Area B Groundwater Investigation Fort Detrick

Progress Report to the RAB

August 28, 2013

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Overview of Topics

- Work Completed Since May 2013 RAB Meeting and Project Status
- Groundwater Tracer Study Overview
- Shallow Direct Push Drilling Update
- Upcoming Work
- Next Steps

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Work Completed Since the Last RAB

- Initiated groundwater tracer study.
- Conducted 9 rounds of comprehensive tracer sampling.
- Completed supplemental direct push well installation and groundwater sampling.

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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**	Jan 2013 (Round 1) **Summer 2013 (Round 2)**
► **Groundwater tracer study** (on-going)	**Spring 2013 to Fall 2013**

Grey = completed

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Status of CERCLA Process

Current Phase →

- Remedial Investigation
  - Data collection and development of CSM
  - Future phase will include a full risk assessment as required by CERCLA

Interim Phase → Potential Interim Remedial Action (connection of select residences to municipal water)

Future Phases

- Feasibility Study (Assessment of possible remedies)
- Proposed Plan (Public document to solicit input on preferred remedy)
- Record of Decision (Final legal document selecting remedy)
- Remedial Action (Implement Final Remedy)

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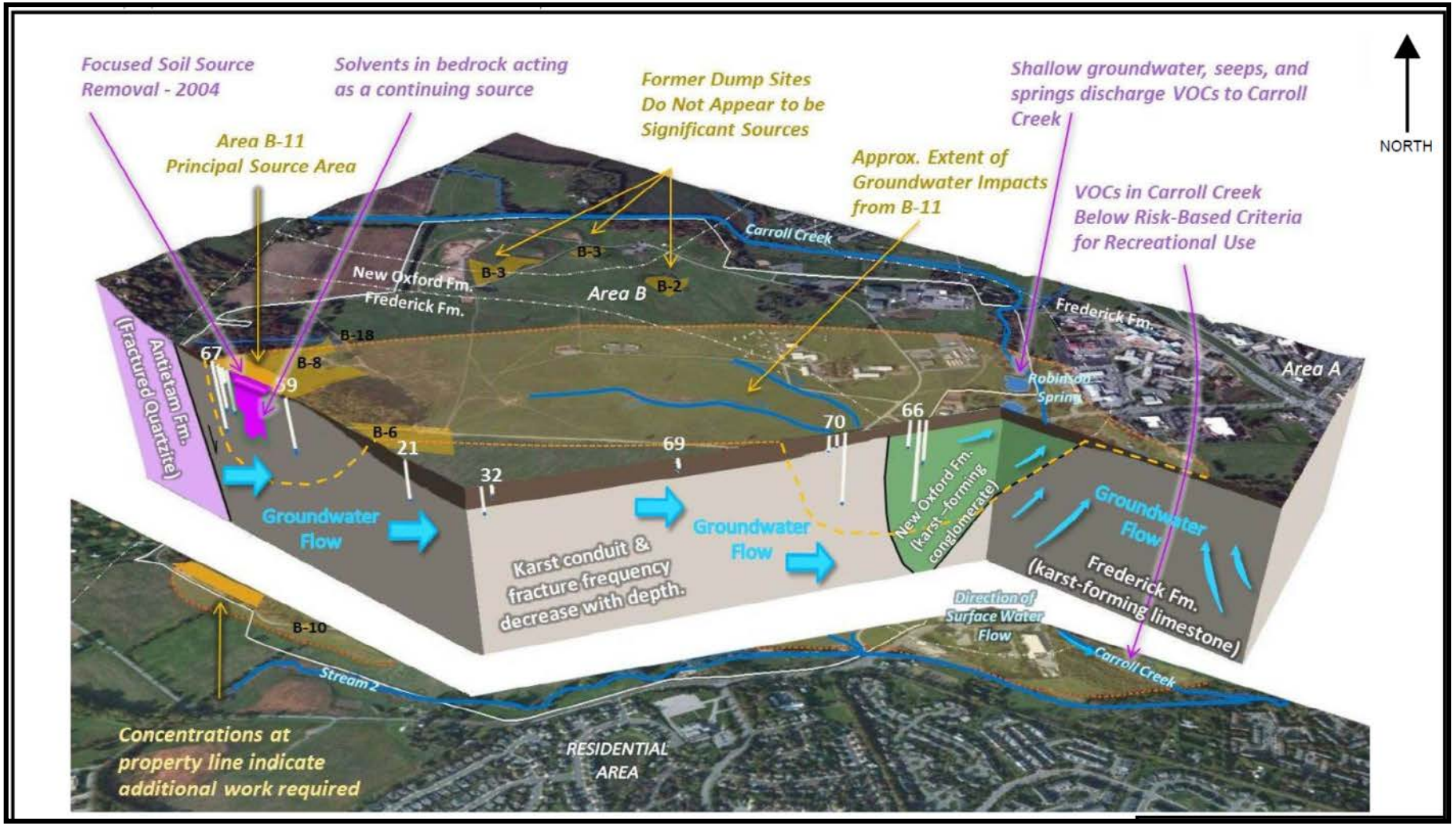
Area B Conceptual Site Model Review



