

# Area B Groundwater Investigation Fort Detrick

Progress Report to the RAB  
November 6, 2013

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ARCADIS

# Overview of Topics

- ❑ Groundwater Tracer Study Overview
- ❑ Shallow Off-Post DPT Drilling Update
- ❑ Schedule for Additional On- and Off-Post Drilling
- ❑ New Site Inspection Task for Area A and Area B Locations

# Work Completed Since the Last RAB

- Continued groundwater tracer study. To date, we've completed 14 of 15 planned rounds of comprehensive tracer sampling.
- Mobilization for additional on- and off-post deep drilling.
- Planning phases for upcoming Site Inspections on Area A and Area B

# Status of Original RI Work Plan Activities

- |  |                                 |
|--|---------------------------------|
| ✓ Existing well assessment and repair        | Feb 2011 to Apr 2011            |
| ✓ New well installation (onsite)             | April 2011 to Mar 2012          |
| ✓ Direct Push Investigation                  | March 2012                      |
| ✓ Spring and Seep Surveys                    | March 2012                      |
| ✓ Groundwater/Surface Water Sampling         | April 2012 /Sept 2012           |
| ✓ Vapor Intrusion Sampling (2 rounds)        | Jan/Aug 2013                    |
| ▶ <b>Groundwater tracer study (on-going)</b> | <b>Spring 2013 to Fall 2013</b> |

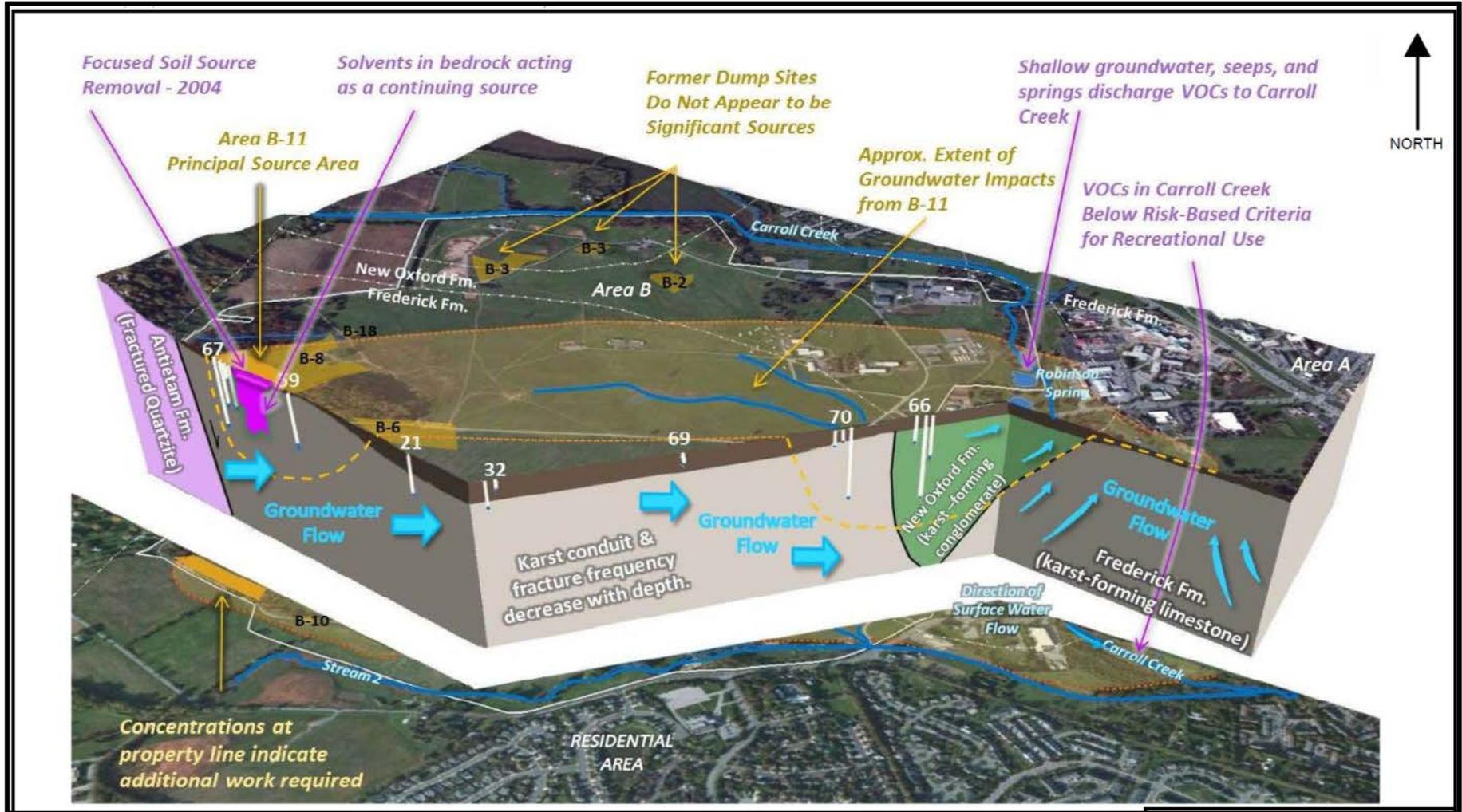
Grey = completed

# Vapor Intrusion Sampling Update

Due to the presence of groundwater contaminated with volatile organic compounds (VOCs) including Trichloroethene (TCE) and Tetrachloroethene (PCE), Vapor Intrusion (VI) testing was performed to check for potential impacts to indoor air.

- 4 offsite, 1 onsite locations (commercial and industrial properties)
- Two rounds of testing completed (January and August 2013)
- Multiple compounds detected
  - Results do not indicate that TCE and PCE impacting indoor air at action levels
  - Several compounds detected slightly above industrial screening level
  - Source of compounds may be local
- Data results provided to EPA and MDE and meeting pending.
- **Next Step: Meet with property owners to discuss results.**

# Area B Conceptual Site Model Review



## Legend

— Streams

■ Spring

■ B-11 Boundary

■ Trichloroethene in Groundwater

→ Groundwater Flow Direction

■ Geologic Contact

Aerial Source: ArcGIS Online Bing Imagery accessed 6/13/2012 via ArcGIS 10.

