

# Area B Groundwater Investigation Fort Detrick

Progress Report to the RAB  
November 5, 2014

John Cherry  
ARCADIS

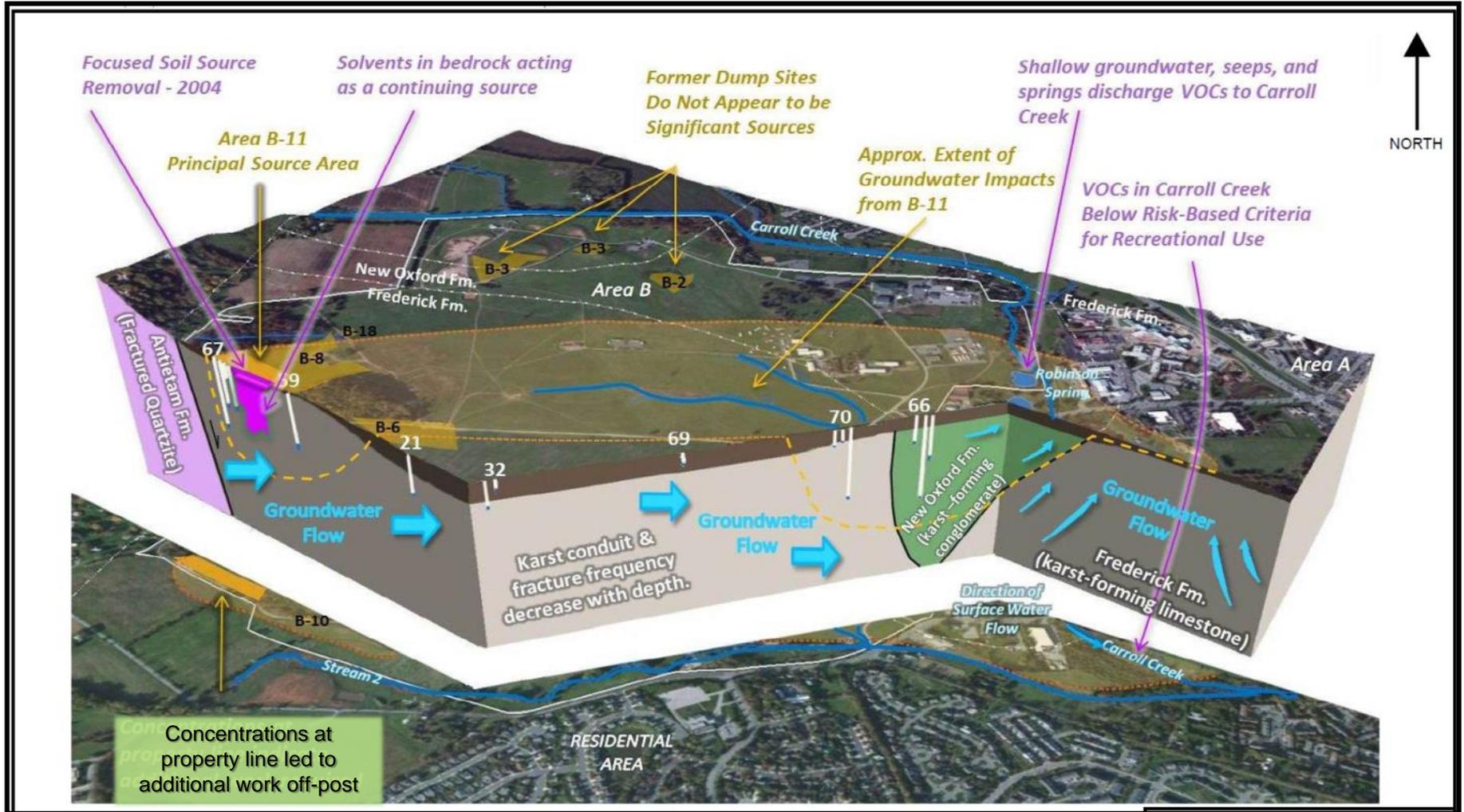


Imagine the result

# Overview of Topics

- ❑ Area B Overview and Snapshot summary of new analytical results and observations since the August 2014 RAB
- ❑ Deep Drilling Update (On- and Off-Post Deep Drilling)
- ❑ New Groundwater Results at off-post Waverley Property
- ❑ Follow-on Off-Post Remedial Investigation Activities
- ❑ Schedule and Next Steps

