



U.S. ARMY



**U.S. ARMY
ENVIRONMENTAL
COMMAND**

Status of Cleanup at Twin Cities Army Ammunition Plant (TCAAP)

RAB Meeting

9-19-2023

- Old Business
- Cleanup Status Update
 - Groundwater Remediation
 - Per- and polyfluoroalkyl substances (PFAS)
 - U.S. Geological Survey (USGS) (Groundwater Model and Site K)
 - Round Lake
- New Business
- Next Meeting Agenda
- Public Comments



- Thomas Toudouze has taken over as Army RPM for TCAAP as of 1 September 2023.
- Contact info located below.



- Vote to accept the minutes from previous meeting.
- Contract for Round Lake construction was awarded in August 2023.
- Army held groundwater stakeholder meeting on 18 September 2023.
- PFAS Preliminary Assessment/Site Investigation (PA/SI) was completed in September 2023.

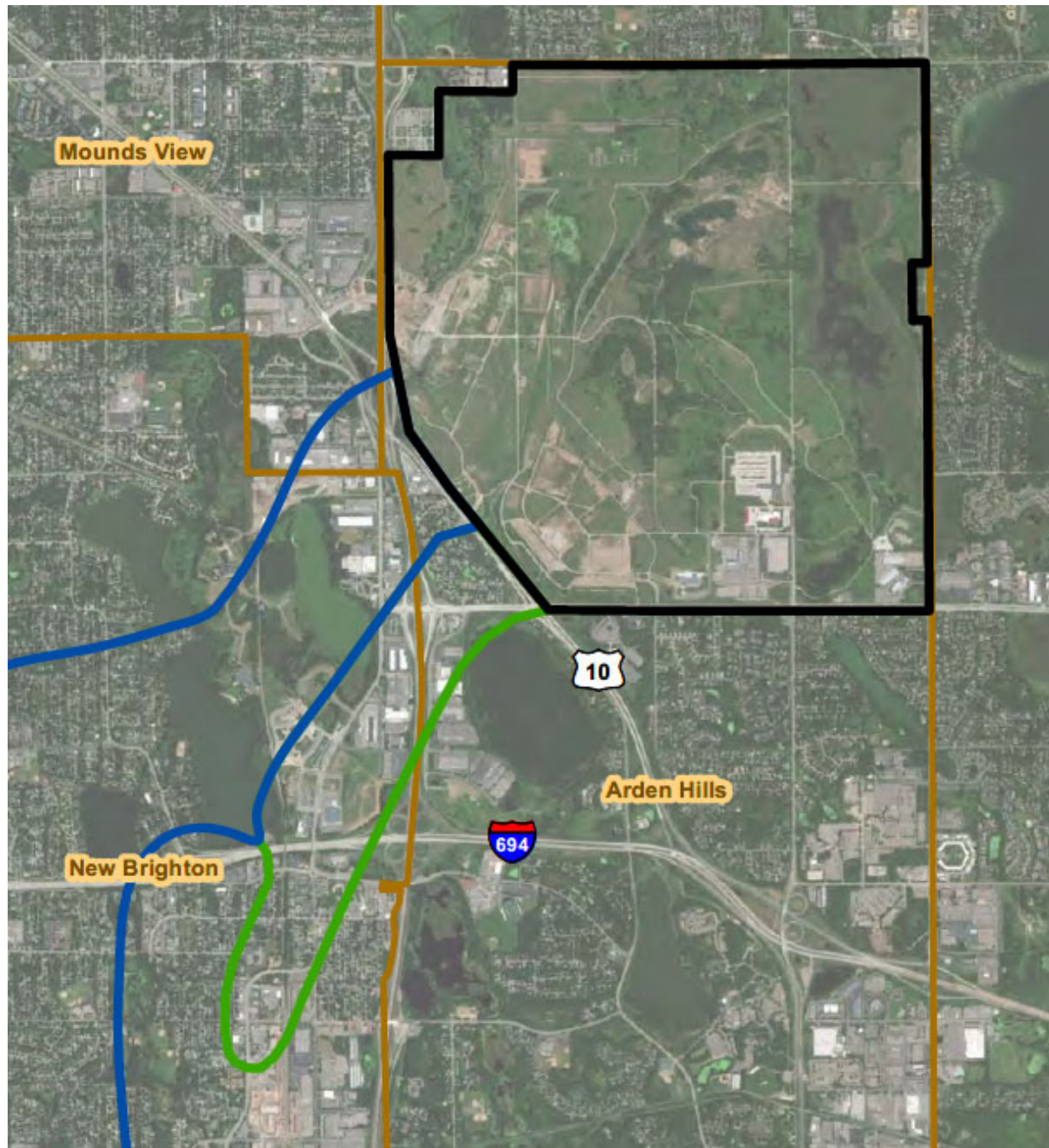


What has the Army done since February 2023?





- Final FY 2022 Annual Performance Report (APR) has been submitted.
- Met with Groundwater Stakeholders on 18 September 2023.
- Round Lake Technical Working Group (TWG) meeting conducted earlier today.
- Began full operation of Source Groundwater Recovery System (SGRS) in February 2023.
- Hydraulic evaluation of the TCAAP Groundwater Recovery System (TGRS) in process.
- Annual groundwater sampling and land use control inspections completed.



TCAAP Cleanup Status Update



LEGEND:

-  Operable Unit 1 (North Plume)
-  Operable Unit 2 of the New Brighton/ Arden Hills Superfund Site (the same area occupied by the Twin Cities Army Ammunition Plant in 1983, when the Site was placed on the NPL.)
-  Operable Unit 3 (South Plume)
-  Municipal Boundaries



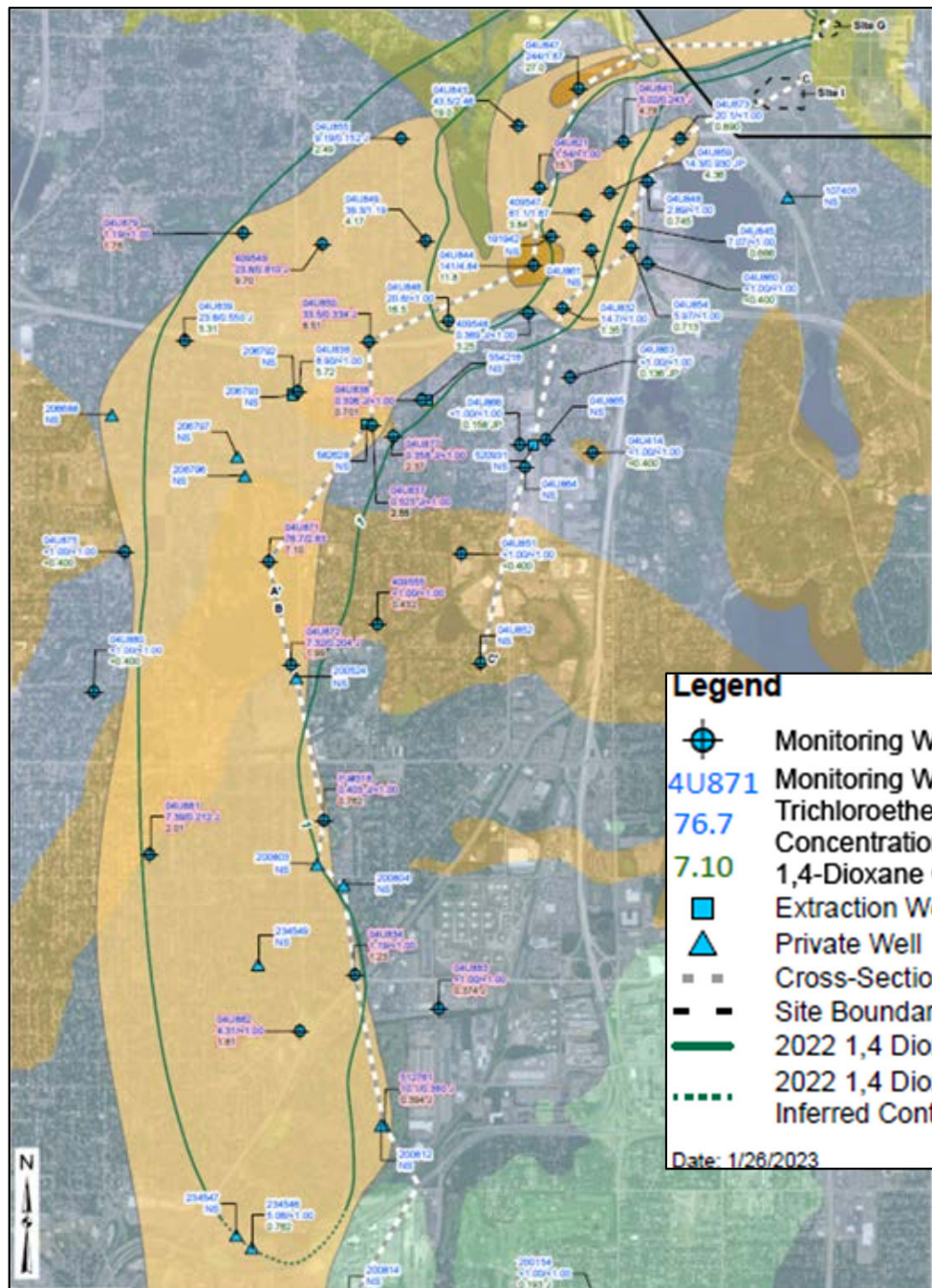
Groundwater Sampling Update


















- Groundwater sampling allows the Army to monitor the plumes and update the maps.
- Groundwater sampling (minor year) completed in Summer 2023.
- Groundwater data being validated and incorporated into the FY 2023 APR.
- Annual plume maps are available in the respective APRs, which will be updated in the FY 2023 APR.
- Statistical evaluation of monitoring well network to be completed during FY 2023/2024.