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.

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Groundwater Tracer Study Overview

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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.

Groundwater Tracer Study

- Why is a groundwater tracer study underway at Area B?

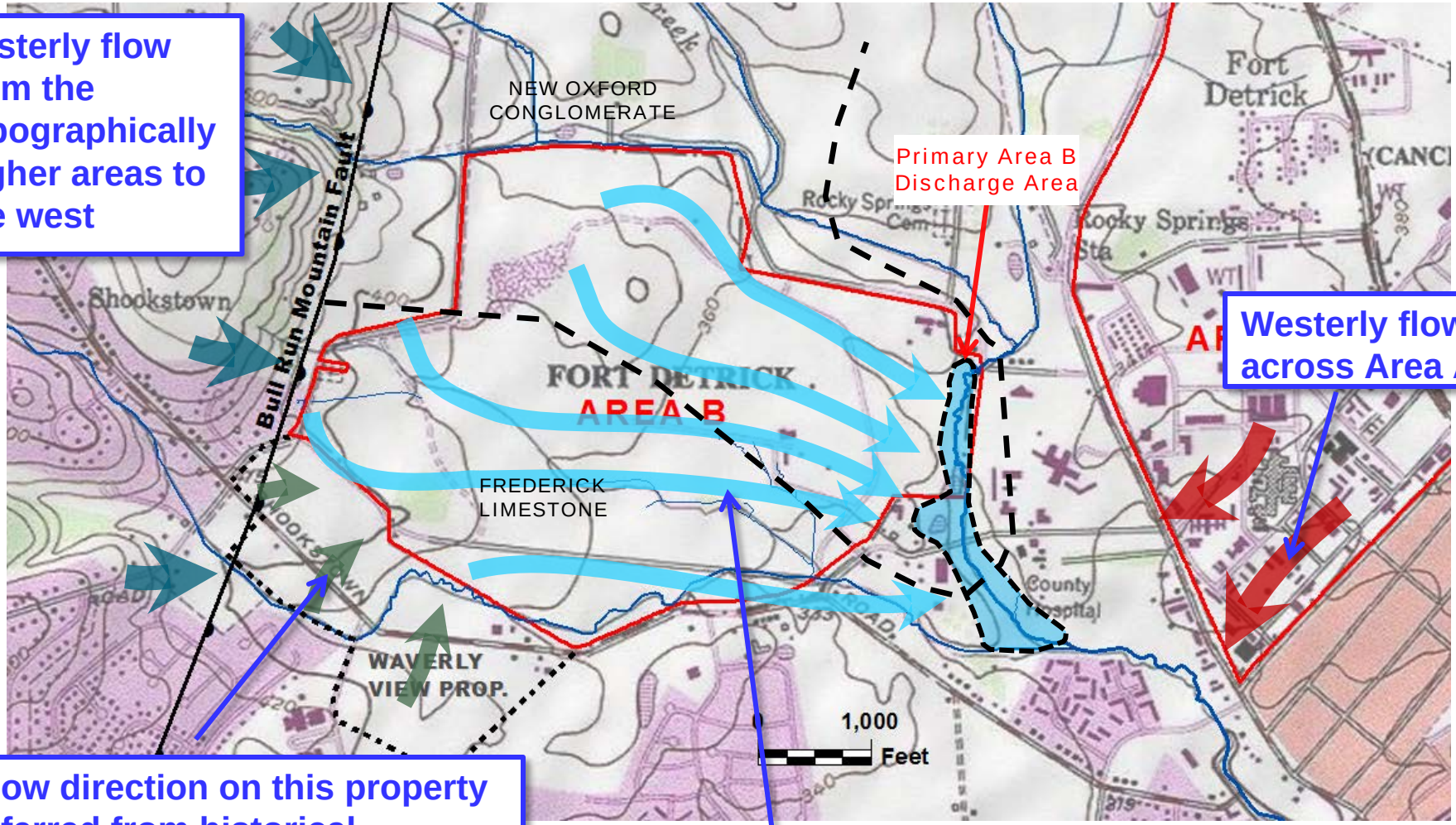
- To evaluate the movement of deep groundwater from the B-11 area and identify locations where groundwater discharges to springs and streams within the study area.
- The tracer study will confirm our understanding of groundwater flow within the study area and help identify any previously unknown points of discharge.
- Note a tracer study has been planned since the EPA-approved 2010 Remedial Investigation Work Plan and is currently on-going. This study is an expansion of a prior tracer study completed in 1995.