# Area B Conceptual Site Model Review



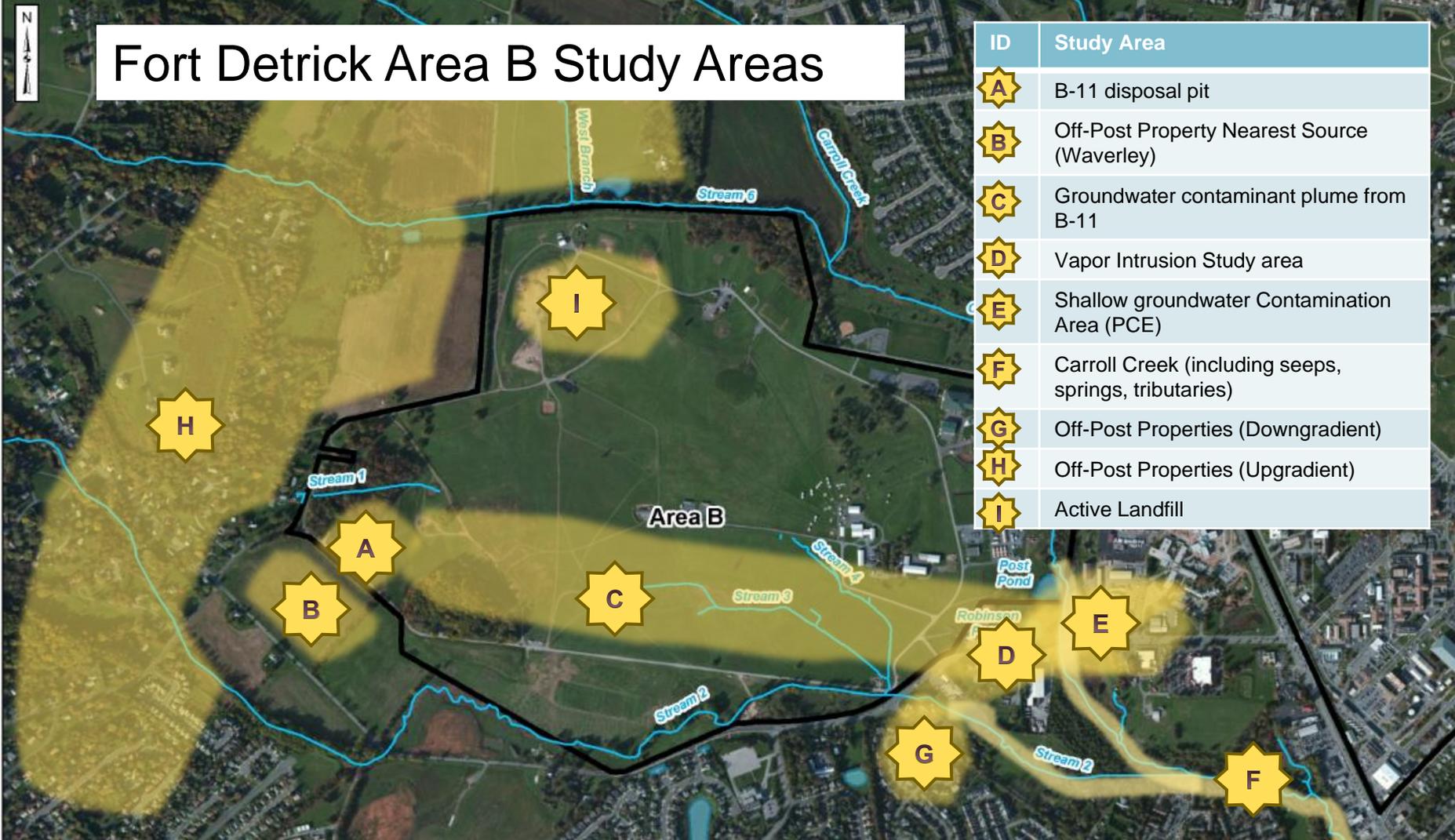
## Legend

- 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.



# Fort Detrick Area B Study Areas



There are multiple on-going and overlapping investigation efforts in and around Area B. This figure provides a generalized representation of the current on- and off-post Area B study areas. Phased investigation activities are being conducted with EPA and MDE oversight and in accordance with approved work plans following the CERCLA process within these areas. For RAB meetings this figure will be included in the slides to indicate which areas are the focal points of the meeting, recognizing that all areas cannot be discussed during each quarterly meeting. Moving forward, the Army will develop and maintain summary slides for each area to keep stakeholders updated on the work in these areas as well as next steps. These slides will be included at the end of the presentation.