# Groundwater Tracer Study Update



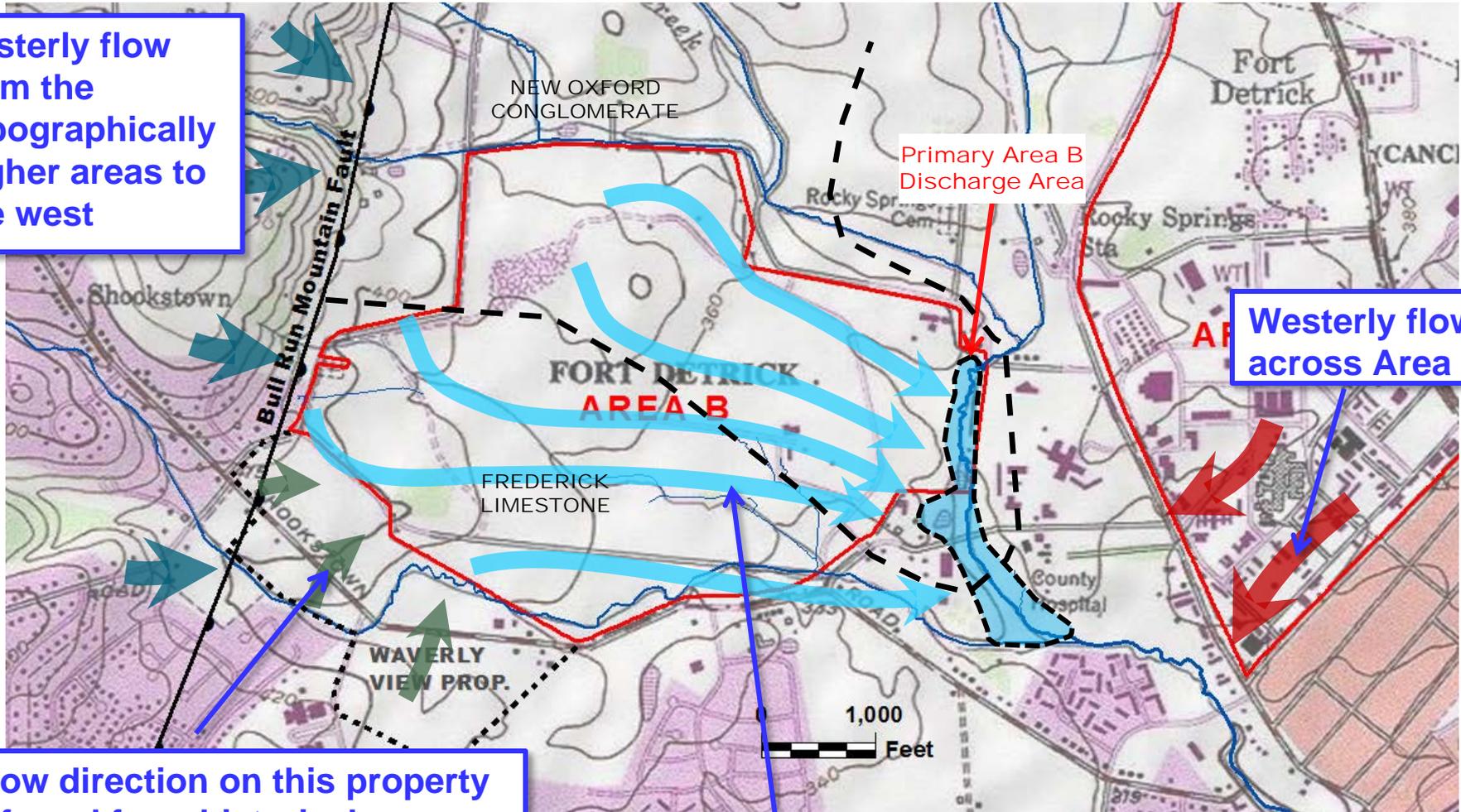
# Groundwater Tracer Study

- What is a groundwater tracer study?
  - A tracer is introduced to the groundwater and monitored over time to see where and when the tracer appears at other monitoring points in the study area (e.g. wells, springs, surface water bodies).
  - Useful for evaluating the groundwater flow velocity and direction of groundwater movement.



# Generalized Patterns of Groundwater Flow

Easterly flow from the topographically higher areas to the west



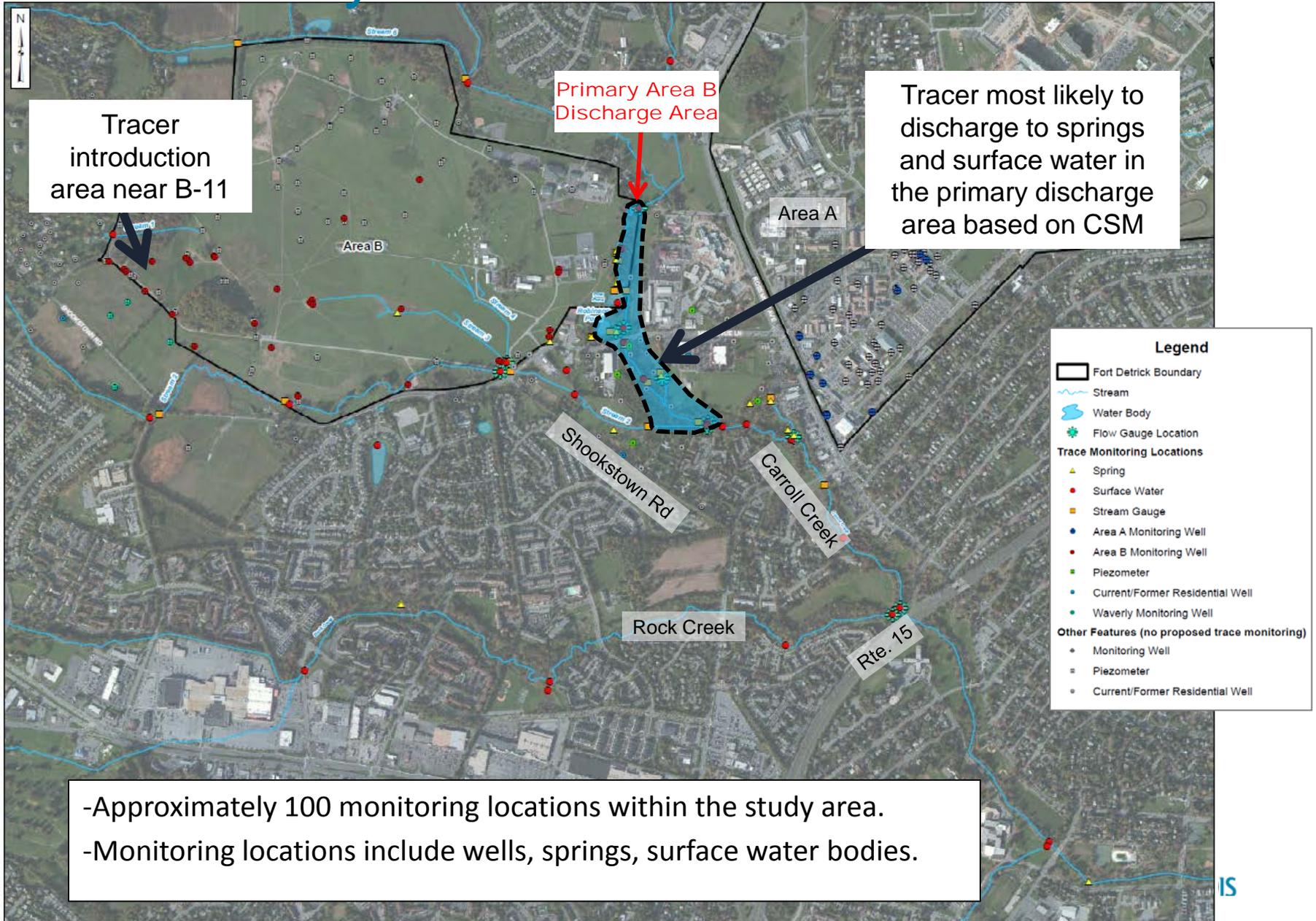
Primary Area B Discharge Area

Westerly flow across Area A

Flow direction on this property inferred from historical measurements in existing monitoring wells