Groundwater Tracer Study

- How does a tracer study work?

1. A background study was completed to choose an appropriate tracer and establish baseline conditions to account for possible interferences.
2. The chosen nontoxic tracer was introduced to the groundwater via two deep Area B monitoring wells.
3. Frequent monitoring began following a prescribed schedule:
   - More than 90 monitoring locations.
   - Weekly sampling at each monitoring location initially. Then reduced to biweekly or monthly as the study has progressed.
   - Laboratory analysis of sampling devices and water samples each week identifies even low part-per-billion concentrations of the tracer.
4. Data evaluation will identify primary discharge locations for the tracer (and consequently groundwater) potentially including previously unidentified discharge locations. The results will factor into future investigation and/or remediation decisions.

Generalized Patterns of Groundwater Flow



Easterly flow from the topographically higher areas to the west

Westerly flow across Area A

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

Easterly flow across Area B

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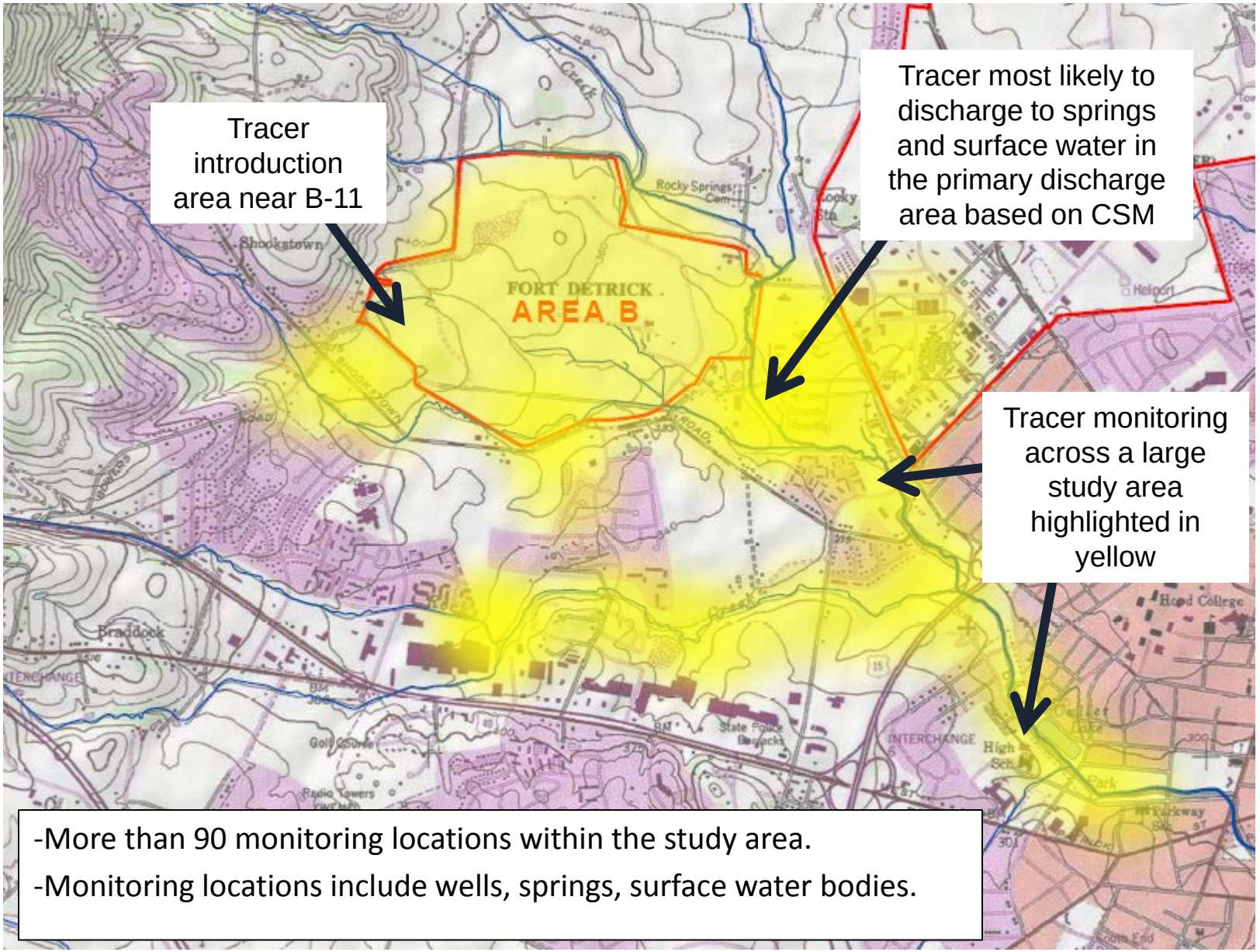
Tracer Study Area (approximate)



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, all 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.

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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.

