Facility-wide Groundwater

Approach to Conducting the Feasibility Study

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Purpose of Meeting

- Present the Project Team
- Summarize the Facility-wide Groundwater Investigation Activities
- Summarize Remedial Investigation (RI) Objectives and Conclusions
- Present the Facility-wide Groundwater Feasibility Study Sites and Anticipated Site-specific Process
- Summarize the Locations and Purpose of Proposed Feasibility Study Wells
- Present Considerations of New Well Construction Activities
- Discuss the Path Forward

Project Team

- Army National Guard (lead agency)
- Ohio Army National Guard
- U.S. Army Corps of Engineers
- Ohio Environmental Protection Agency
- Leidos (performing contractor)

Supplemental Material

- Attachment 1. Facility-wide Groundwater Monitoring Well Network
- Attachment 2. Final RI Sites Recommended for Further Evaluation in an FS
- Attachment 3. Proposed New FS Monitoring Well Locations
- Attachment 4. Load Line 1 Proposed FS Wells
- Attachment 5. Load Line 3 Proposed FS Wells
- Attachment 6. Load Line 12 Proposed FS Wells
- Attachment 7. Fuze and Booster Quarry Ponds Proposed FS Wells

Facility-wide Groundwater
Investigation Activities Overview

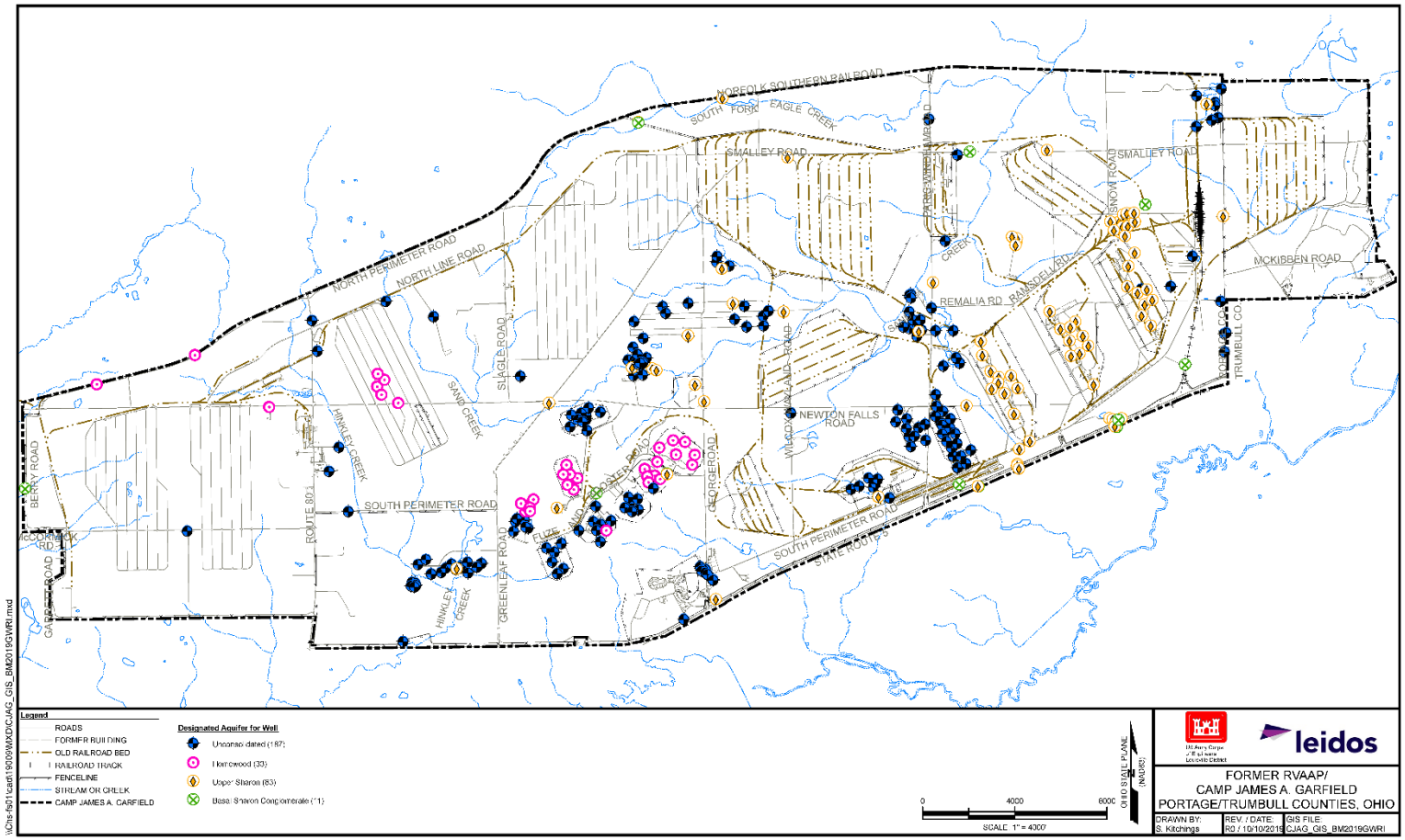
- More than 300 permanent and temporary wells have been installed.
- 86 unique sampling events have been conducted to analyze groundwater.
- 350 chemicals were analyzed in groundwater at the former RVAAP.
- More than 6,400 groundwater samples have been collected and more than 400,000 analytical results and 18,000 field parameters are currently available in REIMS.