Easterly flow across Area B

# Tracer Study Area

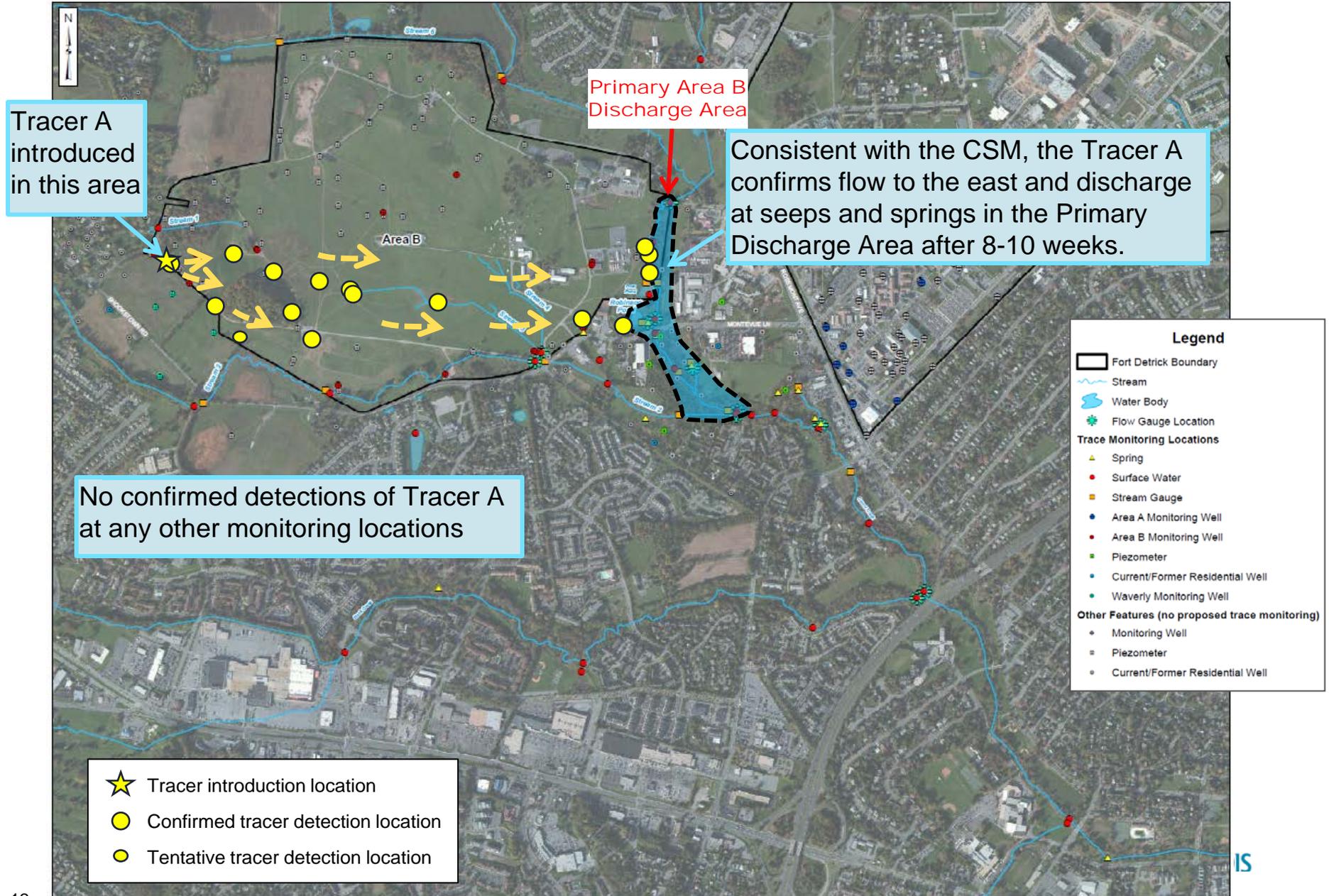


# Groundwater Tracer Study Updates

- Two tracers introduced in deep wells in May '13 at these depths:
  - Tracer A: 140-155 feet deep
  - Tracer B: 313-328 feet deep
  
- Tracer A:
  - In 2-3 weeks Tracer A was detected in springs in the center of Area B.
  - In 5-7 weeks, Tracer A detected in on-post monitoring wells east/southeast of the introduction area.
  - After 8-10 weeks Tracer A has been detected in springs in the primary discharge area.
  - To date, detections are consistent with the conceptual site model for Area B groundwater and contaminant migration east/south east across Area B.
  
  - Monitoring and data evaluation is on-going and these are only preliminary observations available at this point.

# Preliminary Study Observations for Tracer A

(Results through 10/10/13 spanning 5 months since the tracer introduction)



# Groundwater Tracer Study Updates

- Two tracers introduced in deep wells in May '13 at these depths:
  - Tracer A: 140-155 feet deep
  - Tracer B: 313-328 feet deep
  
- Tracer B:
  - In 2-3 weeks Tracer B was detected in shallow monitoring wells very close to the introduction area.
  - After 8-10 weeks, Tracer B has not been detected in any other monitoring locations on Area B, or in the primary discharge area, or in off-post areas.
  - All observations at this time are preliminary pending completion of the study, but appear to indicate:
    - Limited flow at the depth within this portion of the aquifer.
    - Connectivity between the deeper and shallower portion of the aquifer.