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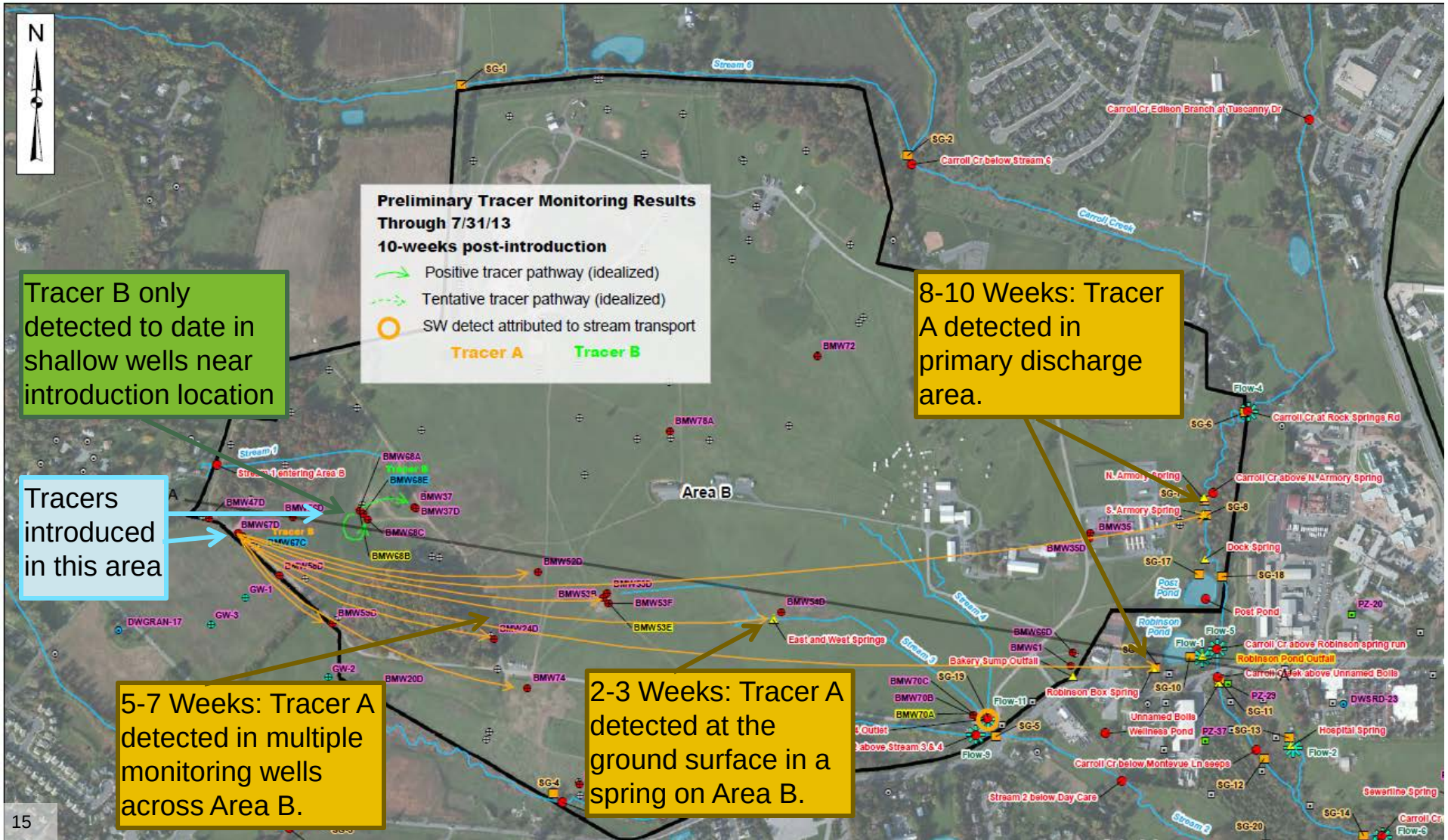
Preliminary Tracer Monitoring Results

Through Week 10 of the Tracer Study

Note: The orange and green tracer pathways below point to the monitoring locations where the tracer(s) have been detected during the study period.