Attachment 1 presents the entirety of CJAG and the monitoring well network.

The first Facility-wide Groundwater Monitoring Program Plan was finalized in September 2004

- Reporting summary since 2004
  - 17 Annual Reports (2005-2021)
  - 45 Semi-annual Sampling Event Reports
  - Multiple addendums have been submitted to specify the upcoming year groundwater sampling.

Facility-wide Groundwater
Monitoring Well Network



Camp James A. Garfield 2019 Facility-wide Groundwater RI

Facility-wide Groundwater
Remedial Investigation Objectives

- Identify potential contaminant sources that may negatively impact groundwater; assess contamination and remedial actions performed.
- Evaluate previously identified data gaps and determine if new data gaps exist within the monitoring network.
- Determine what areas have unacceptable human health or ecological risk and need to be further evaluated within a Feasibility Study.
- Assess the potential transport of contaminant migration that may require evaluation in a Feasibility Study.
- Establish what areas do not pose unacceptable human health or ecological risk from exposure to groundwater at CJAG.

Facility-wide Groundwater
Remedial Investigation Conclusions

April 2022 – The ***Final RVAAP-66 Facility-wide Groundwater Remedial Investigation Report*** was approved.

- Potential Contaminant Source Areas included the evaluation of 53 areas of concern (AOCs), 17 munitions response sites (MRSs), and 14 compliance restoration sites (CRs)
  - The Remedial Investigation demonstrated source areas have been generally well-characterized through the completion of multiple environmental investigations
  - Numerous remedial actions have been completed to address contamination
- Data gaps are continually assessed with newly acquired data
  - Addendums (or Sampling Plans) are developed annually to present an ongoing assessment of nature and extent data gaps
  - Monitor contaminant concentrations within specific wells.

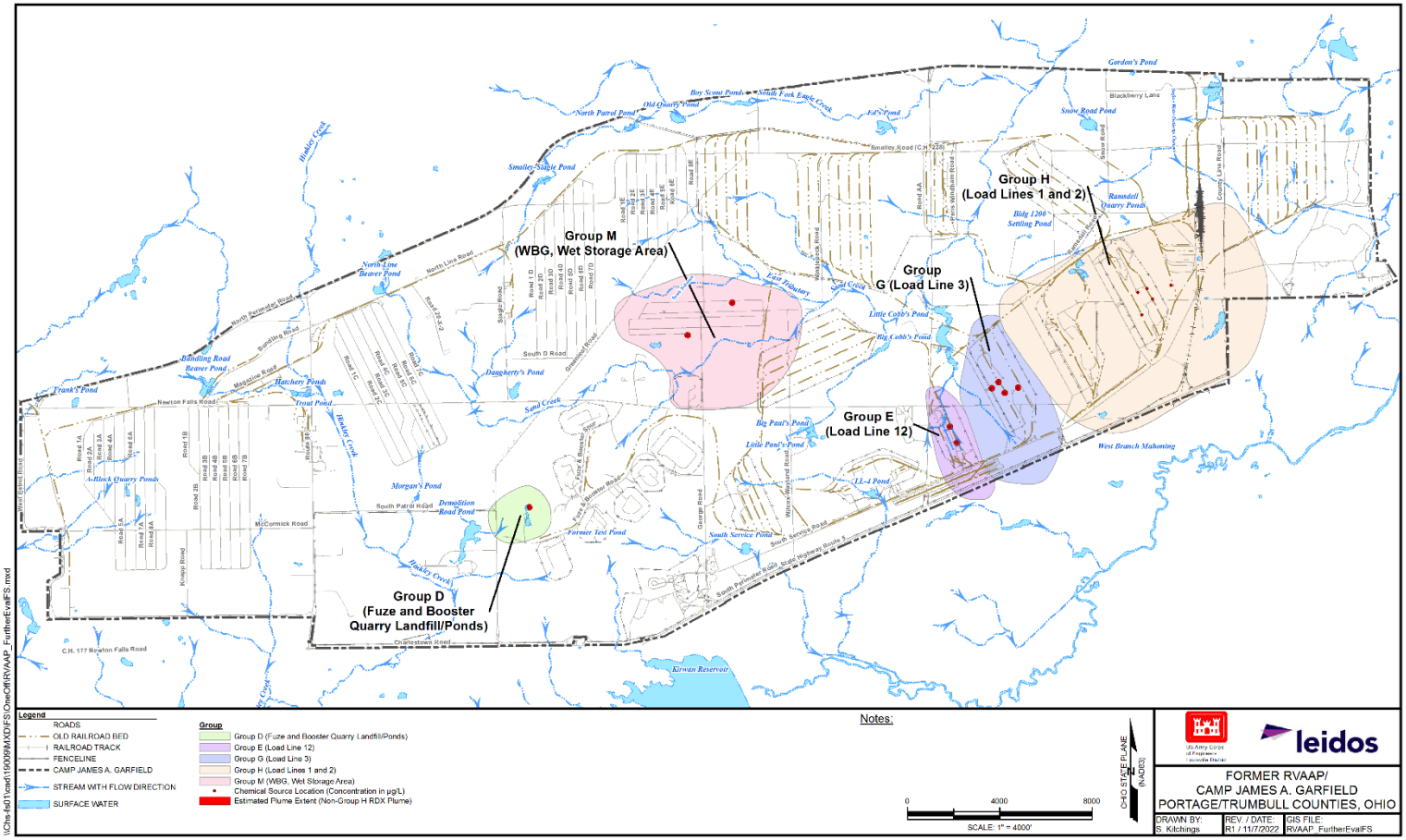
Facility-wide Groundwater
Remedial Investigation Conclusions