# Preliminary Study Observations for Tracer B

(Results through 10/10/13 spanning 5 months since the tracer introduction)



# Preliminary Study Observations for Tracer B

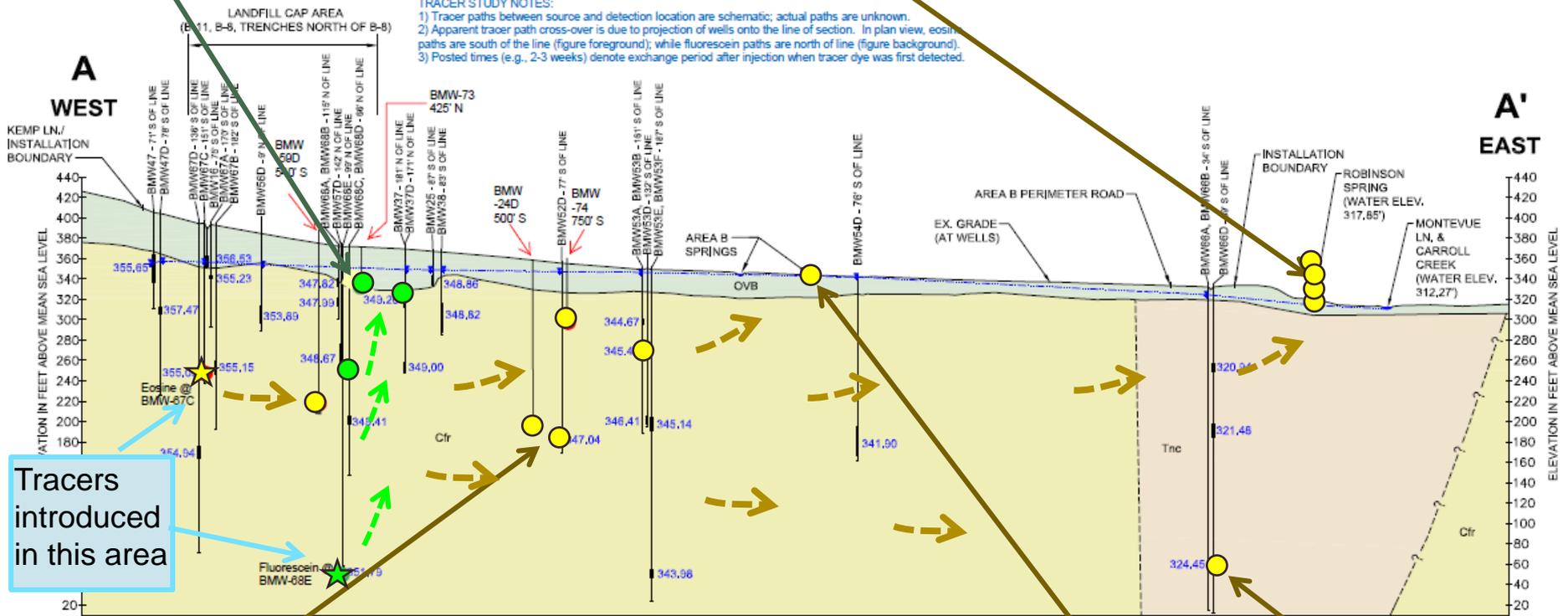
(Results through 10/10/13 spanning 5 months since the tracer introduction)

Tracer B only detected to date in shallow wells near introduction location

8-10 Weeks: Tracer A detected in primary discharge area.

**TRACER STUDY NOTES:**

- 1) Tracer paths between source and detection location are schematic; actual paths are unknown.
- 2) Apparent tracer path cross-over is due to projection of wells onto the line of section. In plan view, eosin paths are south of the line (figure foreground); while fluorescein paths are north of line (figure background).
- 3) Posted times (e.g., 2-3 weeks) denote exchange period after injection when tracer dye was first detected.



Tracers introduced in this area

5-7 Weeks: Tracer A detected in multiple monitoring wells across Area B.

2-3 Weeks: Tracer A detected at the ground surface in a spring on Area B.

20 Weeks: Tracer A detected at property boundary.

**LEGEND:**

OVB = OVERBURDEN

**CROSS SECTION A-A'**



# Groundwater Tracer Study Schedule

- EPA and MDE oversight:
  - Status discussions with EPA and MDE to review laboratory results and observations to date.:
    - August 7, 2013
    - September 30, 2013
- Comprehensive tracer monitoring rounds continue into November 2013. Supplemental sampling rounds will continue.
- The Army and ARCADIS will continue to provide status updates during future community RAB meetings.
- A tracer study report will be prepared and submitted to EPA, MDE, and the RAB at the conclusion of the study.

# Shallow Off-Post DPT Drilling Update



# Supplemental Shallow DPT

- A light weight drilling rig is used to hydraulically push sampling rods into the ground for collecting soil/groundwater samples and installing shallow small diameter wells.
- Drilling depths in this area are limited to ~30-40 feet below ground surface due to shallow bedrock, and sometimes much shallower.
- Approximately 50 DPT locations were completed in the study area in Spring 2012.
- August 2013: Additional DPT drilling completed in three off-post areas.





# Supplemental Sampling Planned Based on Observations in 3 Areas



### Legend

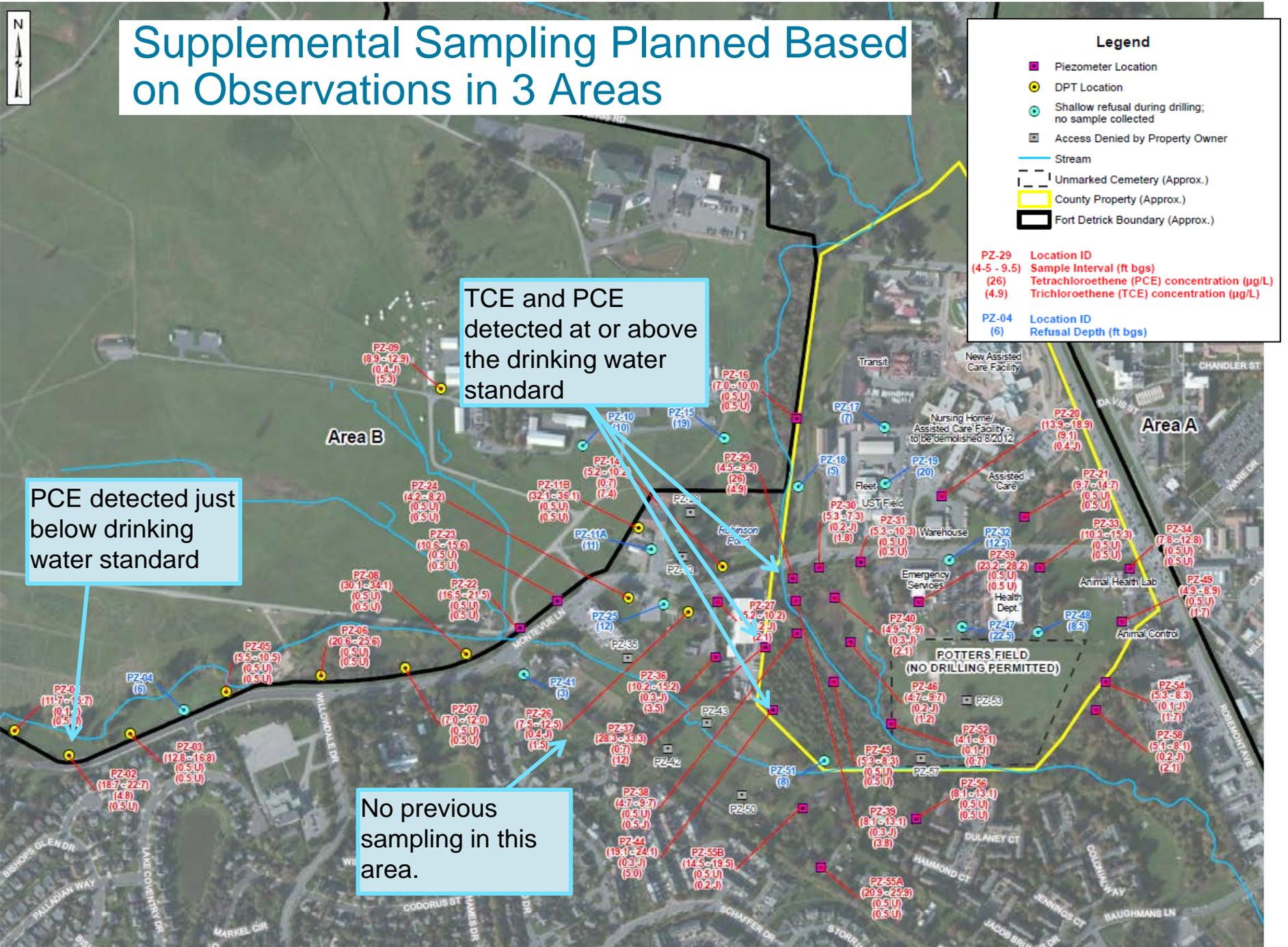
- Piezometer Location
- DPT Location
- Shallow refusal during drilling; no sample collected
- Access Denied by Property Owner
- Stream
- Unmarked Cemetery (Approx.)
- County Property (Approx.)
- Fort Detrick Boundary (Approx.)