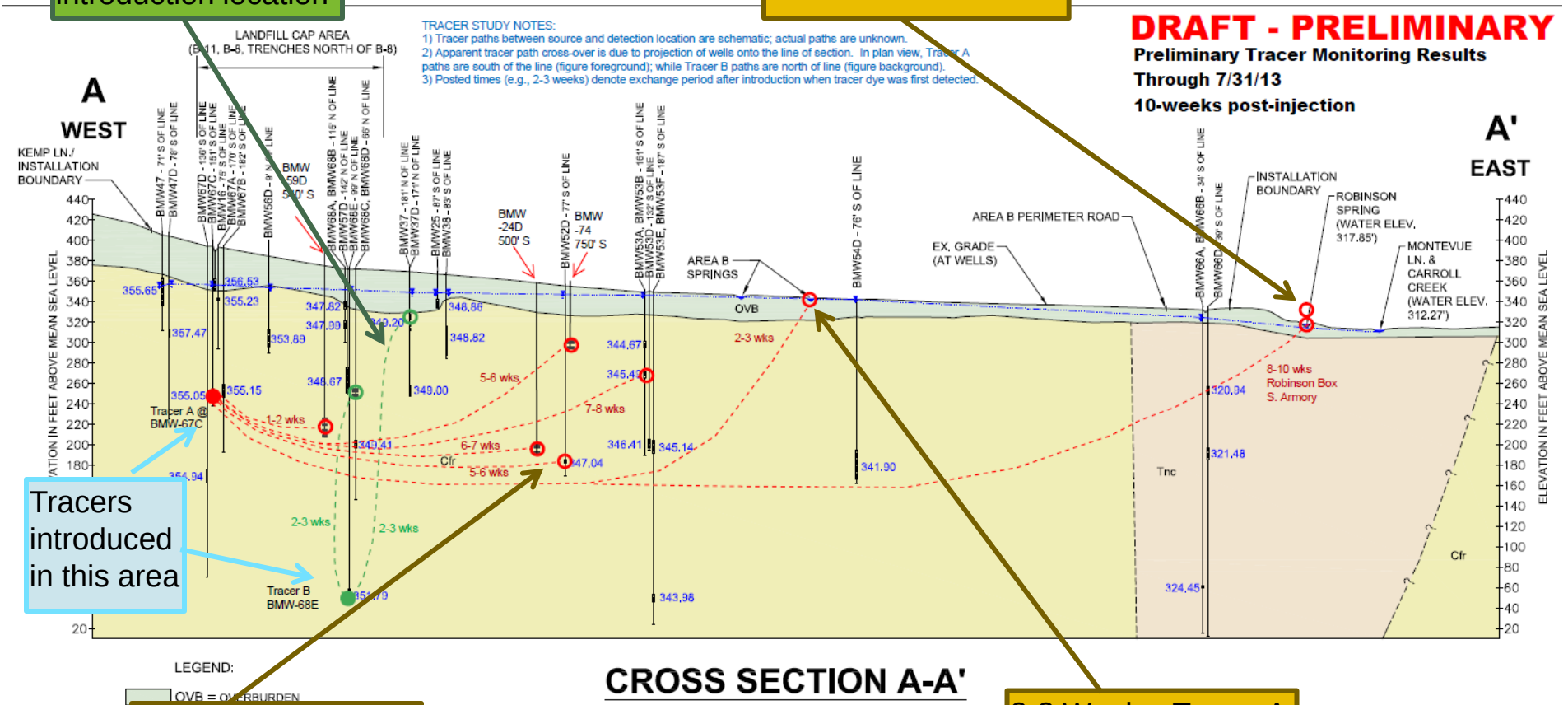


Preliminary Tracer Monitoring Results

Through Week 10 of the Tracer Study

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

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



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.

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Groundwater Tracer Study Schedule

- EPA and MDE oversight:
  - August 7, 2013 status discussion with EPA and MDE to review laboratory results and observations to date.
  - Updates provided upon receipt of new data rounds.
- Comprehensive tracer monitoring rounds continue into November 2013.
- The Army and ARCADIS will 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.

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Direct Push Drilling (DPT) Update