# Focus Areas for Tonight's Presentation

ID	Study Area
<b>A</b>	B-11 disposal pit
<b>B</b>	Off-Post Property Nearest Source (Waverley)
<b>C</b>	Groundwater contaminant plume from B-11
<b>D</b>	Vapor Intrusion Study area
<b>E</b>	Shallow groundwater Contamination Area (PCE)
<b>F</b>	Carroll Creek (including seeps, springs, tributaries)
<b>G</b>	Off-Post Properties (Downgradient)
<b>H</b>	Off-Post Properties (Upgradient)
<b>I</b>	Active Landfill

**New Analytical Data presented tonight for areas in green**

**New Investigation Plans presented tonight for areas in purple**

# Snapshot Updates Since the Last RAB

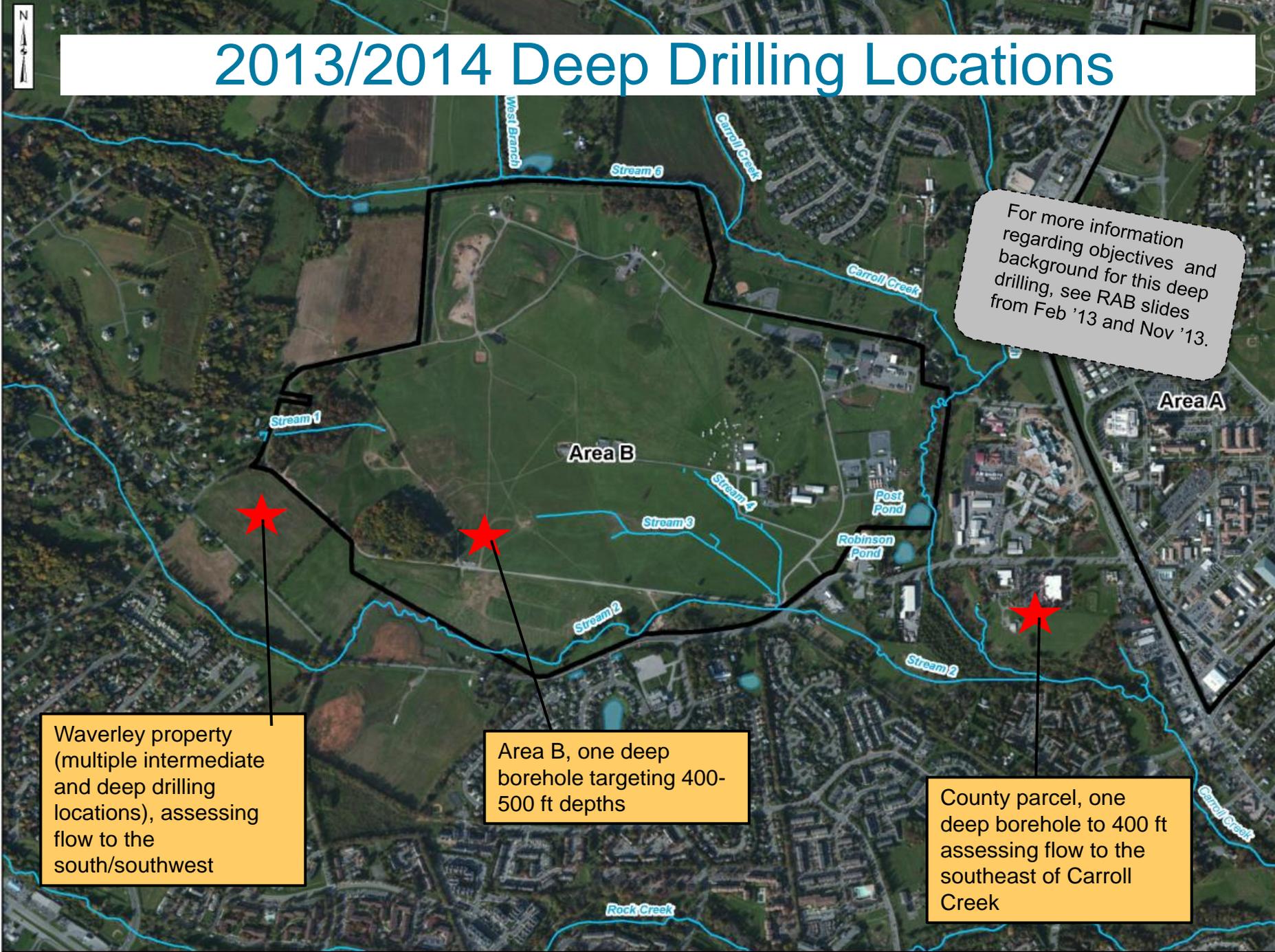


- Two rounds of analytical data received from 11 shallow sampling points installed and sampled on Waverley View property (by USACE).  
(Results presented tonight show shallow off-post MCL exceedances along the property line.) 
- Packer test data results received from off-post deep borings and two deep sample points completed (225-235 ft and 347-377 ft bgs) on the Waverley property.  
(Results presented tonight show deep off-post MCL exceedances in preliminary screening level packer samples along the property line but not further to the south) 
- Six decision-making discussion calls with EPA/MDE since August '14 RAB and one all day meeting with EPA/MDE in Philadelphia.

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# 2013/2014 Deep Drilling Locations



For more information regarding objectives and background for this deep drilling, see RAB slides from Feb '13 and Nov '13.

Waverley property (multiple intermediate and deep drilling locations), assessing flow to the south/southwest