FY 2022 – Prairie du Chien Plume Map

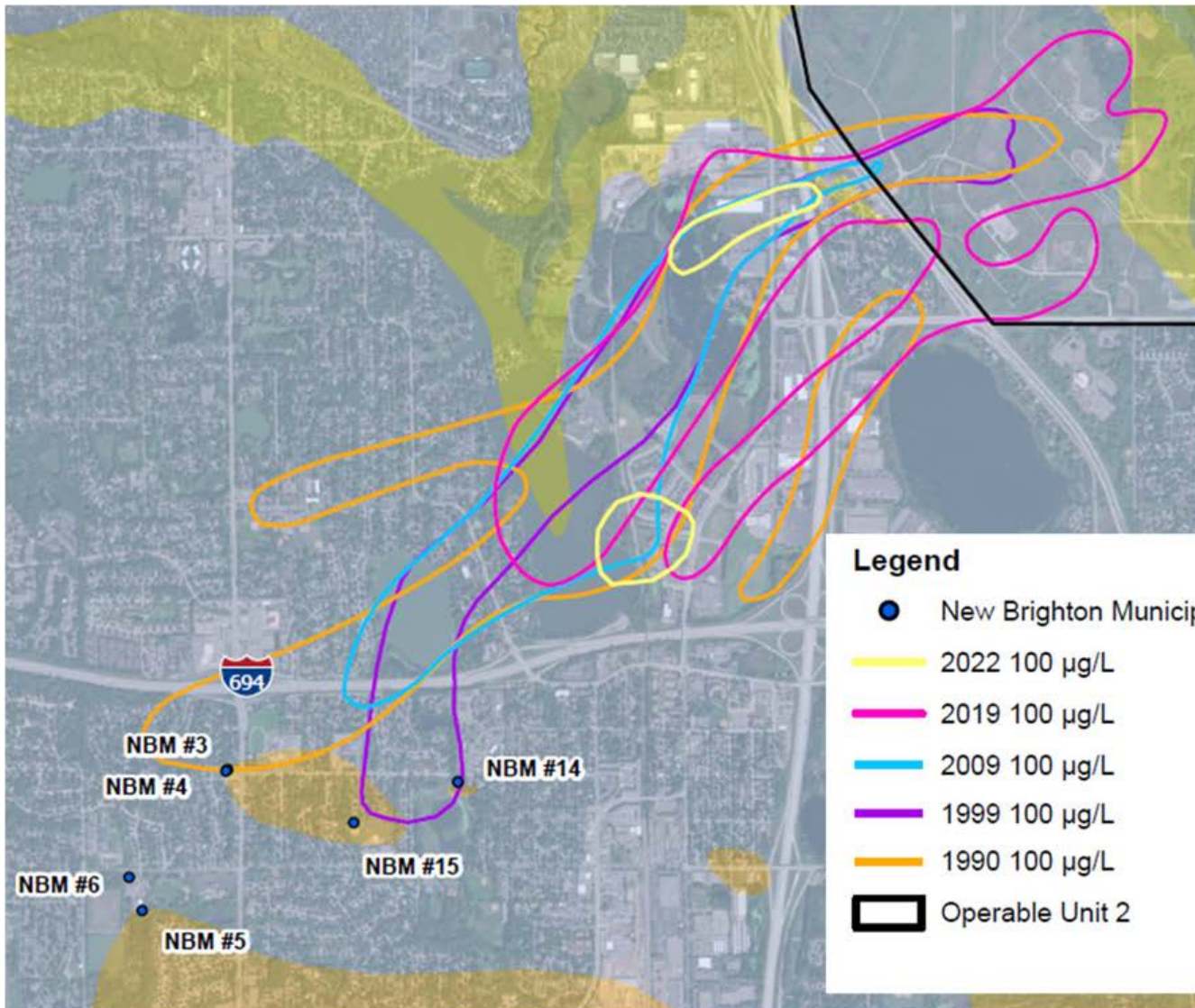
- Plume remains relatively stable compared to FY21 results.
- Some minor increases spread throughout the plume (highlighted in pink/purple).
- Higher concentration area (>100ug/L) has shrunk into two distinct lobes (shown on next slide).



Legend		2022 Trichloroethene Concentrations	
	Monitoring Well		> 0.4 µg/L
4U871	Monitoring Well ID		> 100 µg/L
76.7	Trichloroethene/1,1,1-Trichloroethane Concentration (µg/L)		Operable Unit 2
7.10	1,4-Dioxane Concentration (µg/L)		Decorah Shale, Galena Group
	Extraction Well		Platteville and Glenwood Fms
	Private Well		St. Peter Sandstone
	Cross-Section Line		Prairie du Chien Group
	Site Boundary		Jordan Sandstone
	2022 1,4 Dioxane Concentration Contour (µg/L)		St. Lawrence Formation
	2022 1,4 Dioxane Concentration Inferred Contour (µg/L)		Tunnel City Group

Date: 1/28/2023





Legend

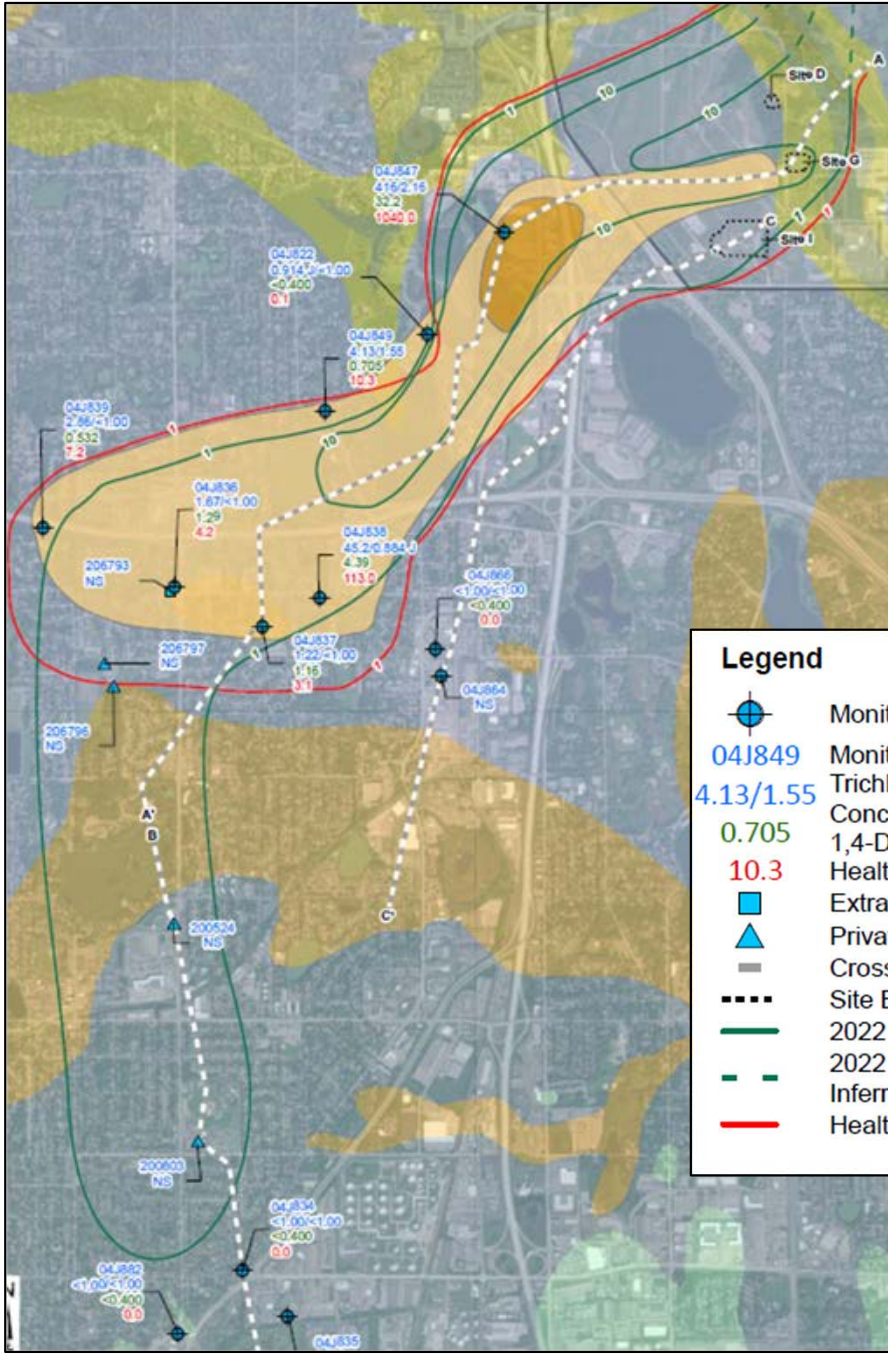
-  New Brighton Municipal Wells
-  2022 100 µg/L
-  2019 100 µg/L
-  2009 100 µg/L
-  1999 100 µg/L
-  1990 100 µg/L
-  Operable Unit 2

Bedrock Geology



















-  Decorah Shale, Galena Group
-  Platteville and Glenwood Fms
-  St. Peter Sandstone
-  Prairie du Chien Group
-  Jordan Sandstone
-  St. Lawrence Formation
-  Tunnel City Group