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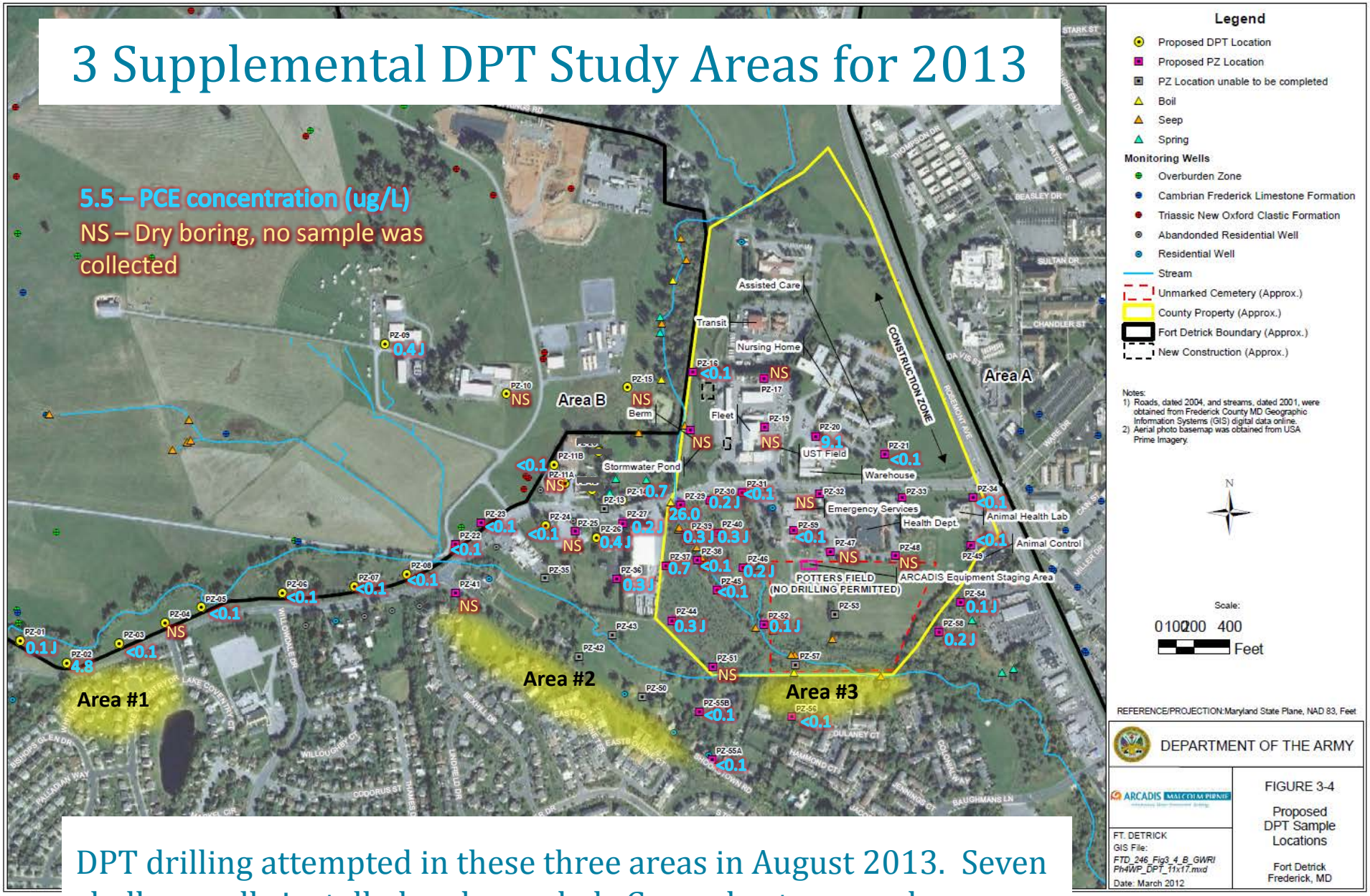
Supplemental Shallow DPT

- 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.

3 Supplemental DPT Study Areas for 2013



DPT drilling attempted in these three areas in August 2013. Seven shallow wells installed and sampled. Groundwater samples are undergoing laboratory analysis. Data to be reviewed at next RAB.

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Upcoming Work

Upcoming Work

The following additional investigation activities are planned for 2013:

- Groundwater tracer study (on-going) — Through Fall 2013
- Vapor intrusion sampling (on-going) — Late August 2013
- Additional deep on-post and off-post drilling — Fall 2013

Update: All rights of entry agreements have been signed with property owners for upcoming supplemental deep drilling.