Area B, one deep borehole targeting 400-500 ft depths

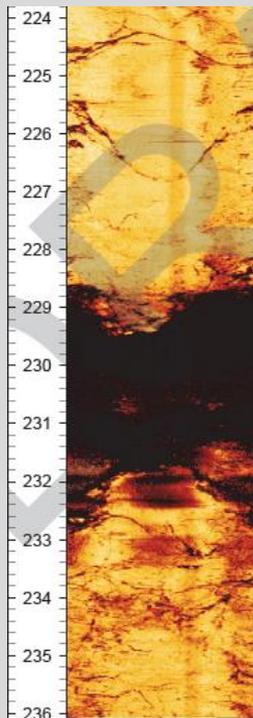
County parcel, one deep borehole to 400 ft assessing flow to the southeast of Carroll Creek

# Deep Drilling Recap (2013/2014)

## Methodology Reminders!

Packer sample intervals are selected in collaboration with EPA and MDE, based on:

- Geophysical testing of the borehole to identify fractures using calipers, imagery of the borehole walls, and other tools.



For more information, about the drilling and sampling approach, see RAB slides from June 2011, February 2013, & March 2014.

- Waverley 
  - 4 boring locations at Waverley Property to assess deep impacts south/southwest of Area B.

Wvly-1	Drilled to 175 ft. Screened 145-155 ft
Wvly-2	Drilled to 142 ft Screened 86-91 ft
Wvly-3	Drilled to 161 ft Screened 100-115 ft
Wvly-5	Drilled to 400 ft Screened 225-235 ft and 347-377 ft

- County 
  - 1 boring location completed to 400 ft deep to assess deep groundwater quality east of Area B and Carroll Creek.

Cnty-1	Drilled to 400 ft. Screened 99-109 ft and 382-397 ft
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- Area B 
  - 1 boring drilled to 500 ft deep to assess deep impacts downgradient of B-11.
  - Completion pending.

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# New Shallow and Deep Groundwater Data Presented Tonight



- Legend**
- Fort Detrick Boundary
  - Approximate ROE Boundary
  - Stream

- WVLY-2 Waverley Monitoring Point (2014)
- TW-1 USACE Temp Sampling Point
- WVLY-4 Abandoned Boring Location
- GW-1 Waverley Monitoring Point (2004)