FY 2022 – Jordan Plume Map


















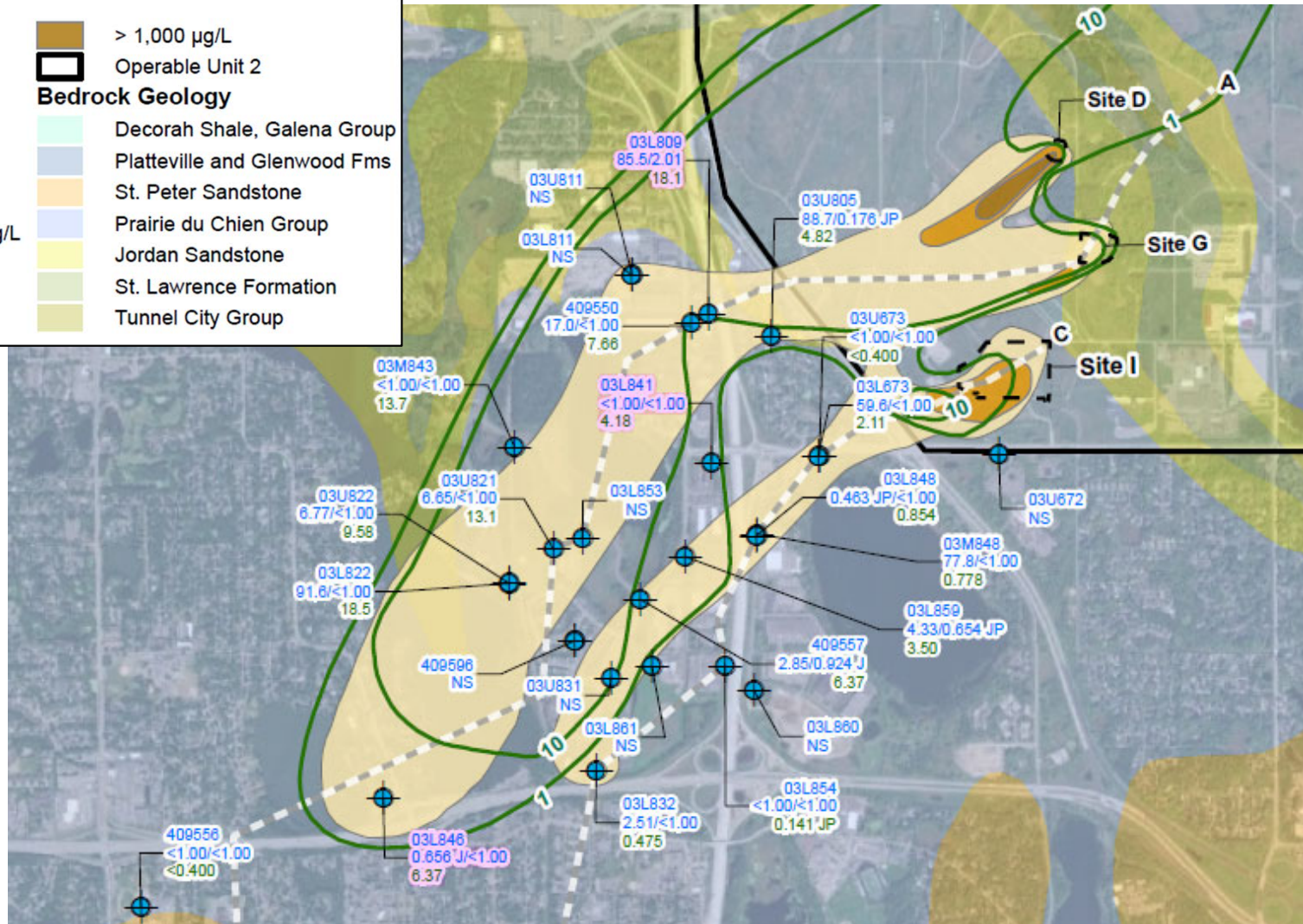
- Main plume remains relatively stable compared to FY21 results.
- Downgradient wells now non-detect.
- Some minor increases spread throughout the plume (highlighted in pink/purple).
- Higher concentration area (>100ug/L) roughly the same as FY21.

Legend		2022 Trichloroethene Concentrations (µg/L)	
	Monitoring Well		> 0.4 µg/L
04J849	Monitoring Well ID		> 100 µg/L
4.13/1.55	Trichloroethene/1,1,1-Trichloroethane Concentration (µg/L)		Operable Unit 2
0.705	1,4-Dioxane Concentration (µg/L)		Decorah Shale, Galena Group
10.3	Health Risk Index		Platteville and Glenwood Fms
	Extraction Well		St. Peter Sandstone
	Private Well		Prairie du Chien Group
	Cross-Section Line		Jordan Sandstone
	Site Boundary		St. Lawrence Formation
	2022 1,4 Dioxane Concentration Contour (µg/L)		Tunnel City Group
	2022 1,4 Dioxane Concentration Inferred Contour (µg/L)		
	Health Risk Index = 1		



Legend

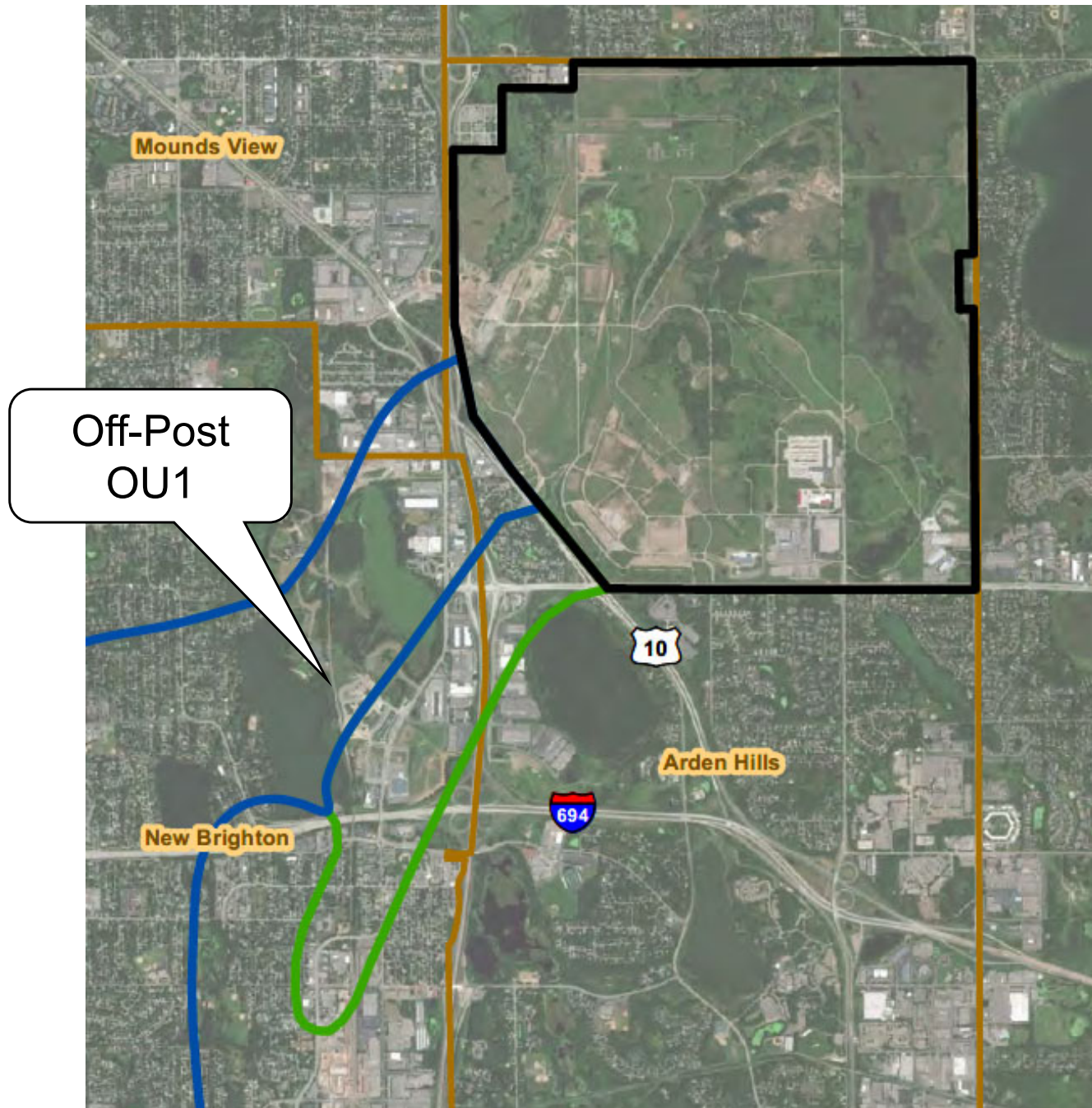
	Monitoring Well Locations		> 1,000 µg/L
03L822	Monitoring Well ID		Operable Unit 2
91.6	Trichloroethene/1,1,1-Trichloroethane Concentration (µg/L)	Bedrock Geology	
18.5	1,4-Dioxane Concentration (µg/L)		Decorah Shale, Galena Group
	Cross-Section Line		Platteville and Glenwood Fms
	Site Boundary		St. Peter Sandstone
	2022 1,4 Dioxane Concentration Contour (µg/L)		Prairie du Chien Group
	2022 Trichloroethene Concentrations		Jordan Sandstone
	> 0.4 µg/L		St. Lawrence Formation
	> 100 µg/L		Tunnel City Group







- Plume remains relatively stable compared to FY21 results.
- Some minor increases spread throughout the plume (highlighted in pink/purple).
- Higher concentration area (>1,000ug/L) smaller than FY21.



Twin Cities Army Ammunition Plant Cleanup



LEGEND:

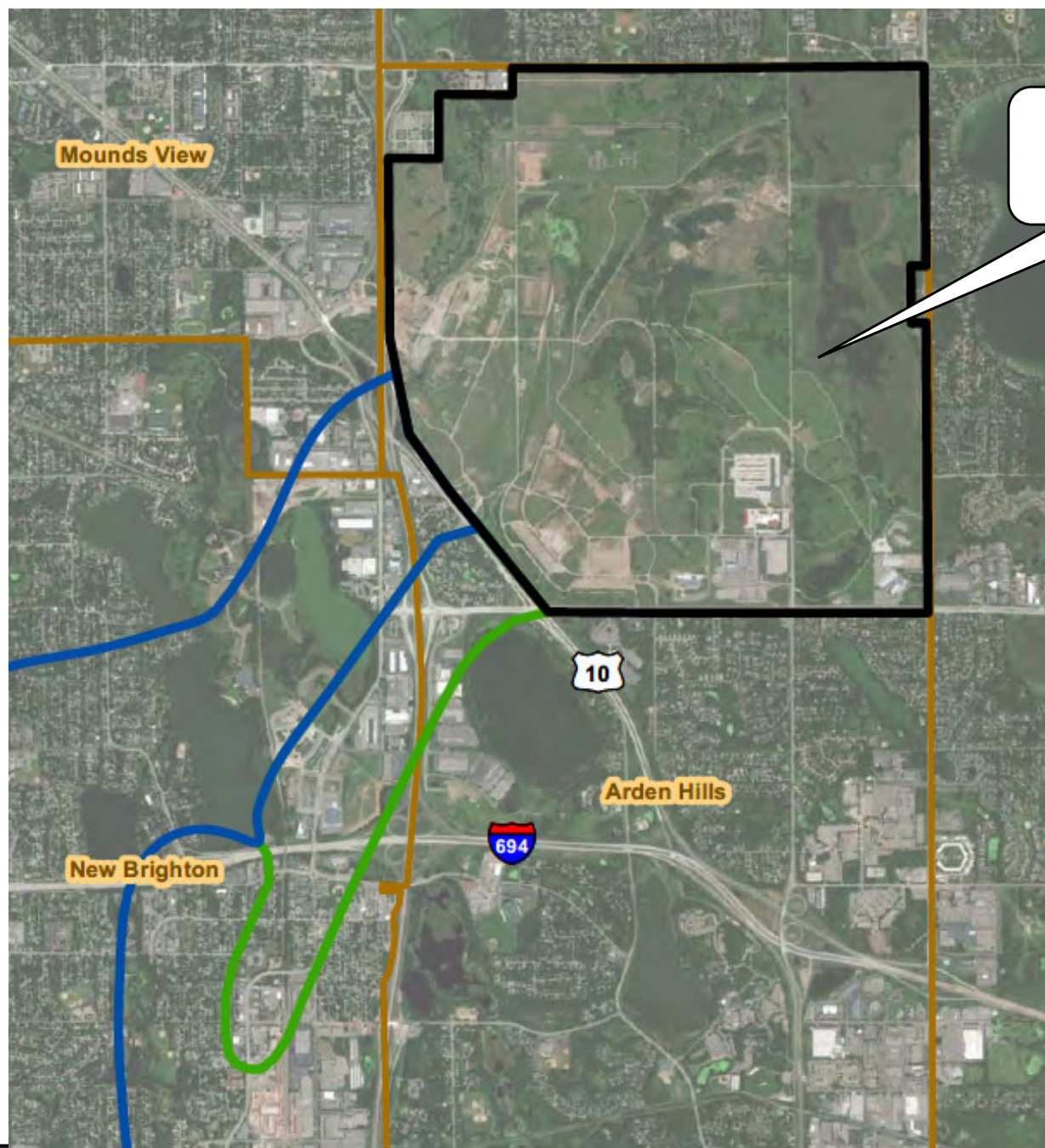
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-  Operable Unit 3 (South Plume)
-  Municipal Boundaries



- No change since last meeting.
- Goal: increase amount of contaminant removed by relocating well more central to plume.
- Optimization identified a need for a new well in New Brighton.







Twin Cities Army Ammunition Plant Cleanup



On-Post
OU2

LEGEND:

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-  Municipal Boundaries

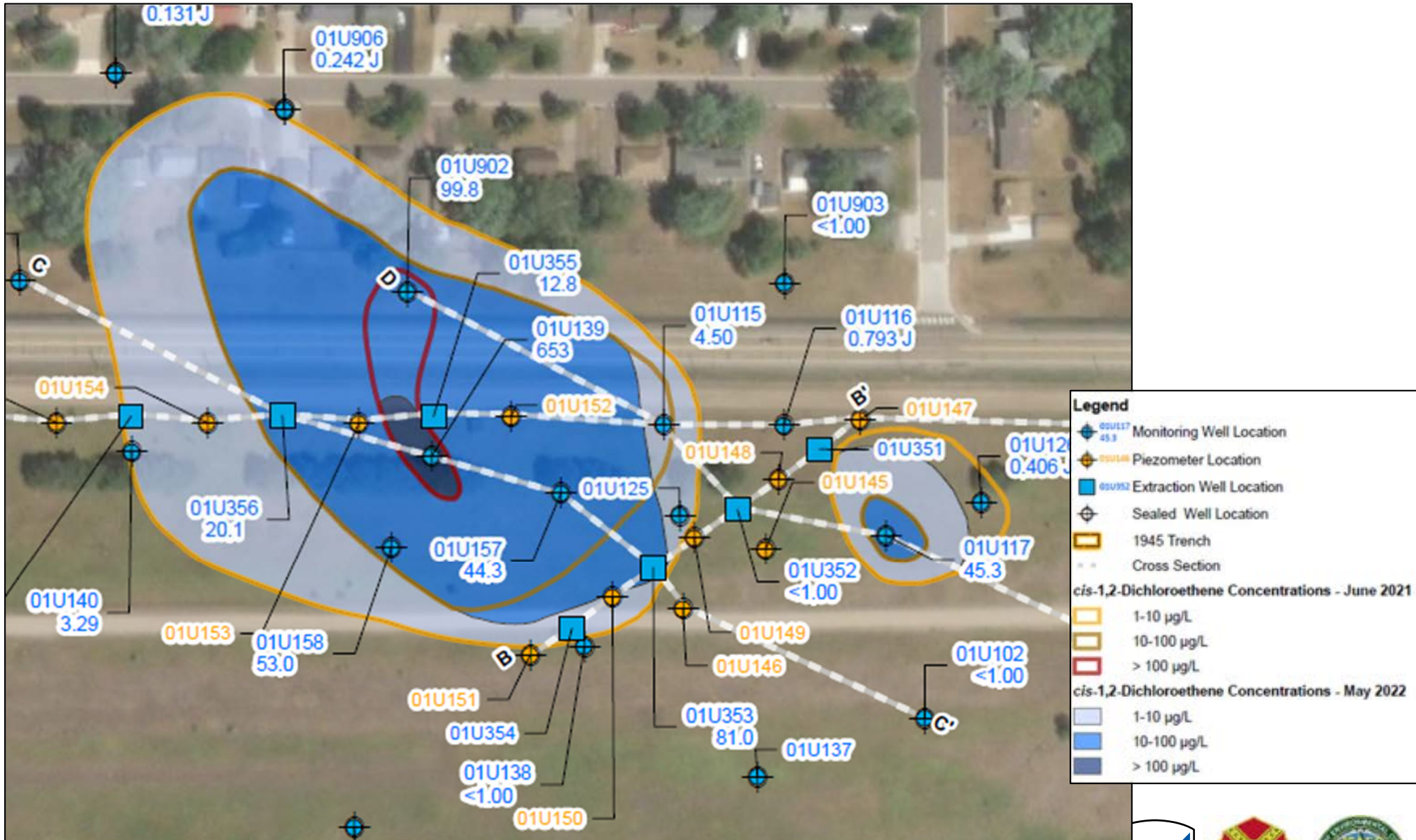


OU2 – Site A Monitored Natural Attenuation

- Main plume (FY 2022) relatively stable compared to FY 2021 – higher concentration area ($> 100 \mu\text{g/L}$) decreasing.
- Distal portions of the smaller plume appear to have pulled back.
- Resampling completed in August 2023 due to sample shipping issues.



OU2 – Site A Monitored Natural Attenuation



OU2 – Site C Monitored Natural Attenuation











- Only one location exceed cleanup level compared to two locations in FY 2021.
- Plume decreased compared to FY 2021. Previous minor detections are now less than laboratory reporting limits.
- Continue monitored natural attenuation.



OU2 – Site C Monitored Natural Attenuation



Legend

 01U573 21.6	Monitoring Well Location		Approximate Boundary of Wetland Constructed in 2007
 01U569	Sealed Well Location		Exceeds Groundwater Cleanup Level (15 µg/L) - May 2022 (Values in parentheses were not used for contouring purposes)
 SW-6	Surface Water Sampling Locations		--- Inferred Groundwater Elevation Contours
	Groundwater Elevation Contours (ft amsl)		- - - Cross Section
	Location of Plot for Phytoremediation Demonstration		— Ditch

