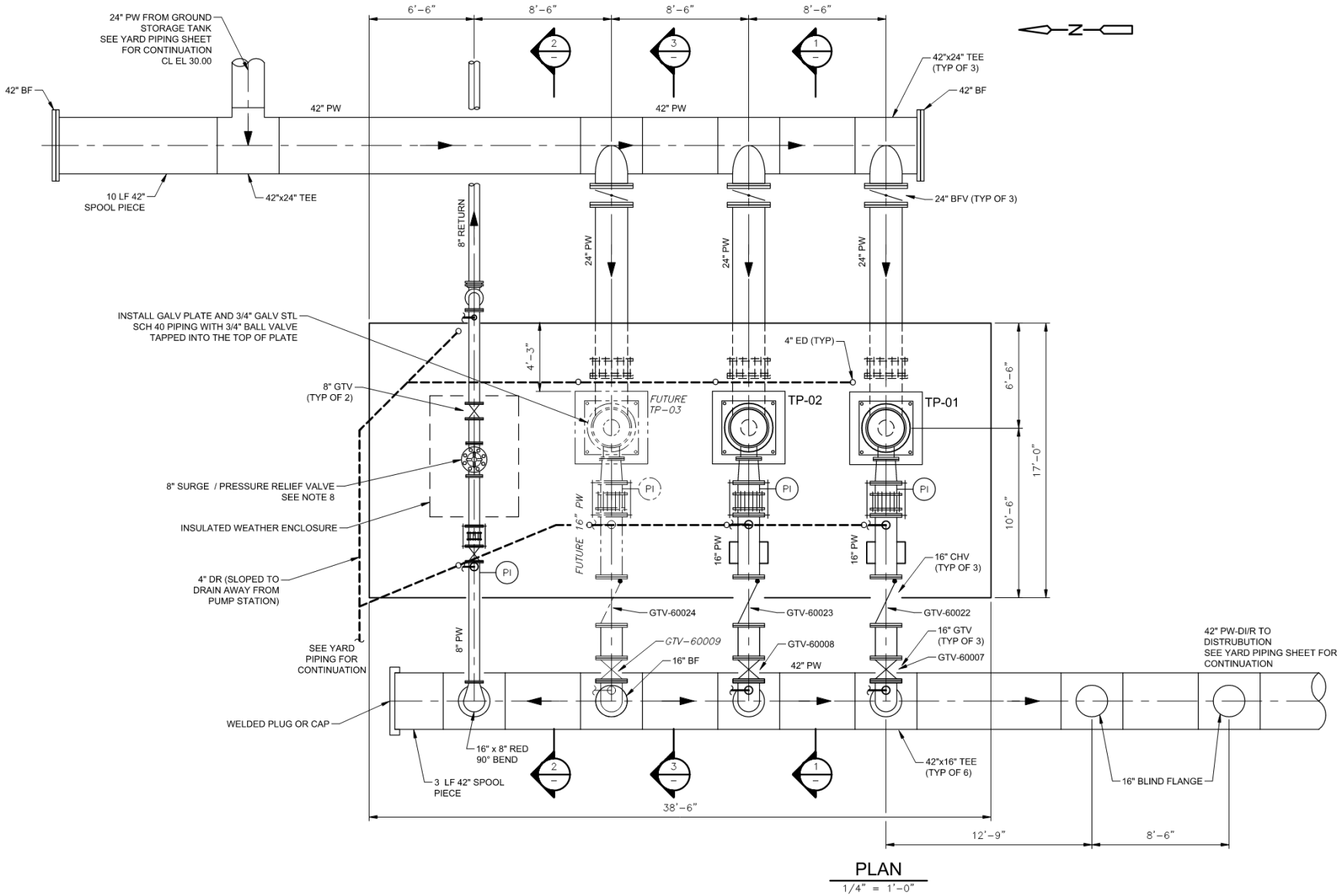
1/4" = 1'-0"