Eleven shallow 'first water' borings to ~50 ft with 2 sample rounds

Four deep borings ranging in depth from 140 to 400 ft with packer samples

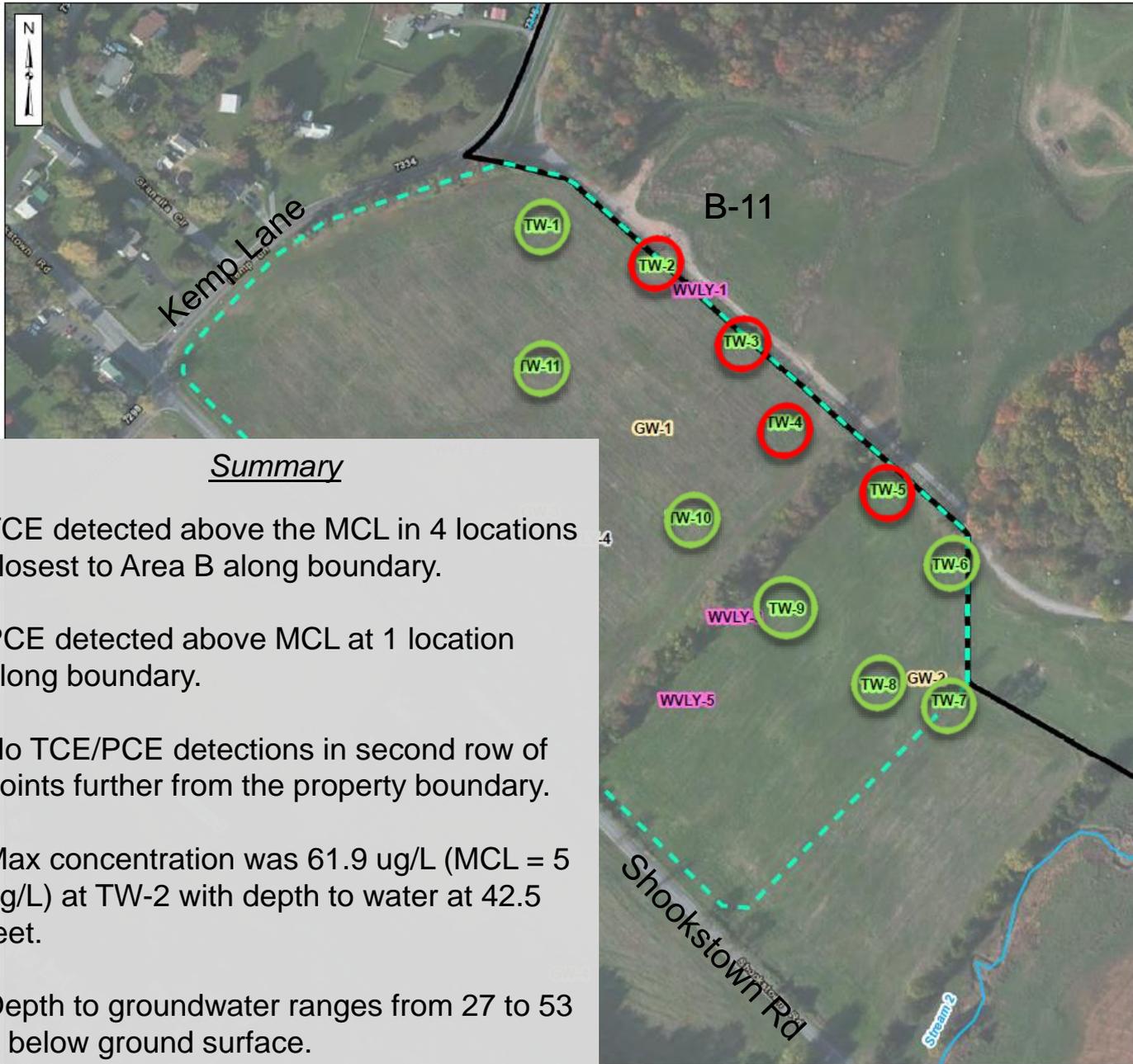


Waverley Property

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# Shallow Water Sample Results (July & August 2014)



- Legend**
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  - WVLY-2 Waverley Monitoring Point (2014)
  - TW-1 USACE Temp Sampling Point
  - WVLY-4 Abandoned Boring Location
  - GW-1 Waverley Monitoring Point (2004)

TCE and/or PCE exceeds MCL at this location in shallow groundwater.

No MCL exceedances at this location in shallow groundwater.

## Summary

- TCE detected above the MCL in 4 locations closest to Area B along boundary.
- PCE detected above MCL at 1 location along boundary.
- No TCE/PCE detections in second row of points further from the property boundary.
- Max concentration was 61.9 ug/L (MCL = 5 ug/L) at TW-2 with depth to water at 42.5 feet.
- Depth to groundwater ranges from 27 to 53 ft below ground surface.