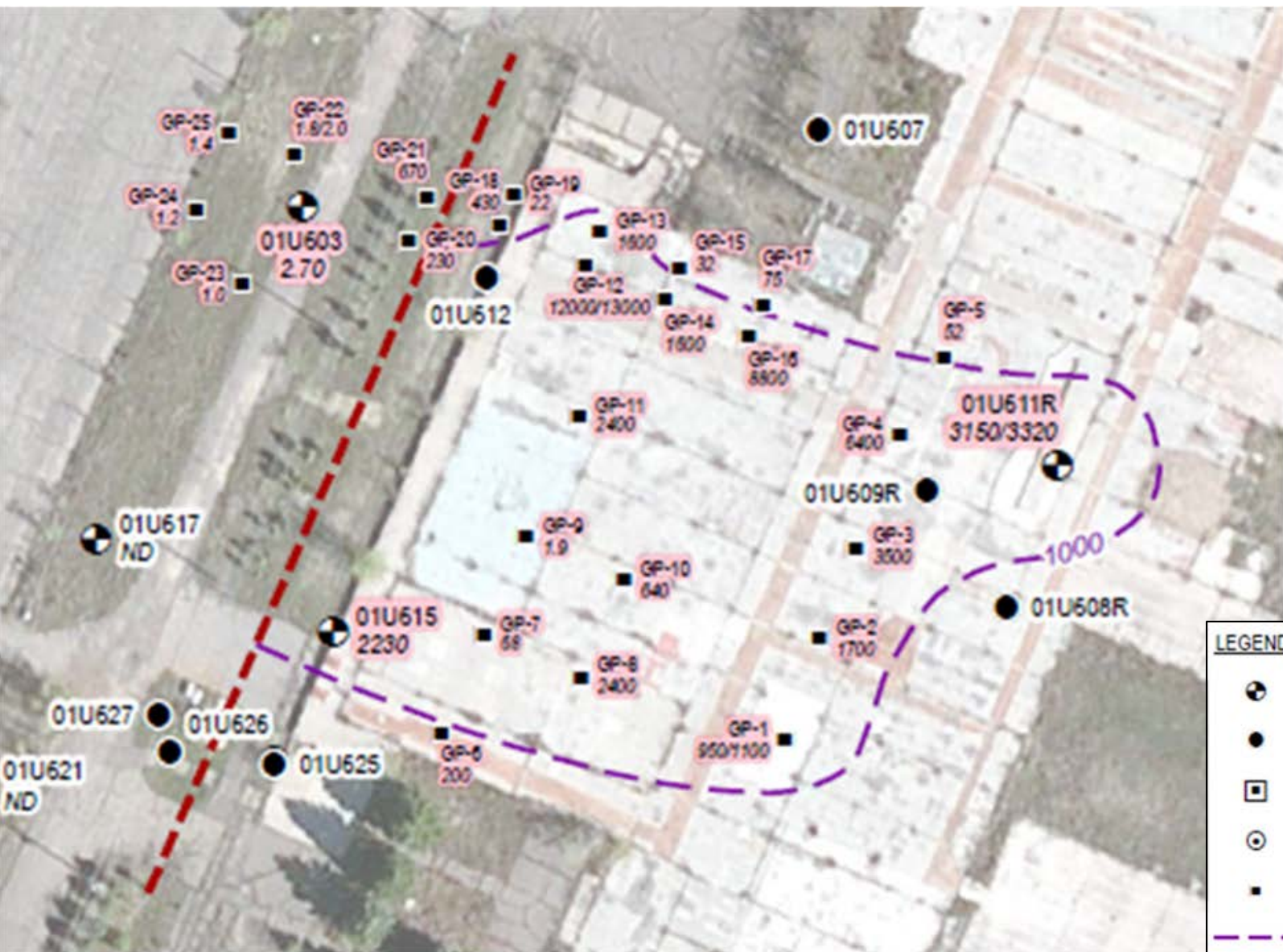


OU2 – Site K Pump and Treat








- Plume relatively stable compared to FY 2021.
- Groundwater collection system continues to provide containment of the horizontal and vertical extent of the trichloroethene (TCE) plume.
- Continue pump and treat operations.



OU2 – Site K Pump and Treat



LEGEND

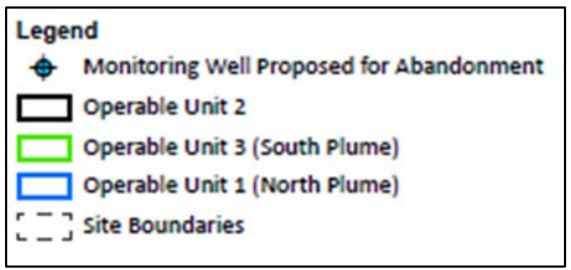
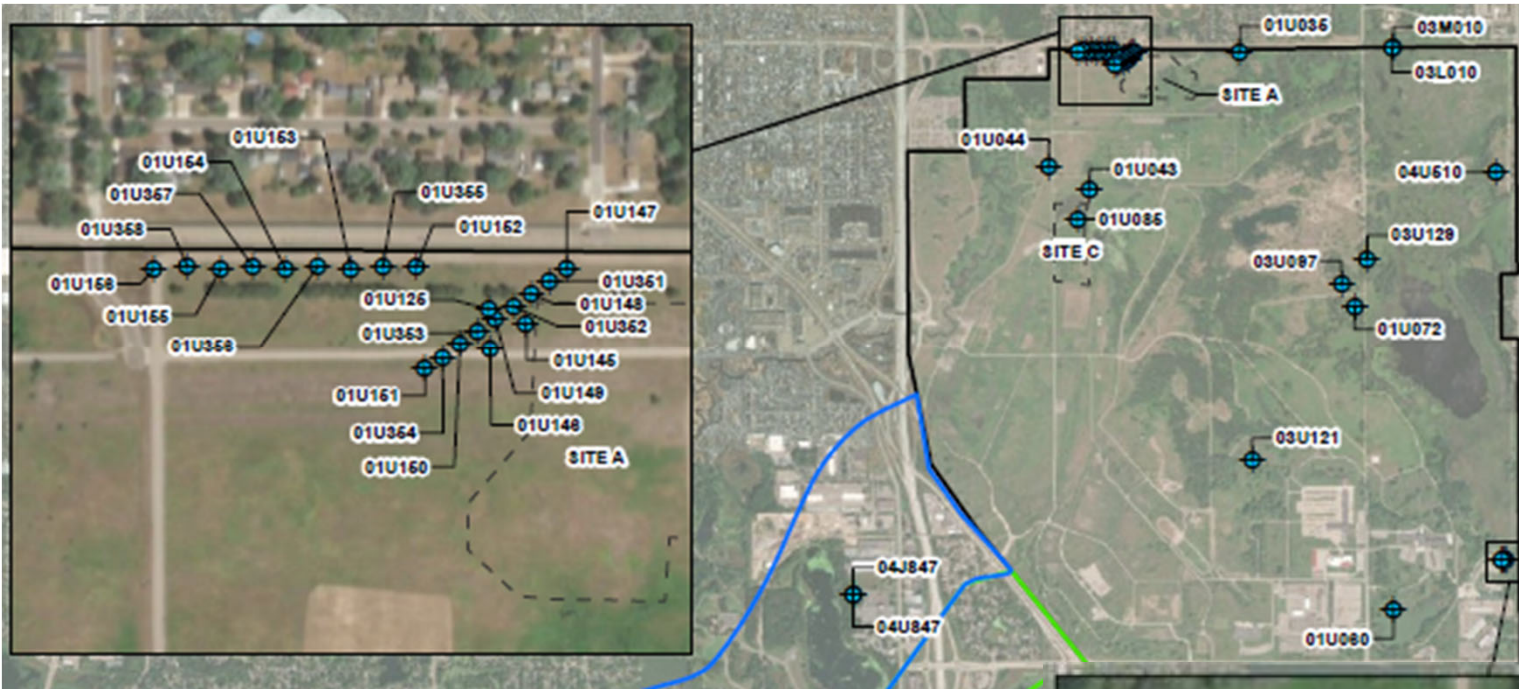
-  ANNUAL UNIT 1 WATER QUALITY MONITORING WELL LOCATION
-  ANNUAL UNIT 1 WATER LEVEL MONITORING WELL LOCATION
-  UNIT 3 SENTINEL WELL LOCATION
-  BUILDING 102 MONITORING WELL (SAMPLED IN MAY 2022)
-  GEOPROBE BORING LOCATION FROM 2014 INVESTIGATION
-  1000 µg/L TCE PLUME LIMIT (ESTIMATED BASED ON 2014 DATA)
-  SITE K COLLECTION TRENCH LOCATION



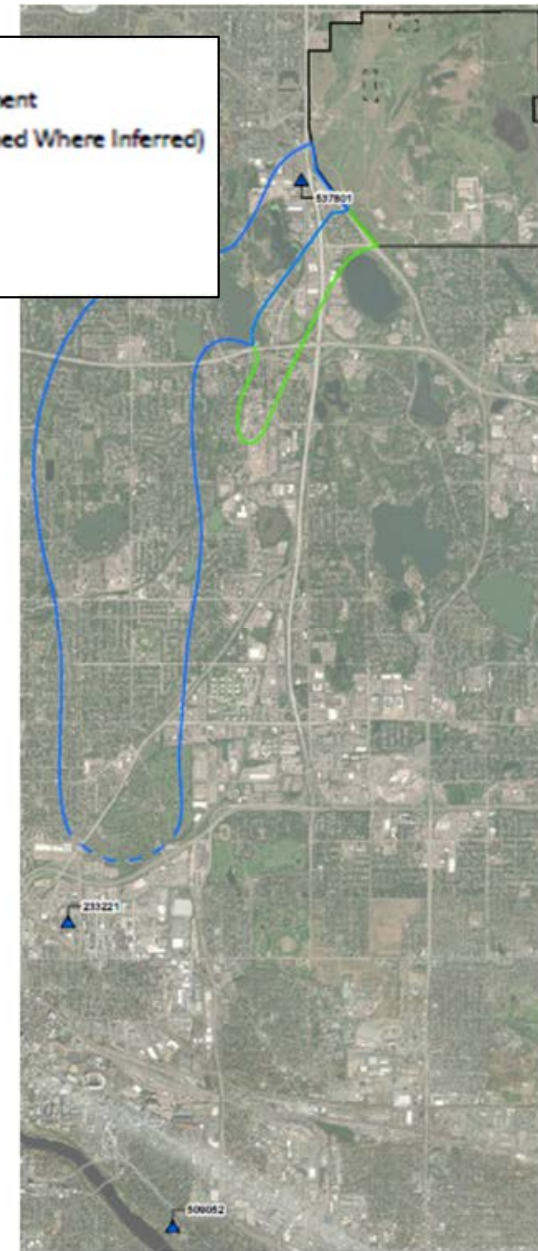
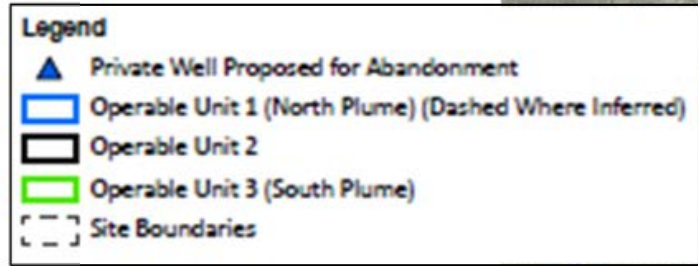
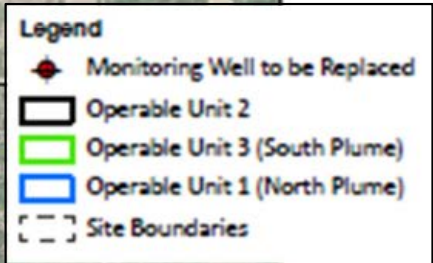
- Abandonment of three industrial wells in OU1 and 42 monitoring wells in OU2.
- Reinstallation of four monitoring wells in OU1 and one monitoring well in OU2.
- Monitoring well reinstallation in OU1 pending successful right-of-entry negotiations.