- The Remedial Investigation Report identified five areas where groundwater concentrations (explosives and nitrate) require further evaluation in a Feasibility Study due to results of the human health risk assessment.

Source Area	Contaminant of Concern
RVAAP-05 Winklepeck Burning Grounds	RDX
RVAAP-08 Load Line 1	1,3-DNB; 2,4-DNT; 2,6-DNT; and RDX
RVAAP-10 Load Line 3	2,4,6-TNT; 2,6-DNT; 4 amino-2,6-DNT; and RDX
RVAAP-12 Load Line 12	nitrate and ammonia
RVAAP-16 Fuze and Booster Quarry	2,4-DNT; 2 amino-4,6-DNT; 4-amino-2,6-DNT; and 2,4,6-TNT

- The ecological risk assessment concluded no further action is required to be protective of important ecological resources.
- Fate and transport analysis further confirmed migration of groundwater to surface water was not a concern.
- Attachment 2 presents Remedial Investigation Report conclusions for areas where further evaluation in a Feasibility Study is recommended.

Facility-wide Groundwater
Feasibility Study Sites



Attachment 2. Areas Within CJAG Requiring Further Evaluation within a Feasibility Study

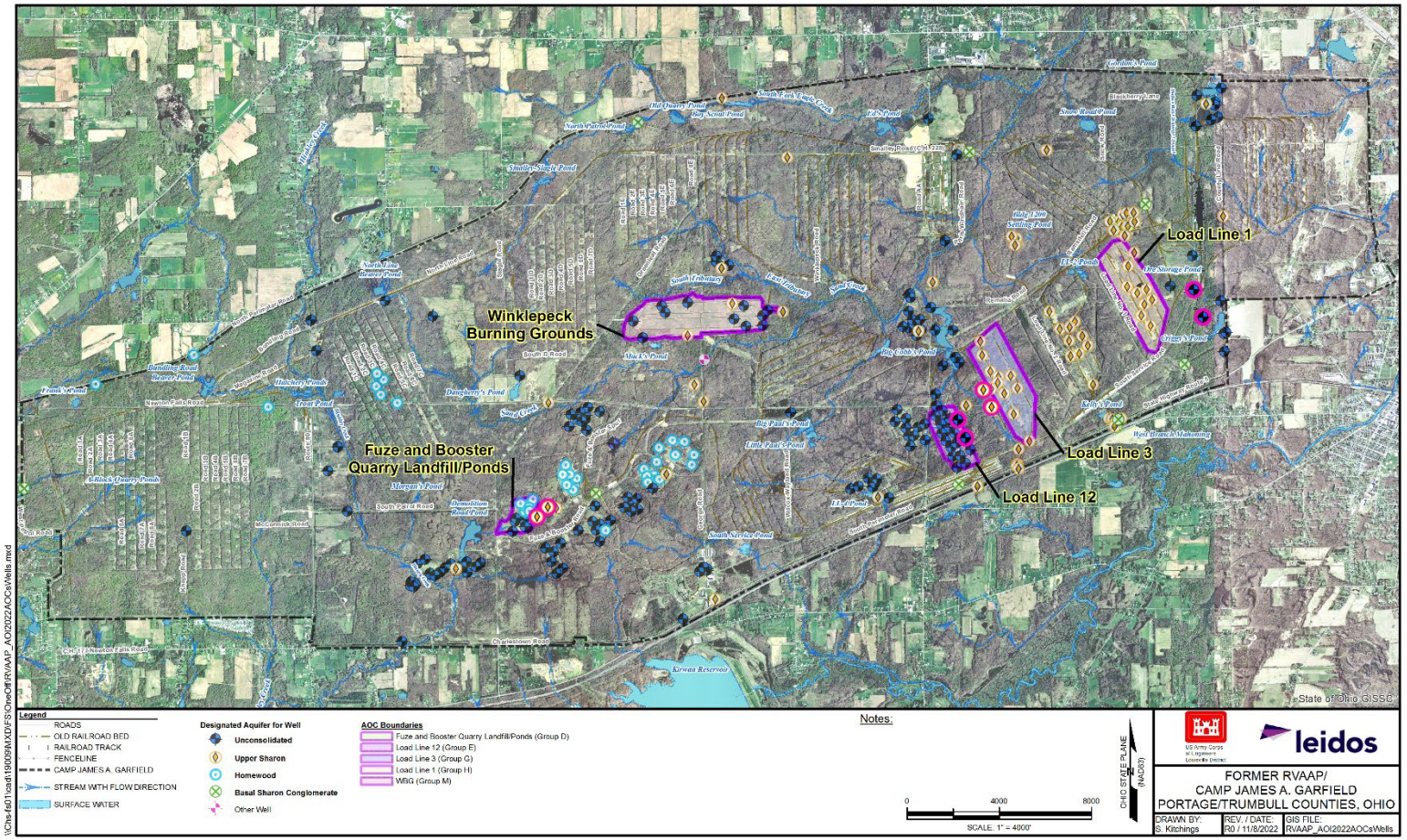
Facility-wide Groundwater
Feasibility Study Process

- Develop Remedial Action Objectives
  - Mitigate unacceptable human health risk associated with contaminants of concern in groundwater (explosives and nitrate)
- Develop Conceptual Site Model (CSM)