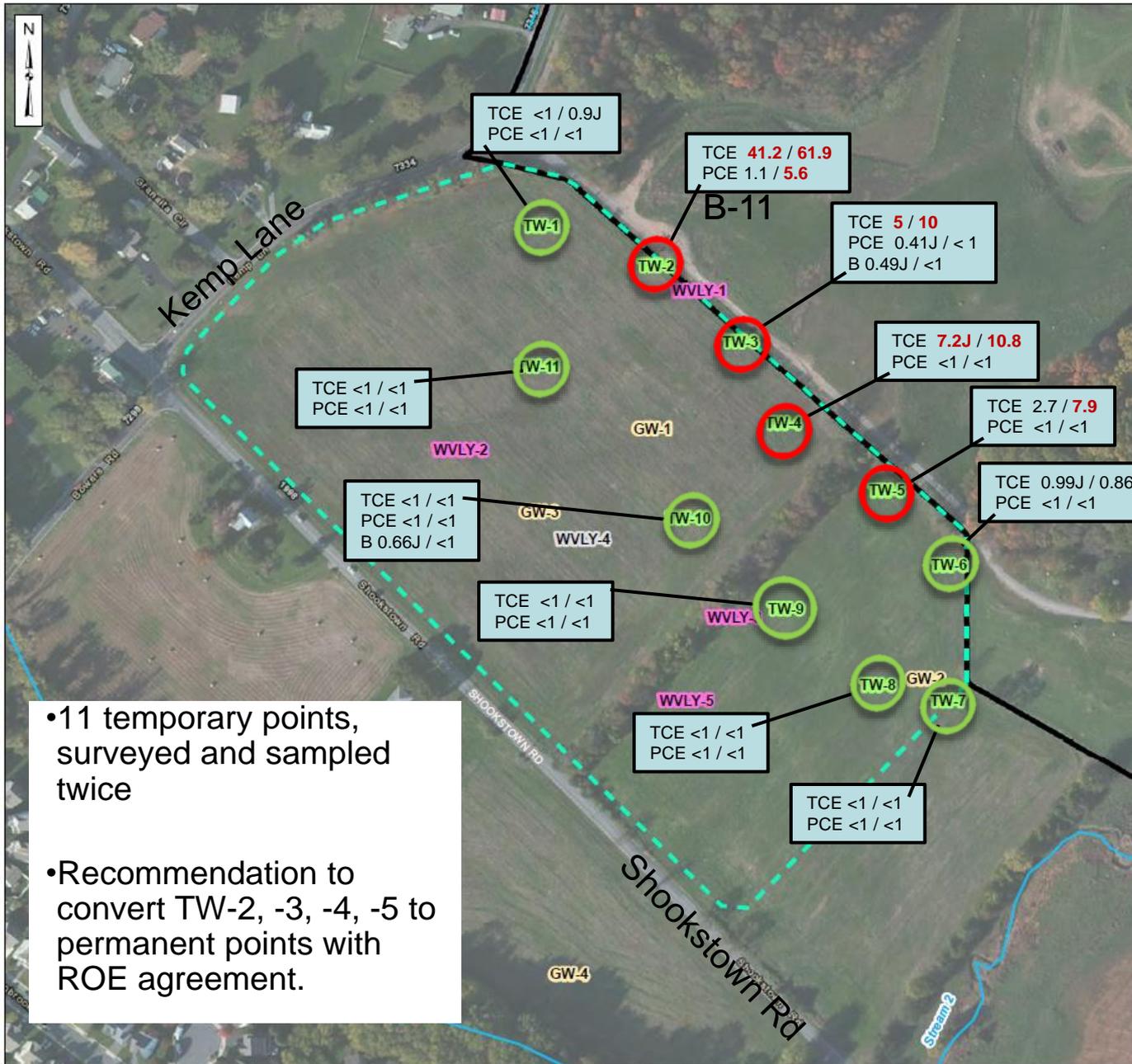
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Waverley Property

Area B Groundwater Investigation  
Fort Detrick  
Frederick, MD



# Shallow Water Sample Results (July & August 2014)



- Concentrations in micrograms per liter (ug/L)
- TCE = trichloroethene
- PCE = tetrachloroethene
- B = benzene
- MCL (drinking water standard):  
 PCE = 5 ug/L  
 TCE = 5 ug/L  
 B = 5 ug/L
- **41.2** = bold/red text denotes MCL exceedance