OU1/OU2 Well Abandonment and Reinstallation



OU1/OU2 Well Abandonment and Reinstallation



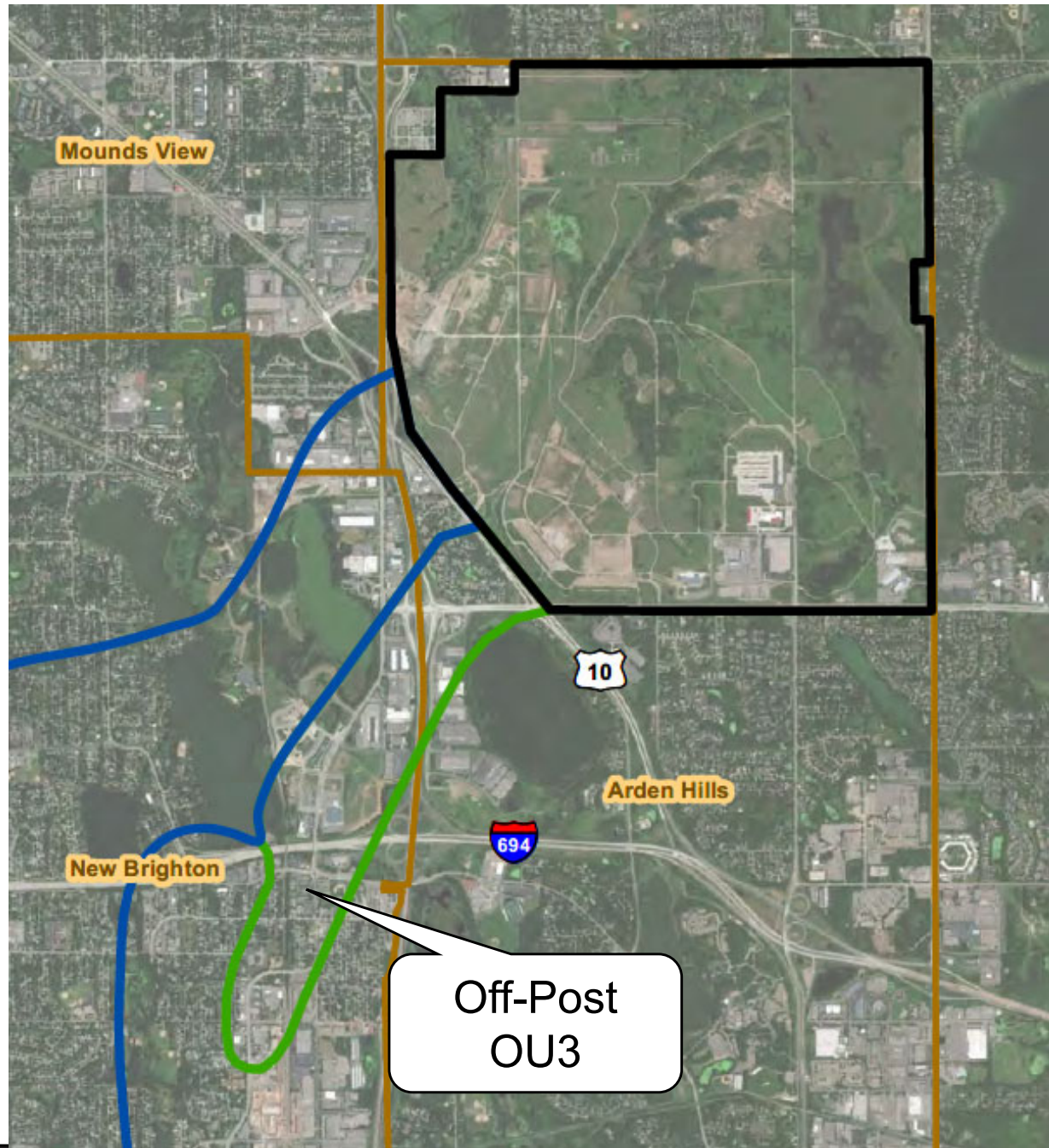
- SGRS construction complete.
 - Official full-scale operation began on 6 February 2023.
 - Discharge limits consistently met in monthly sampling.
 - Currently operating at 407 gpm with all SGRS wells pumping.
- Boundary Groundwater Recovery System (BGRS) extraction = 1,600 gpm. Total TGRS = 2,004 gpm (TGRS Global Operating Strategy minimum = 1,745 gpm).







- Hydraulic Evaluation of SGRS system completed in Spring 2023.
- Draft report submitted to Minnesota Pollution Control Agency and Environmental Protection Agency.
- Report concludes that SGRS extraction wells substantially capture their respective source areas (Sites D, G and I).
- Proposes shut down of BGRS operating wells containing low TCE concentrations and revised minimum operating rates for remaining wells.



Twin Cities Army Ammunition Plant Cleanup



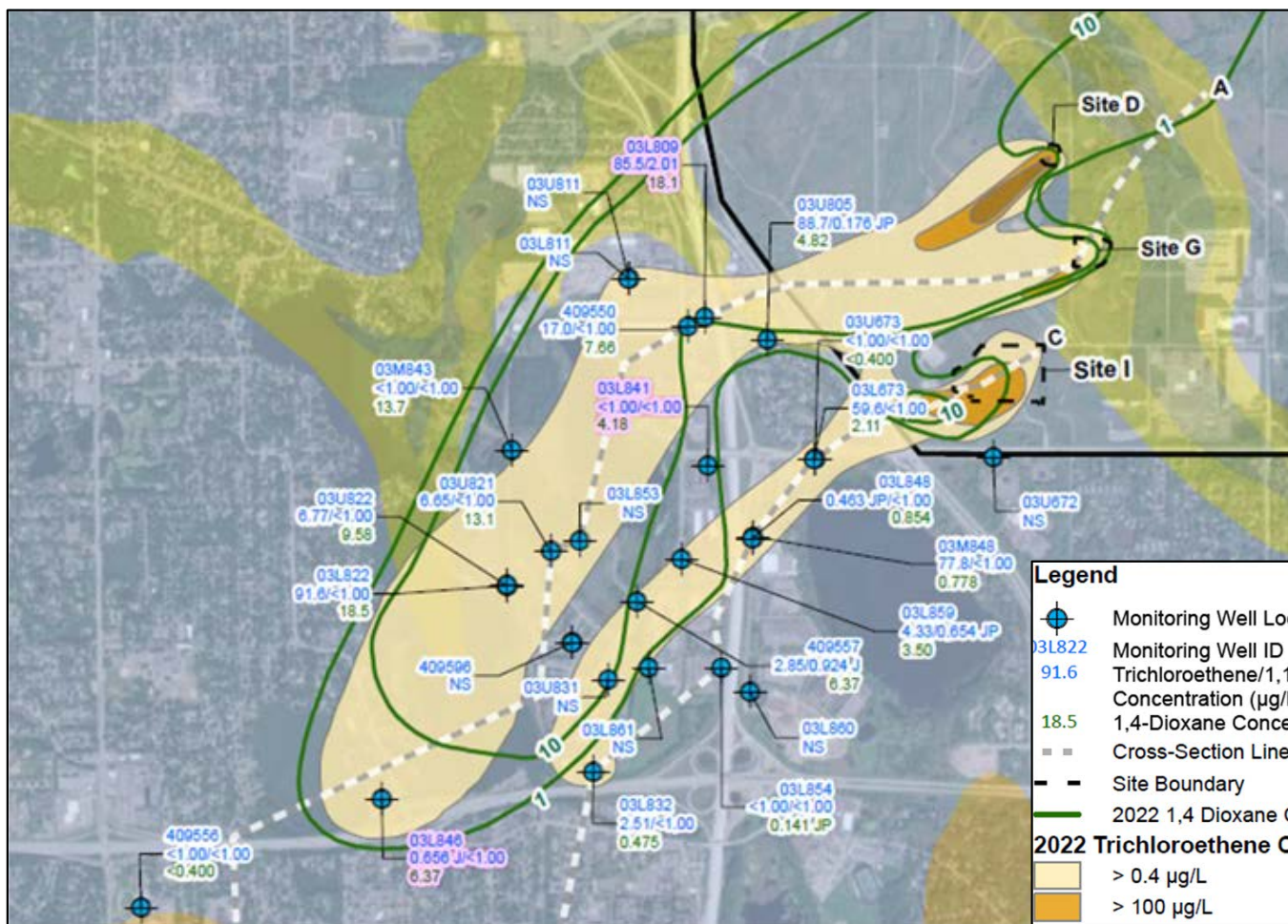
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Off-Post
OU3