  - Install Feasibility Study wells and collect data to refine CSM
  - Establish localized groundwater flow pattern for fate and transport
  - Confirm vertical and horizontal delineation
- Develop site-specific remediation goals
  - Maximum contaminant level for nitrate
  - Tap Water regional screening levels for explosives (1E-05 or target HQ of 1)
- Review Applicable, Relevant, and Appropriate Requirements (ARARs)
  - Chemical-, location- and action-specific ARARs
  - To Be Considered Guidance (TBCs)
- Evaluate General Response Actions
- Conduct Initial and Detailed Screening
- Develop Alternatives for Analysis
- Conduct Comparative Analysis

Facility-wide Groundwater
Feasibility Study Wells

- The Army is proposing the installation of 12 new wells to supplement the Feasibility Study Report, providing additional delineation and contaminant transport data.
- Data will be used to support the CSM, trend analysis, and site-specific fate and transport.
- Feasibility Study sites recommended for new wells:
  - RVAAP-08 Load Line 1
  - RVAAP-10 Load Line 3
  - RVAAP-12 Load Line 12
  - RVAAP-16 Fuze and Booster Quarry.
- In July 2022, the Army drafted a *Feasibility Study Monitoring Well Installation Plan for RVAAP-66 Facility-wide Groundwater*, which is currently undergoing Ohio EPA review.
- Attachment 3 depicts the proposed 12 new monitoring well locations.