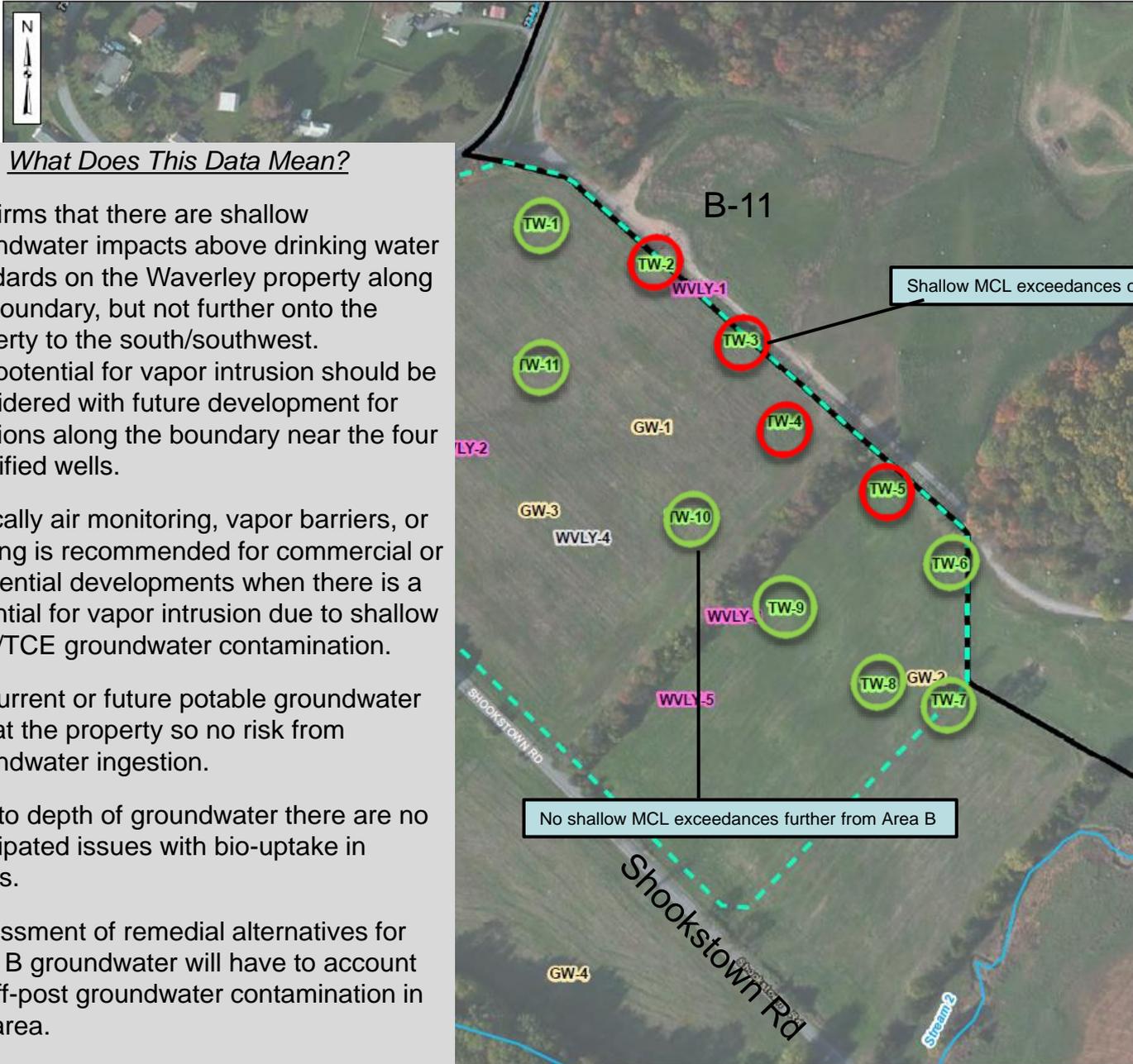
• 11 temporary points, surveyed and sampled twice

• Recommendation to convert TW-2, -3, -4, -5 to permanent points with ROE agreement.