PZ-29	Location ID
(4.5 - 9.5)	Sample Interval (ft bgs)
(26)	Tetrachloroethene (PCE) concentration (µg/L)
(4.9)	Trichloroethene (TCE) concentration (µg/L)
PZ-04	Location ID
(6)	Refusal Depth (ft bgs)

TCE and PCE detected at or above the drinking water standard

PCE detected just below drinking water standard

No previous sampling in this area.



# 3 Supplemental DPT Study Areas Completed in August 2013

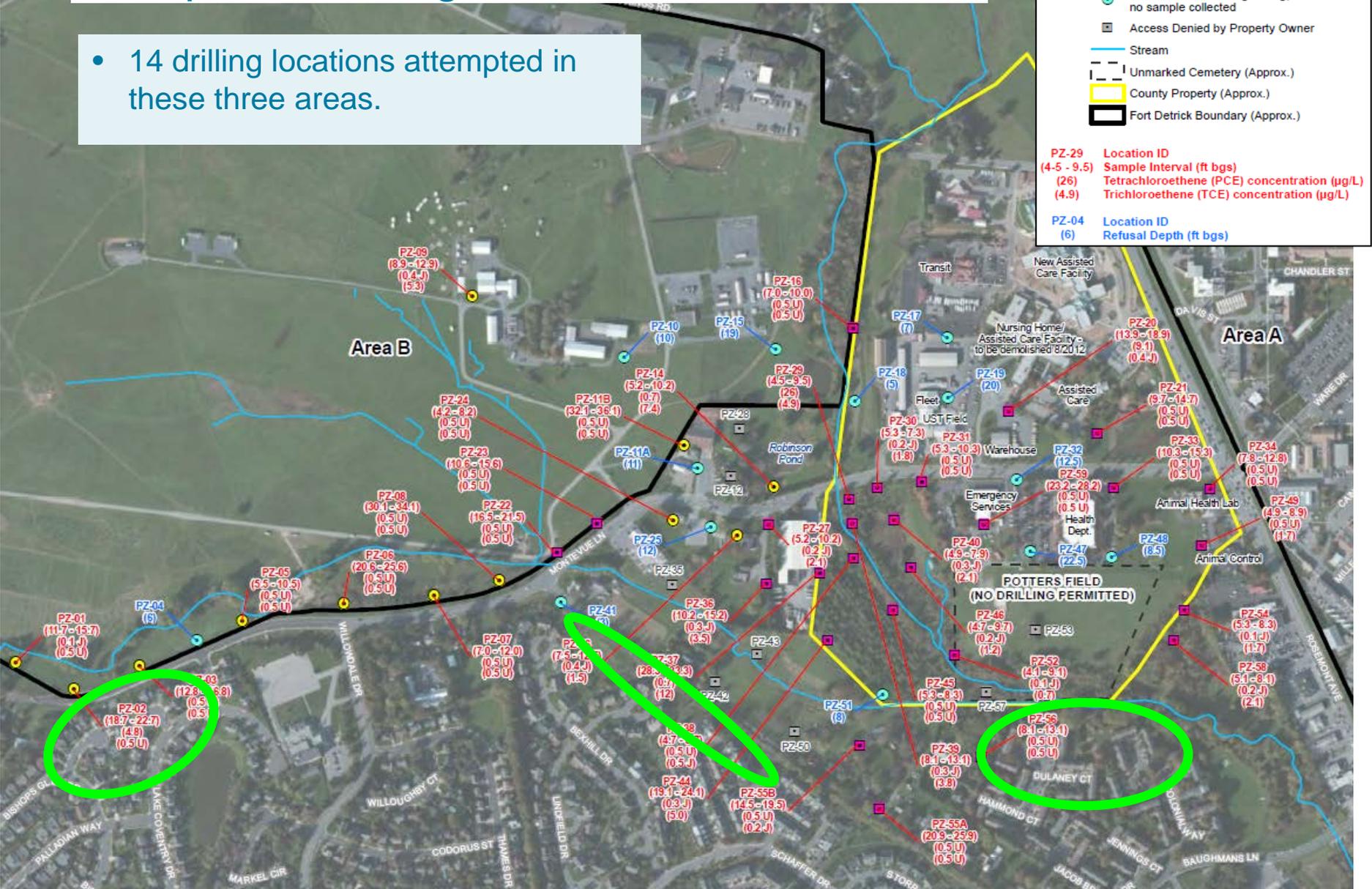
- 14 drilling locations attempted in these three areas.

**Legend**

- Piezometer Location
- DPT Location
- Shallow refusal during drilling; no sample collected
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**PZ-29** Location ID (4-5 - 9.5)  
 Sample Interval (ft bgs) (26)  
 Tetrachloroethene (PCE) concentration (µg/L) (4.9)  
 Trichloroethene (TCE) concentration (µg/L)

**PZ-04** Location ID (6)  
 Refusal Depth (ft bgs)



# 3 Supplemental DPT Study Areas Completed in August 2013

- 14 drilling locations attempted.
- Shallow bedrock prevented drilling and groundwater sampling in some areas.
- 7 shallow wells installed and sampled in August 2013.