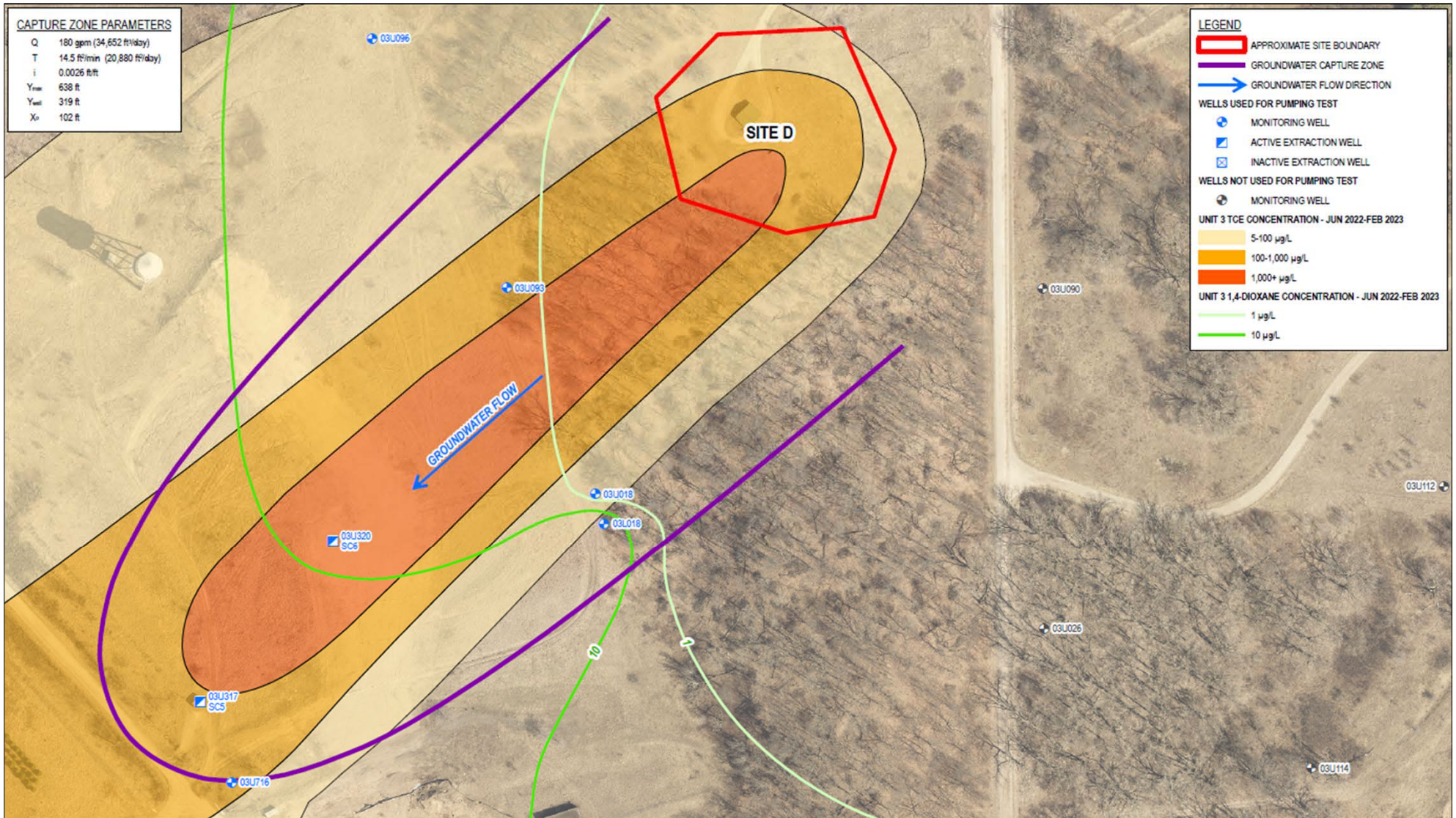
- OU3 plume remains relatively stable – some migration to the south but areas of higher concentrations have diminished.
- Continued monitored natural attenuation.
- Annual groundwater sampling completed in May 2023.



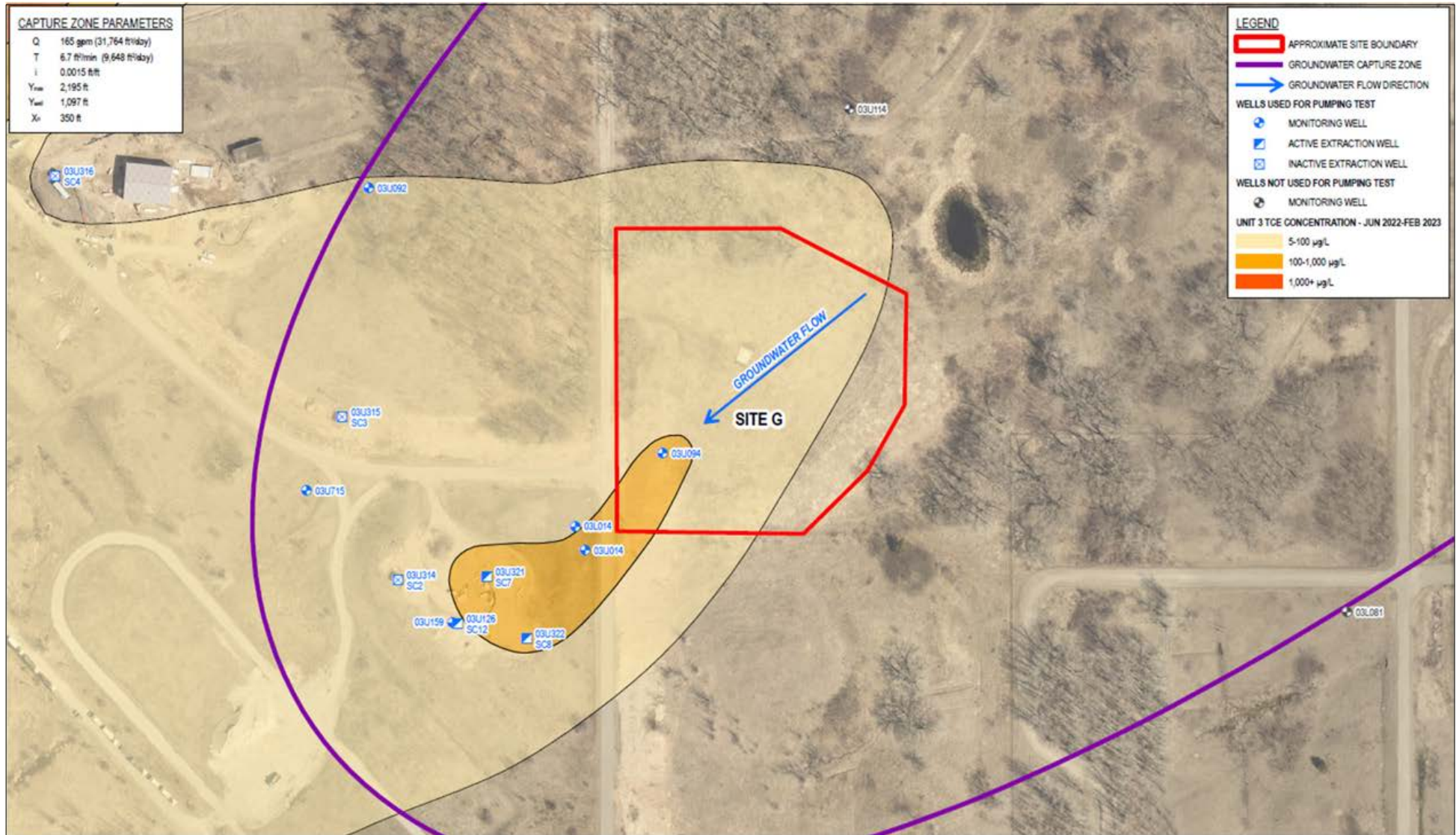
Legend	
	Monitoring Well Locations
03L822	Monitoring Well ID
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18.5	1,4-Dioxane Concentration (µg/L)
	Cross-Section Line
	Site Boundary
	2022 1,4-Dioxane Concentration Contour (µg/L)
	> 0.4 µg/L
	> 100 µg/L
	> 1,000 µg/L
	Operable Unit 2
Bedrock Geology	
	Decorah Shale, Galena Group
	Platteville and Glenwood Fms
	St. Peter Sandstone
	Prairie du Chien Group
	Jordan Sandstone
	St. Lawrence Formation
	Tunnel City Group