Facility-wide Groundwater
Feasibility Study Wells



Attachment 3. Proposed New Feasibility Study Wells

Facility-wide Groundwater
Feasibility Study Wells

Location	New Well ID	Targeted Aquifer	Approx Well Depth	Purpose
RVAAP-08 Load Line 1			ft bgs	
North of LL1mw-064 (NESTED)	LL1mw-090	Unconsolidated	15	Delineate lateral and vertical extent to the east
	LL1mw-091	Upper Sharon, shallow	70	
West of Criggy's Pond (NESTED)	LL1mw-092	Unconsolidated	30	Delineate lateral and vertical extent to the southeast toward Criggy's Pond
	LL1mw-093	Upper Sharon, shallow	90	
RVAAP-10 Load Line 3				
West of cluster south of LL3mw-245	LL1mw-247	Upper Sharon, shallow	50	Delineate lateral extent to the west
West of cluster south of LL3mw-245	LL1mw-248	Upper Sharon, shallow	50	Delineate lateral extent to the west
RVAAP-12 Load Line 12				
Eastern Border of LL12 North well	LL12mw-248	Unconsolidated	25	Lateral extent to the east
Eastern Border of LL12 South well	LL12mw-249	Unconsolidated	25	Lateral extent to the east
RVAAP-16 Fuze and Booster Quarry Ponds				
Between FBQmw-174 and FWGmw-023 (NESTED)	FBQmw-178	Homewood, shallow	90	Delineate lateral and vertical extent to the east
	FBQmw-179	Upper Sharon, deep	155	
Southeast of FBQmw-174 (NESTED)	FBQmw-180	Homewood, shallow	75	Delineate lateral and vertical extent to the east around topographic high
	FBQmw-181	Upper Sharon, deep bedrock	140	

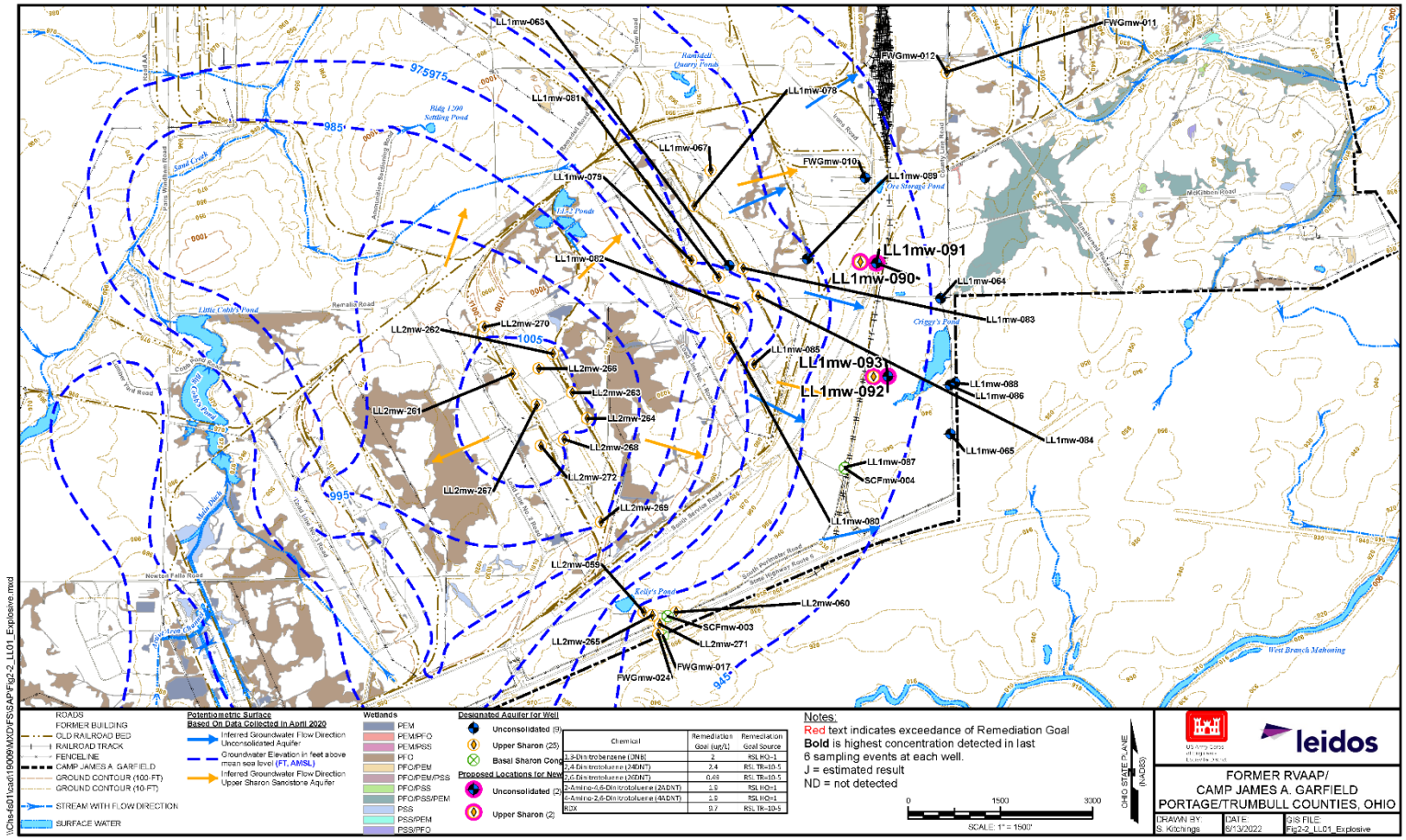
Facility-wide Groundwater
Feasibility Study Well Considerations