**Legend**

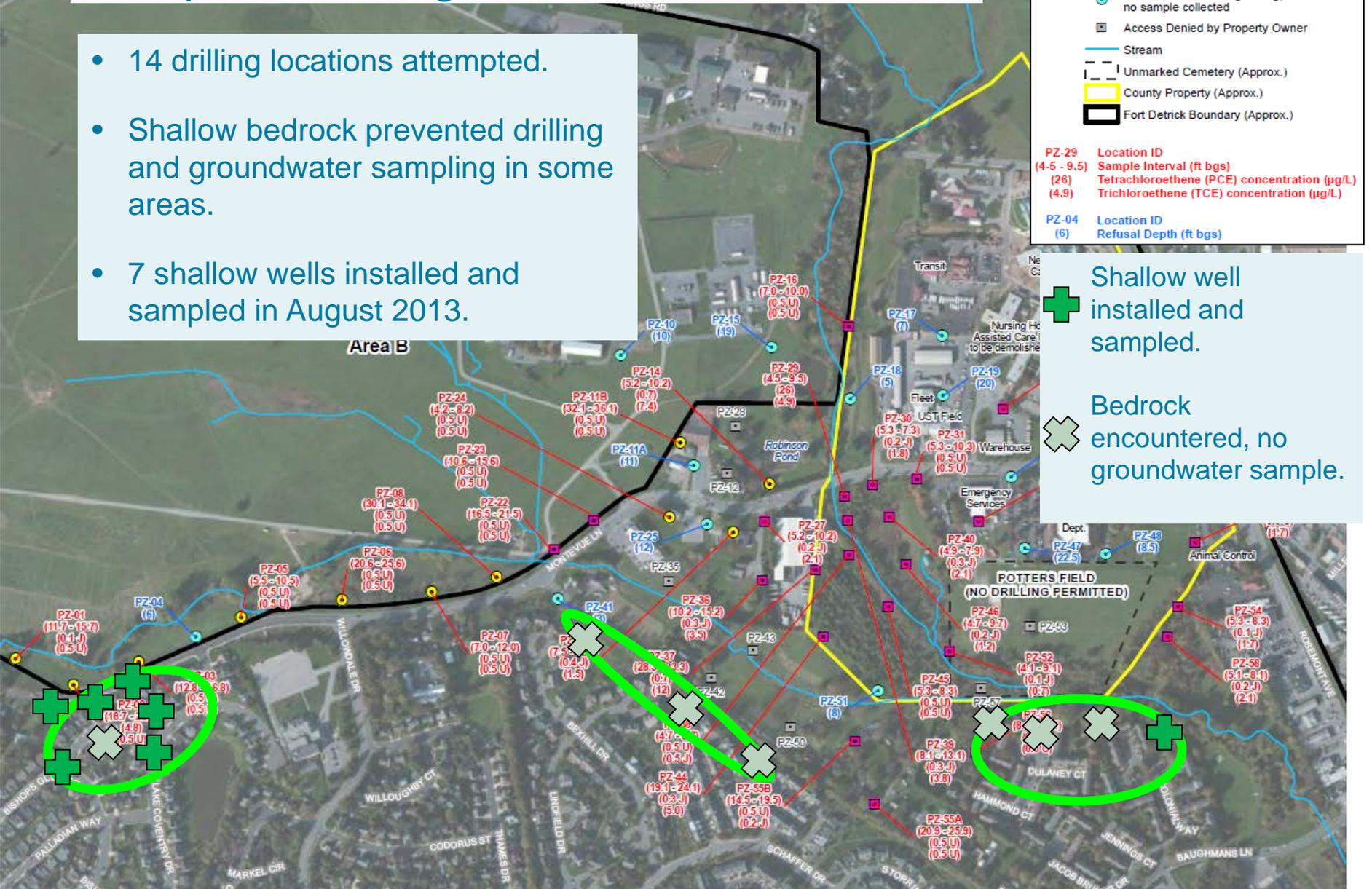
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PZ-04 Location ID  
 (6) Refusal Depth (ft bgs)

⊕ Shallow well installed and sampled.

⊗ Bedrock encountered, no groundwater sample.



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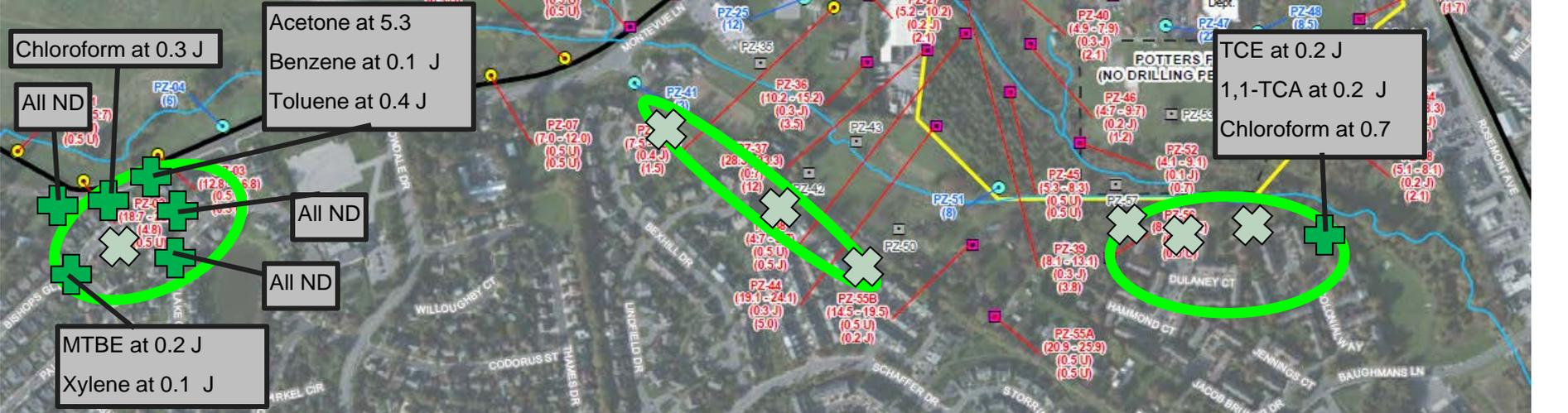
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⊕ Shallow well installed and sampled.

⊗ Bedrock encountered, no groundwater sample.