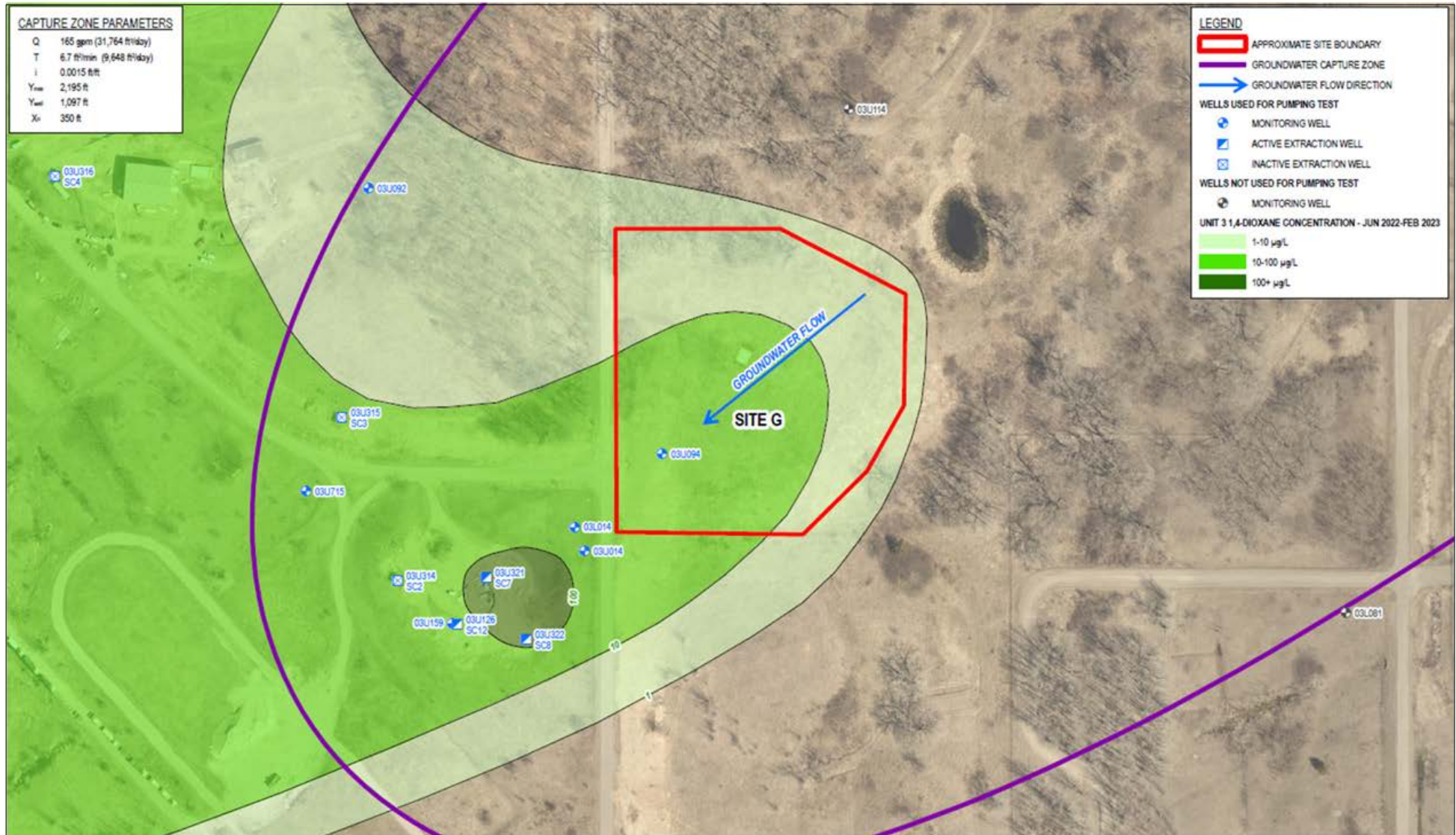
Site D Hydraulic Capture



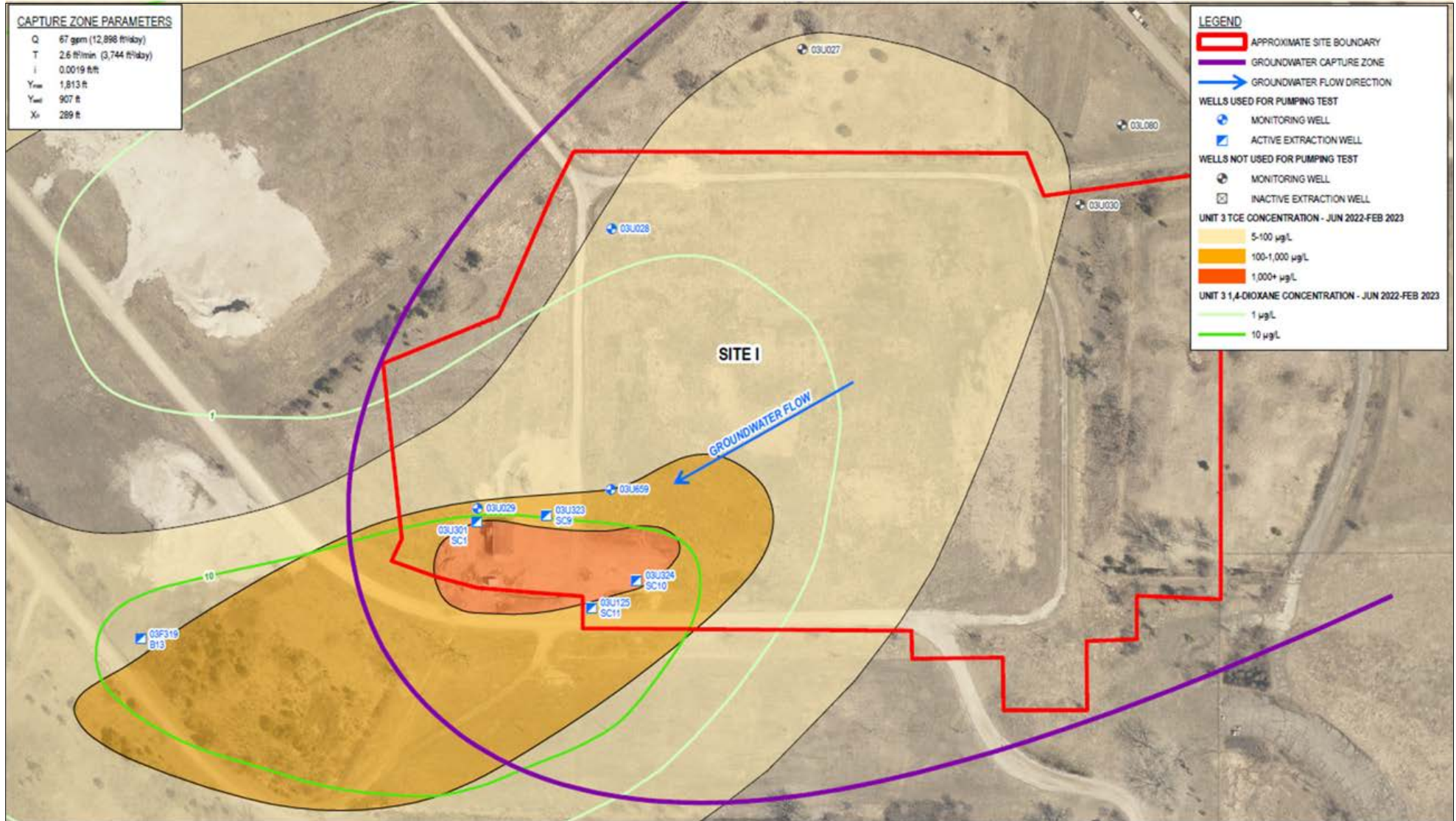
Site G Hydraulic Capture



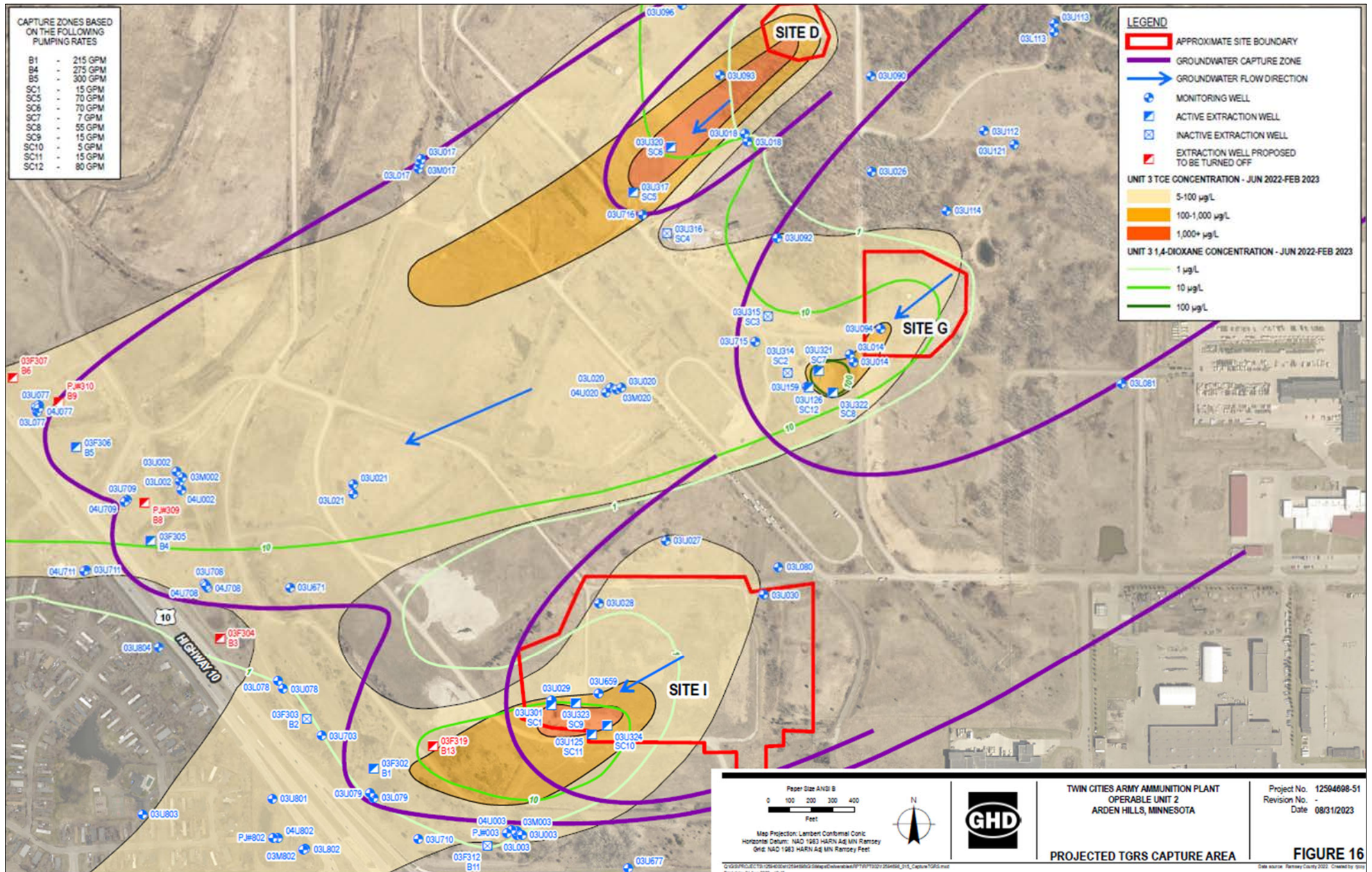
Site G Hydraulic Capture



Site I Hydraulic Capture



Projected TGRS Capture



- Discharged water from both BGRS and SGRS is sampled monthly and analyzed in accordance with the Record of Decision (ROD) to ensure discharge standards are met.
- SGRS process water sampling results were used to model air emissions. Emissions are below Minnesota inhalation risks levels for acute, subchronic, chronic, and cancer exposures.
- Key findings included no detectable ozone emissions and much lower TCE concentrations entering the air stripper than estimated in April 2021.
- BGRS Influent TCE concentrations (and TCE emissions) have decreased over 80% due to SC-1 and SC-5 being rerouted to SGRS for treatment.



- After the new TGRS operational flow rates are established and modified operational strategy is implemented:
 - Air sampling and modeling will be completed for Building 116 emissions.
 - This allows the sampling to be based on actual operating conditions and ensures the modeling of maximum conditions is accurate.



- USGS Groundwater Modeling
- USGS Site K
- Round Lake Design



- OU1
 - Optimization identified a need for a new well in New Brighton.
 - Begin industrial well abandonment (3 wells).
 - Begin installation of 4 monitoring wells.
- OU2
 - Begin abandonment of 42 monitoring wells.
 - Begin installation of 1 monitoring well including optimization of the monitoring well network.
 - Begin Risk Assessment for unrestricted land use.
 - 135 Primer Tracer Area.
- OU3
 - Continue groundwater monitoring.
- Round Lake
 - Continue remedial design.
- Administrative Record/Information Repository
 - Army working with Arden Hills Army Training Site (AHATS) to enlarge space.



- Recommend next RAB meetings 20 February and 17 September 2024.
- Topics for future RAB meetings?
- Additional administrative requirements for RAB?
- Suggestions for improvement of RAB?



- Review/Approve minutes of last meeting
- Old Business
- Cleanup Status Update
- New Business
- Next Meeting Agenda
- Public Comments



- Does anyone have any comments, concerns or suggestions



- You can ask questions now or at anytime using the email listed on the website.