› Site Considerations
- Ensure that well location and access do not impact wetlands.
- Locate wells near existing roads to minimize overall site disturbance.
- Minimize vegetation removal, limiting grubbing of existing vegetation to reduce potential erosion and sedimentation.
- Trees greater than 3 inches in diameter will attempt to be avoided. If unavoidable, the trees will be marked, reviewed by OHARNG, and cut between October 1 and March 31.
- Anticipate less than a 1-acre disturbance.

› Drilling Considerations
- Method: Hollow-stem auger/air rotary or sonic drilling.
- Waste: Efficient processes drilling through bedrock that reduce investigation-derived waste generation.

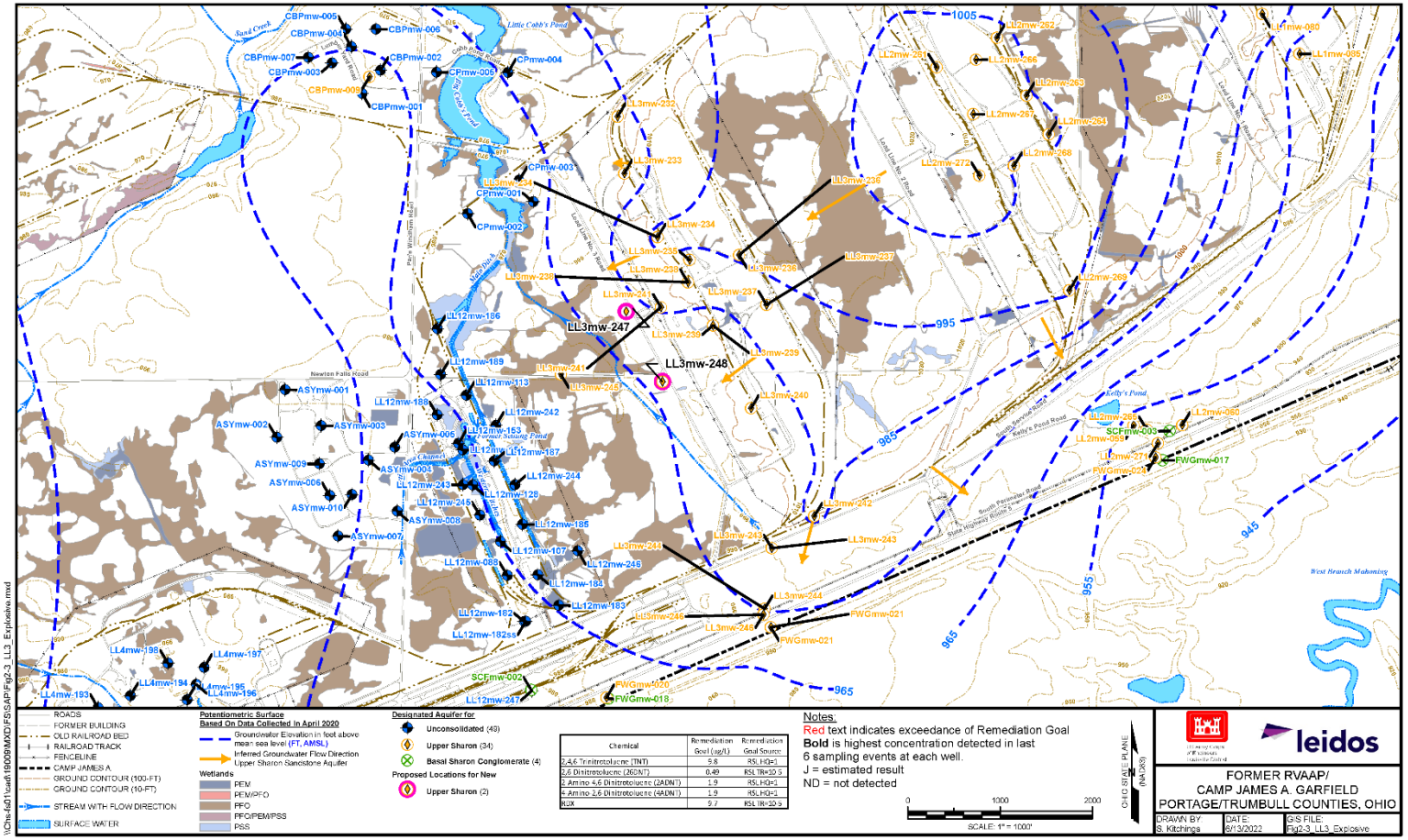
- Attachments 4 thru 7 provide site-specific monitoring well locations on wetland maps.