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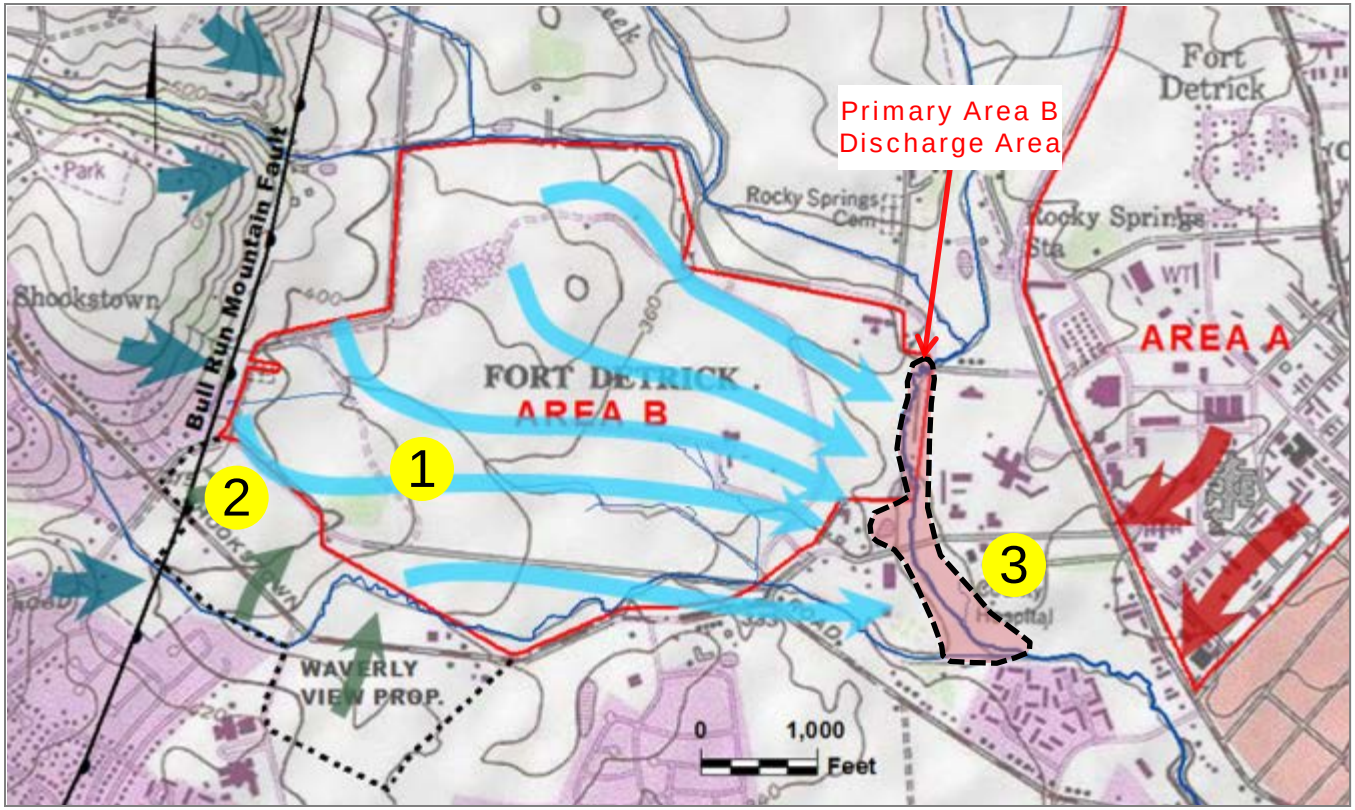
Additional Deep On-Post & Off-Post Drilling

- 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 contaminant delineation.
- Approximately 7 new borings with up to 11 nested wells installed.

Supplemental Deep Drilling Locations

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)

Generalized patterns of flow



Next Steps

Next Steps

- Complete groundwater tracer study to assess deep groundwater flow (Through Fall 2013)
- Conduct round 2 vapor intrusion sampling (Late August 2013)
- Complete follow-on drilling activities and supplemental investigations based on identified data needs (Fall 2013)

Regular updates to be provided during community RAB meetings.

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Questions and Discussion