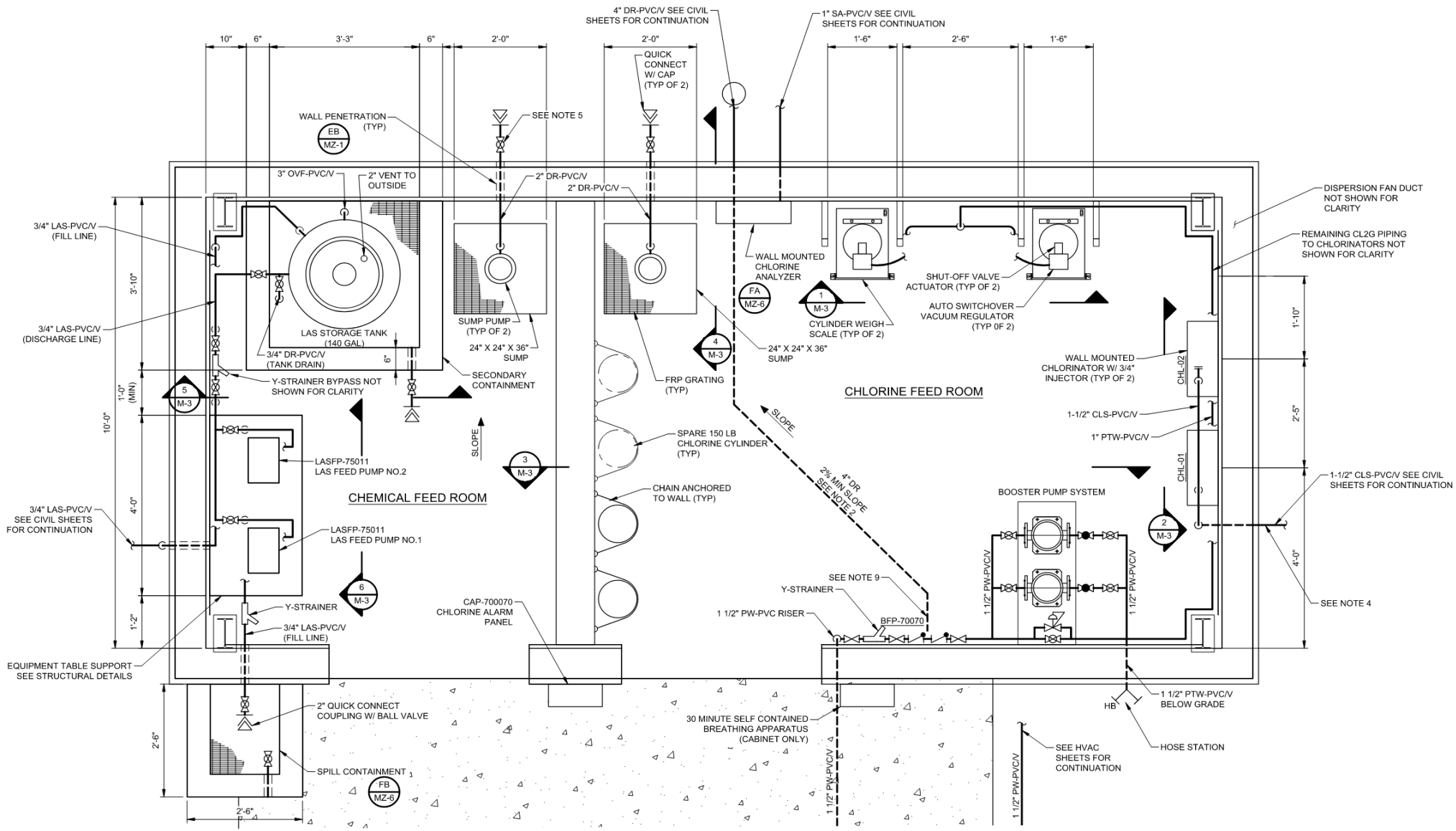
SECTION 1

1/4" = 1'-0"