Facility-wide Groundwater
Proposed FS Study Wells Load Line 1



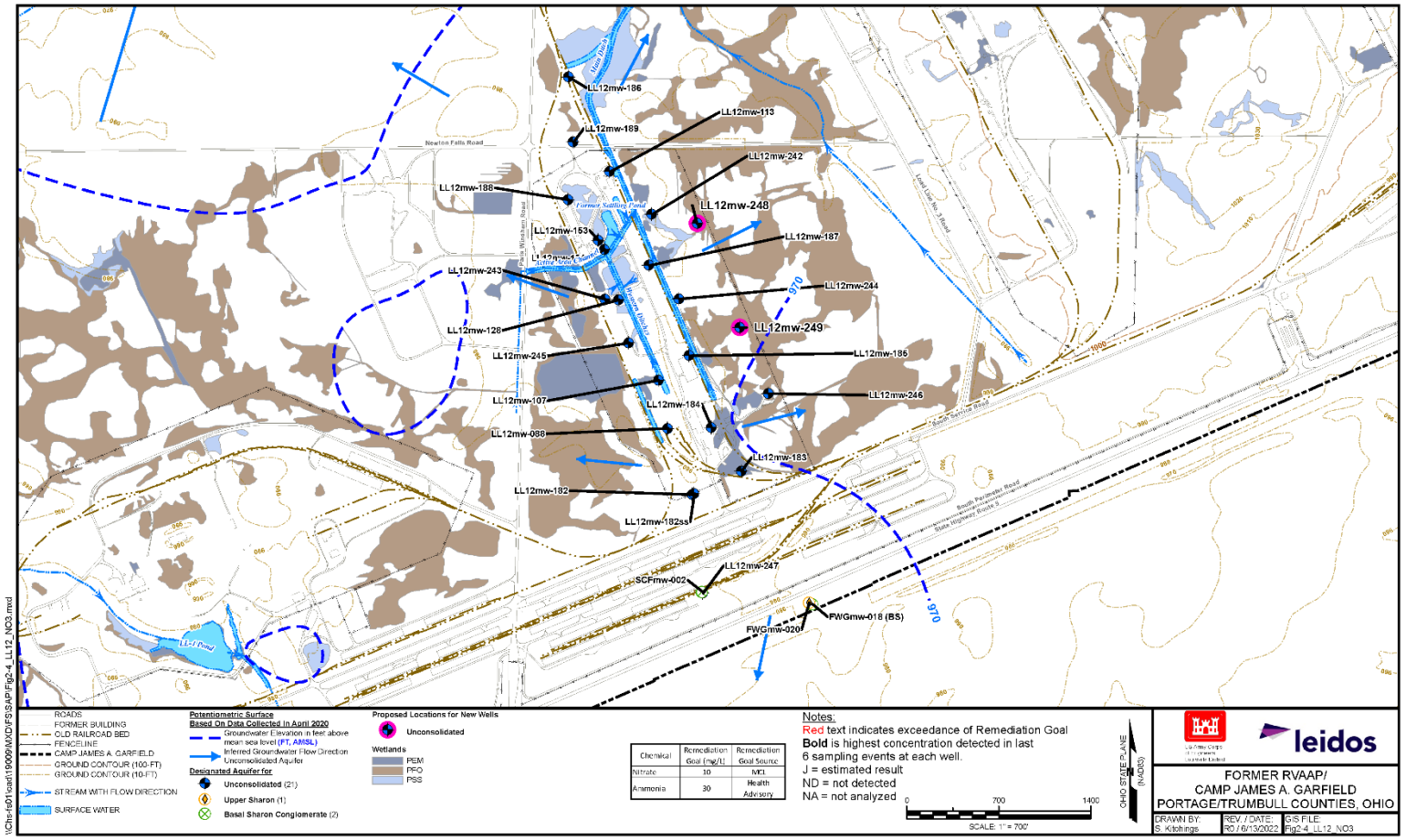
Attachment 4. Proposed Feasibility Study Wells - Load Line 1