# Schedule for Additional On- and Off-Post Drilling



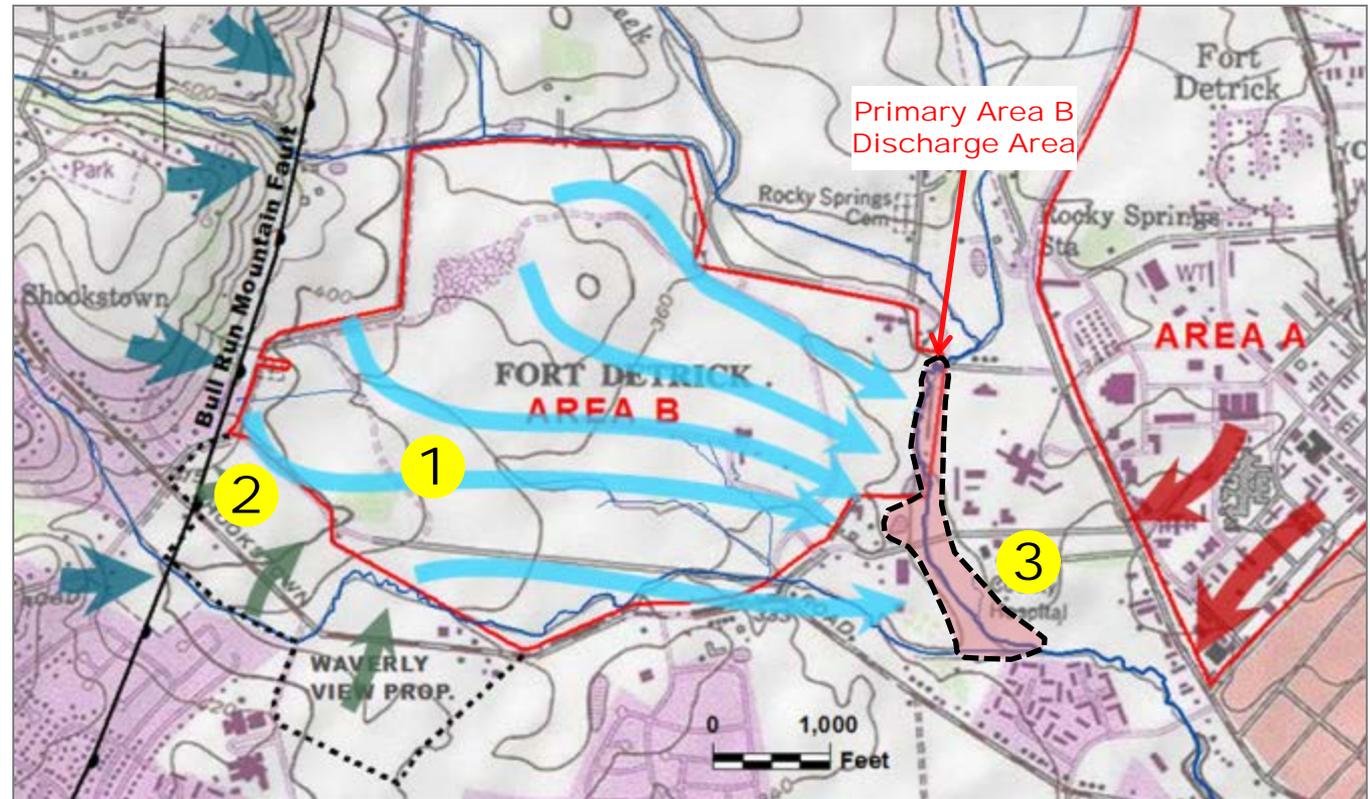
# Additional Deep On-Post & Off-Post Drilling

- Right of entry agreements signed for planned off-post drilling locations.
- Drilling methodology will follow the same techniques employed during the 2011/2012 drilling program (including geophysical logging and packer testing).
- Maximum drilling depths anticipated to be ~400-500 feet below ground surface at some new locations.
- Multiple nested wells to be installed to aid in vertical delineation.
- Approximately 7 new borings with up to 11 nested wells installed.



# Supplemental Deep Drilling Locations

*Generalized patterns of flow*



1. Vertical delineation downgradient of B-11 to depths greater than 325 ft. (~ 2 nested wells)
2. Delineation south of B-11 area (Waverley Property) (~3 drilling areas w/ ~7 nested wells)
3. Horizontal delineation east of Carroll Creek (underflow) (~ 2 nested wells)

# New Site Inspection Task for Area A and Area B Locations

# Site Inspection (SI) Task

- The Army's review of historical archive records identified sites at Fort Detrick Area A and Area B that warrant initial evaluation and screening.
- ARCADIS team will be completing CERCLA Site Inspections at these locations.
- The objective is to achieve Final SI reports for these sites with to determine appropriate next steps:
  1. No further action needed (Site Evaluation Accomplished), or
  2. Recommendation for more comprehensive sampling (e.g., CERCLA Remedial Investigation).

# Site Inspection (SI) Locations

- Work plans for screening the SI locations will be prepared and submitted for regulatory review.
- Field work is anticipated to begin in Spring 2014, and will include a variety of soil, groundwater, and sediment sampling based on the historical uses and activities at the SI locations.
- The SI locations have been grouped into 8 categories for evaluation.

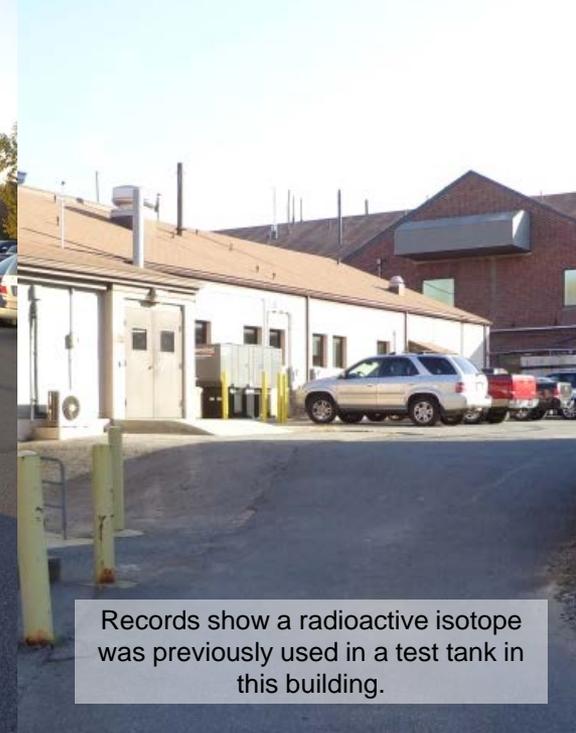
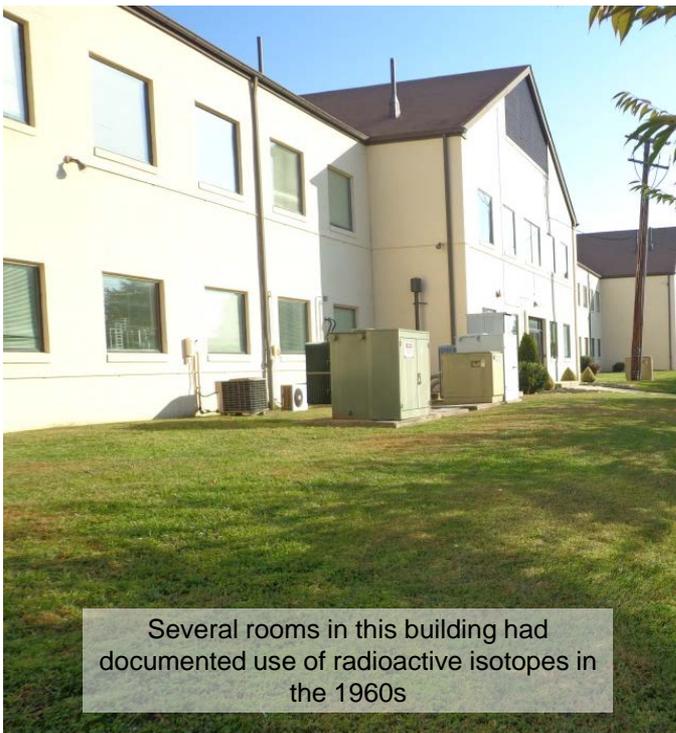
## Group 1: Former herbicide sites