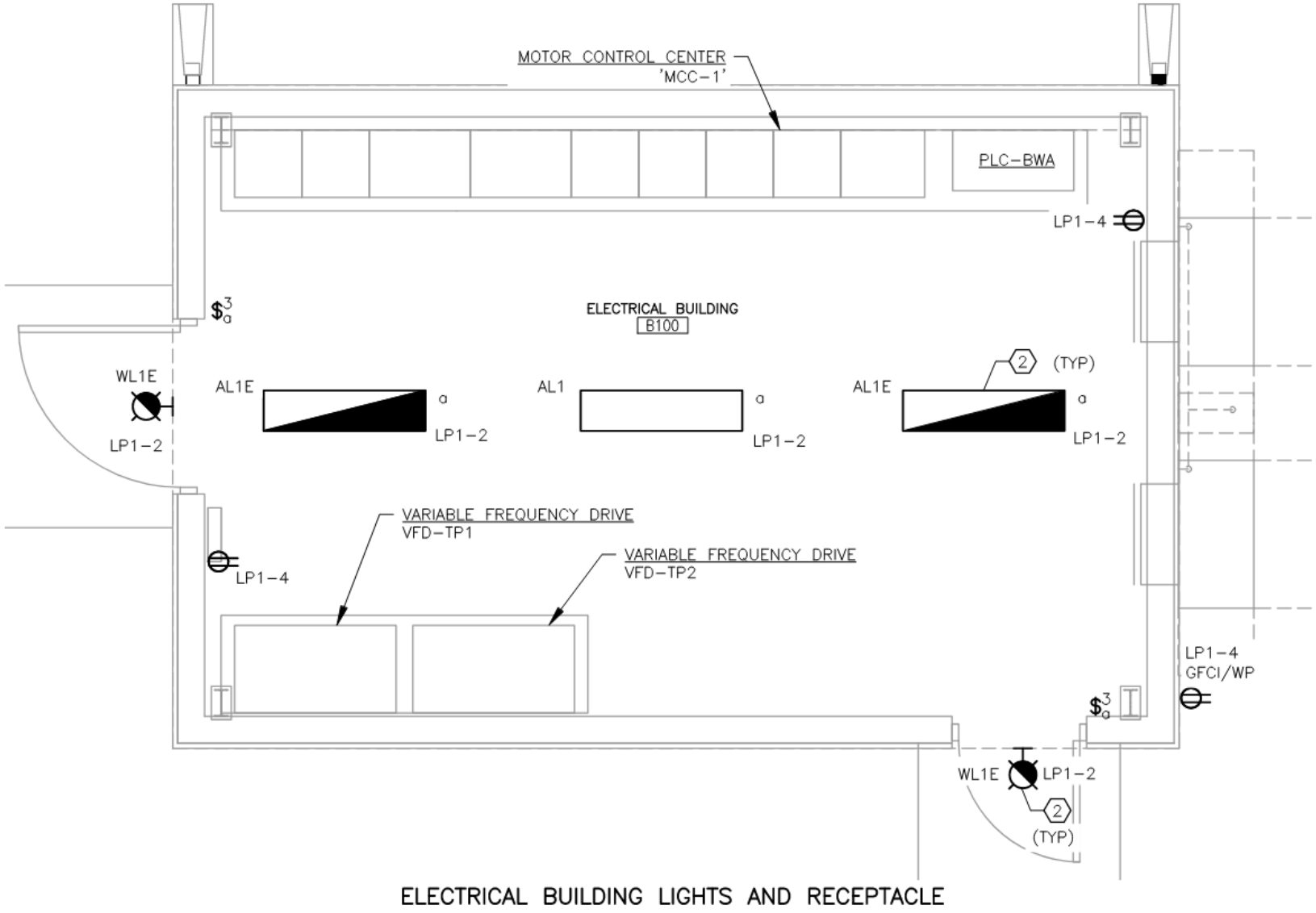
Booster Pumps



Chemical Room



Electrical Building



ELECTRICAL BUILDING LIGHTS AND RECEPTACLE


CAT

Next Steps


CDM Smith
SAFETY FIRST
CDM Smith
PFAS Water Treatment Pilot

Next Steps

- Apply for an Class V ASR permit
- Submit TCEQ Step 1 for Potable Water Well
- Drill first ASR well
- Test ASR well to confirm/ refine aquifer characteristics
- Refine well field layout and supporting infrastructure based on ASR test well results

listen . think. deliver.