Facility-wide Groundwater
Proposed FS Study Wells Load Line 3



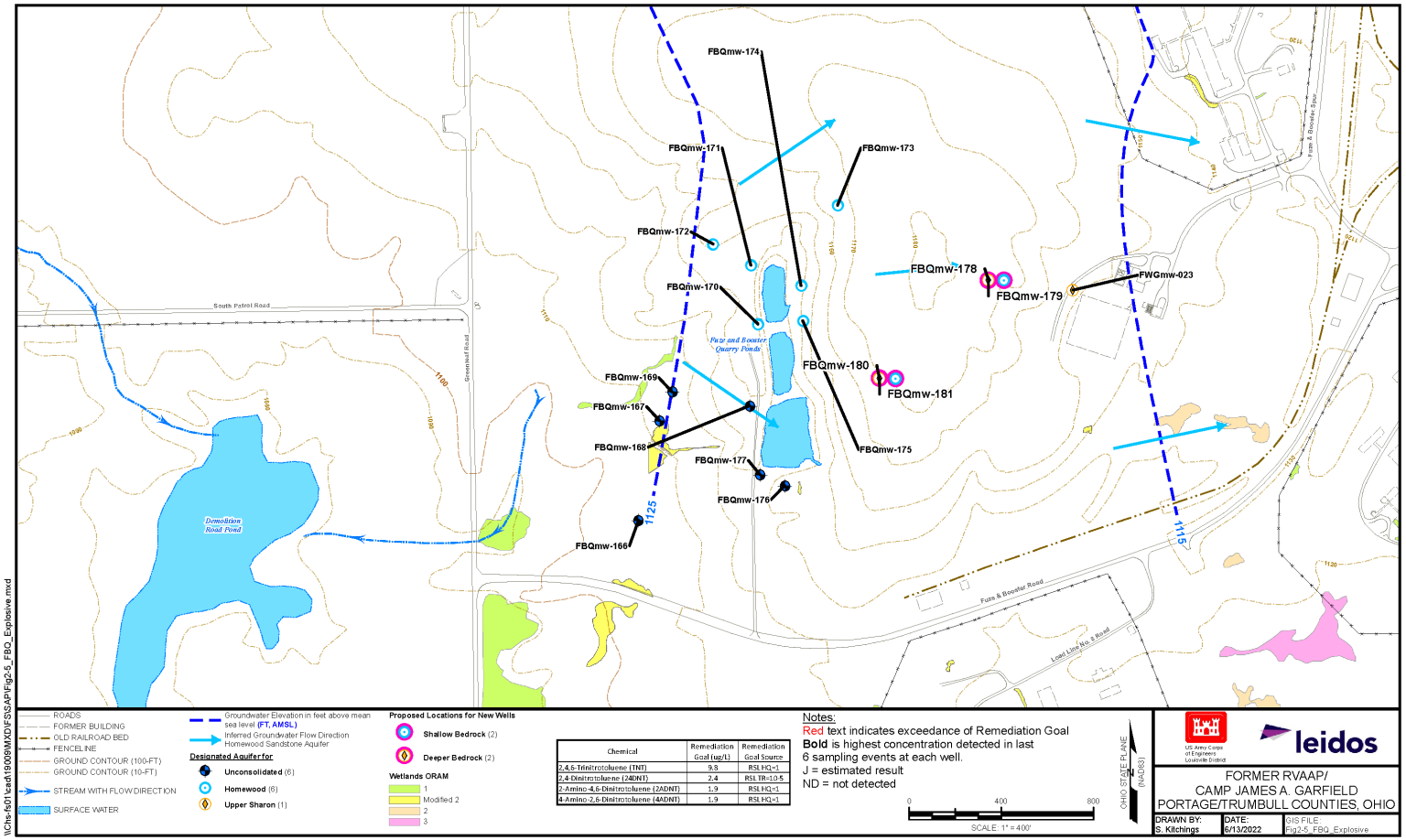
Attachment 5 Proposed Feasibility Study Wells - Load Line 3

Facility-wide Groundwater
Proposed FS Study Wells Load Line 12



Attachment 6. Proposed Feasibility Study Wells - Load Line 12

Facility-wide Groundwater
Proposed FS Study Wells Fuze and Booster Quarry



Attachment 7. Proposed Feasibility Study Wells - Fuze and Booster Quarry

Facility-wide Groundwater
Path Forward

- New monitoring well data satisfy delineation data gaps associated with Feasibility Study sites.
- The Feasibility Study process continues, incorporating the most recent data to evaluate alternatives that achieve remedial action objectives.
- The Army continues to update the FWGWMP Plan
  - The Army will continue to perform semi-annual sampling (continuing during development and review of the Feasibility Study Report)
  - Annual Addenda provide assessments on a well-by-well basis.

Questions?