- Ten historical anti-crop herbicide sites will be sampled during the SI testing.
- These are areas where historical aerial imagery or other records indicate controlled field experiments may have been conducted on small test plots during the 1940s and 1950s.
- Today these areas are covered by a mix of parking lots, buildings, trees, and grassy areas.
- Records indicate a low likelihood for detecting residual herbicides but testing will be conducted in these areas for confirmation.



## Group 2: Low-level Radiation Areas

- Eighteen current or former Area A buildings were identified for historical use of sealed-source or by-product radioactive materials for laboratory experiments beginning in the late 1940s.
- The likelihood of environmental impact is considered low and there is no evidence of a prior release. Testing for radioactive isotopes will be completed in the vicinity of these buildings to confirm.
- Several examples of the types of locations in this grouping are shown below:



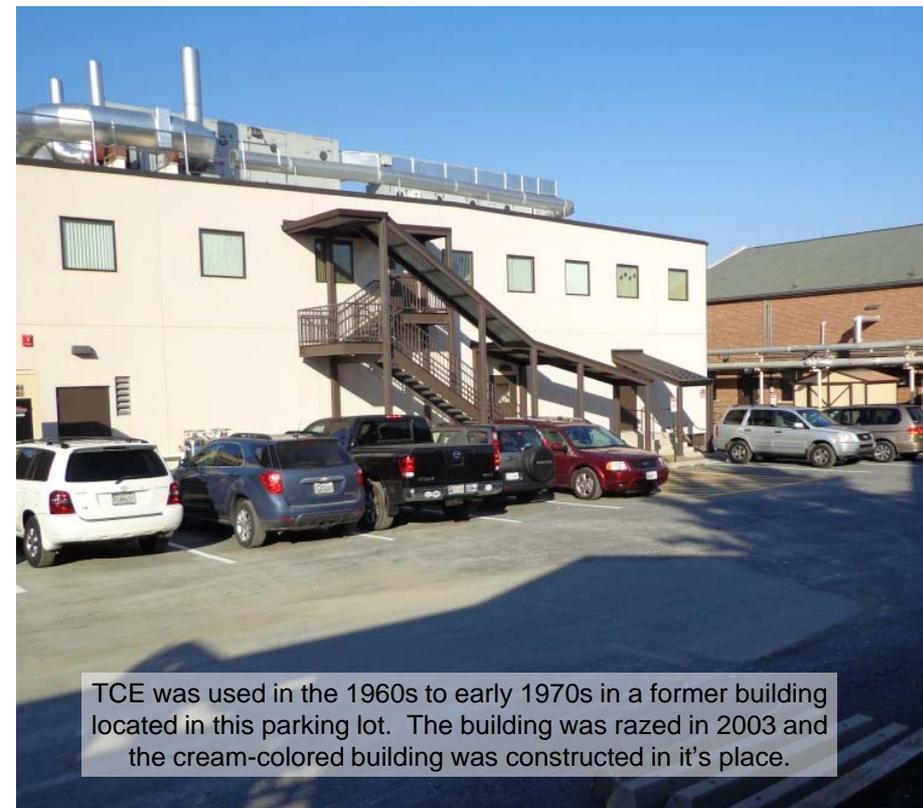
## Group 3: Incinerator Sites

- Eleven former incinerator locations in Area A dating back to World War II previously used for disposal of burnable wastes and decontamination of air from test facilities.
- Environmental impacts from air deposition is possible in the vicinity of these locations. The historical use and storage of fuel oil for firing the incinerators also warrants evaluation.
- Most locations have been reutilized for other purposes for many decades.



## Group 4: TCE Sites

- Records identified the documented use of TCE in three Area A buildings for refrigeration and/or freeze-drying purposes. These activities were associated with test chambers and other activities dating back to the 1960s.
- Environmental impacts are possible and warrant groundwater sampling near these buildings. One of the buildings had been inactive since 1971 and was razed in 2003.



TCE was used in the 1960s to early 1970s in a former building located in this parking lot. The building was razed in 2003 and the cream-colored building was constructed in its place.



## Group 5: Petroleum, Oil, and Lubricant (POL) Sites

- Records identified 15 locations with historic POL storage, use, or dispensing. These locations include former underground fuel lines, pumping/dispensing areas, and possible underground storage tanks.
- Environmental impacts are possible due to the historical use of gasoline, diesel, and fuel oil in these areas.



## Group 6: Dispersion Test Areas

- Records identified 3 areas in Area A that were previously used as outdoor test grids for simulants and crop agents. The tests were intended to evaluate how the simulants, such as a yeast slurry, were dispersed from 20mm rounds and small-arms fire (e.g., shotgun shells).
- The likelihood for environmental impacts is considered low but further evaluation will be completed.



## Group 7: Vehicle Maintenance Areas

- Historical records review identified two former vehicle maintenance areas, including motor repair shops, wash racks, and a gasoline station.
- Site evaluation needed to assess whether these historical activities could have impacted soil or groundwater and to determine if USTs may still be present.



## Group 8: General disposal, storage, or other use areas

- This group includes a mix of Area A and Area B locations, including small storage/test sheds, a locomotive shed, a photo lab, paint shops, and former storage or disposal areas.
- Site inspection sampling will be tailored based on the types of historical activities and uses in these areas.



# Next Steps

# Next Steps

- Conduct remaining groundwater tracer sampling rounds and complete thorough data evaluation and reporting.
- Complete follow-on drilling activities and supplemental investigations based on identified data needs.
- Prepare Site Inspection Work Plans for Area A and Area B SI locations for regulatory review and mobilize for field work in Spring 2014.

*Regular updates to be provided during community RAB meetings.*

# Questions and Discussion