Waverley Property  
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# Shallow Water Sample Results (July & August 2014)



## What Does This Data Mean?

- Confirms that there are shallow groundwater impacts above drinking water standards on the Waverley property along the boundary, but not further onto the property to the south/southwest. The potential for vapor intrusion should be considered with future development for locations along the boundary near the four identified wells.
- Typically air monitoring, vapor barriers, or venting is recommended for commercial or residential developments when there is a potential for vapor intrusion due to shallow PCE/TCE groundwater contamination.
- No current or future potable groundwater use at the property so no risk from groundwater ingestion.
- Due to depth of groundwater there are no anticipated issues with bio-uptake in plants.
- Assessment of remedial alternatives for Area B groundwater will have to account for off-post groundwater contamination in this area.

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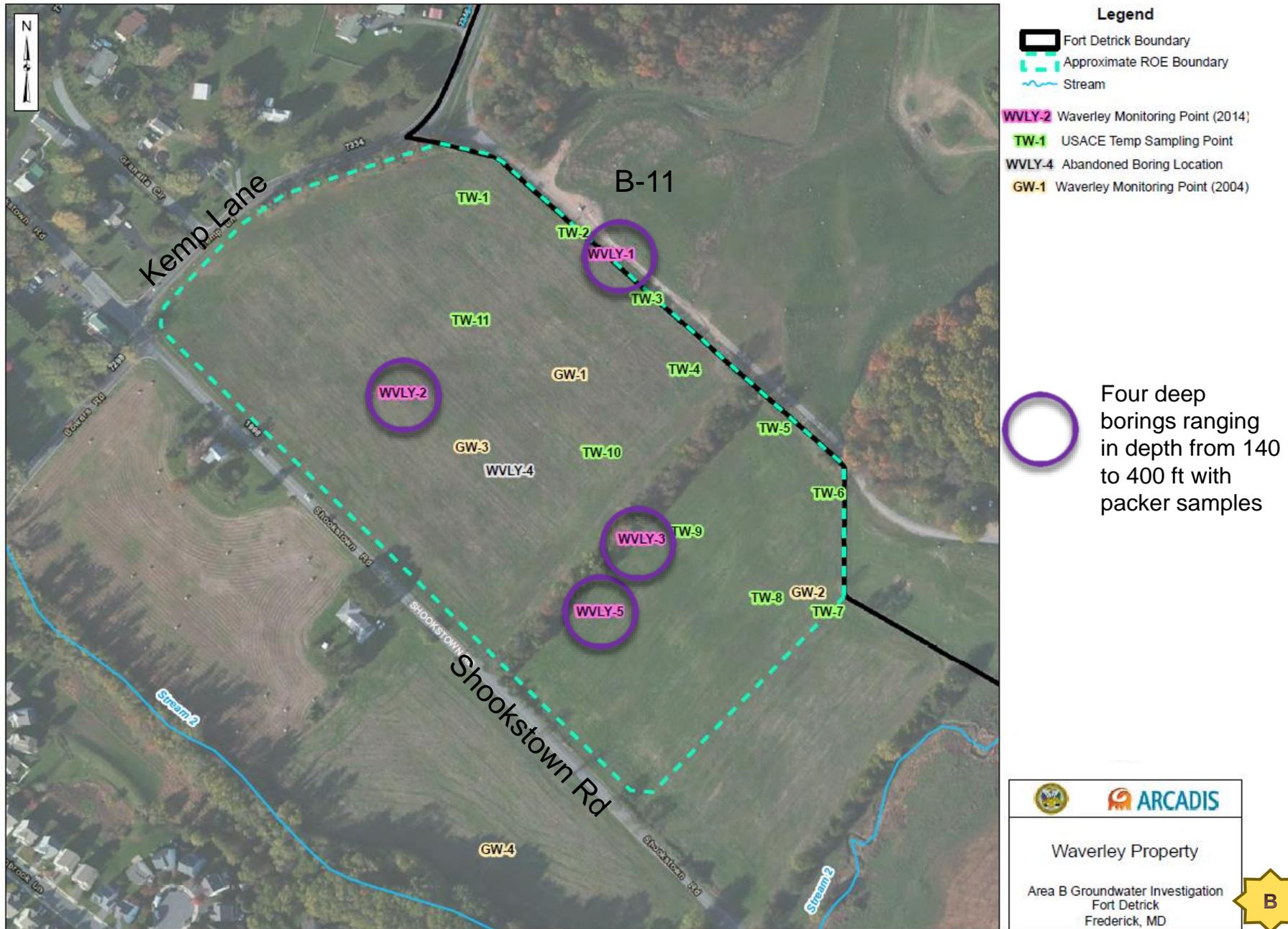
**ARCADIS**

Waverley Property

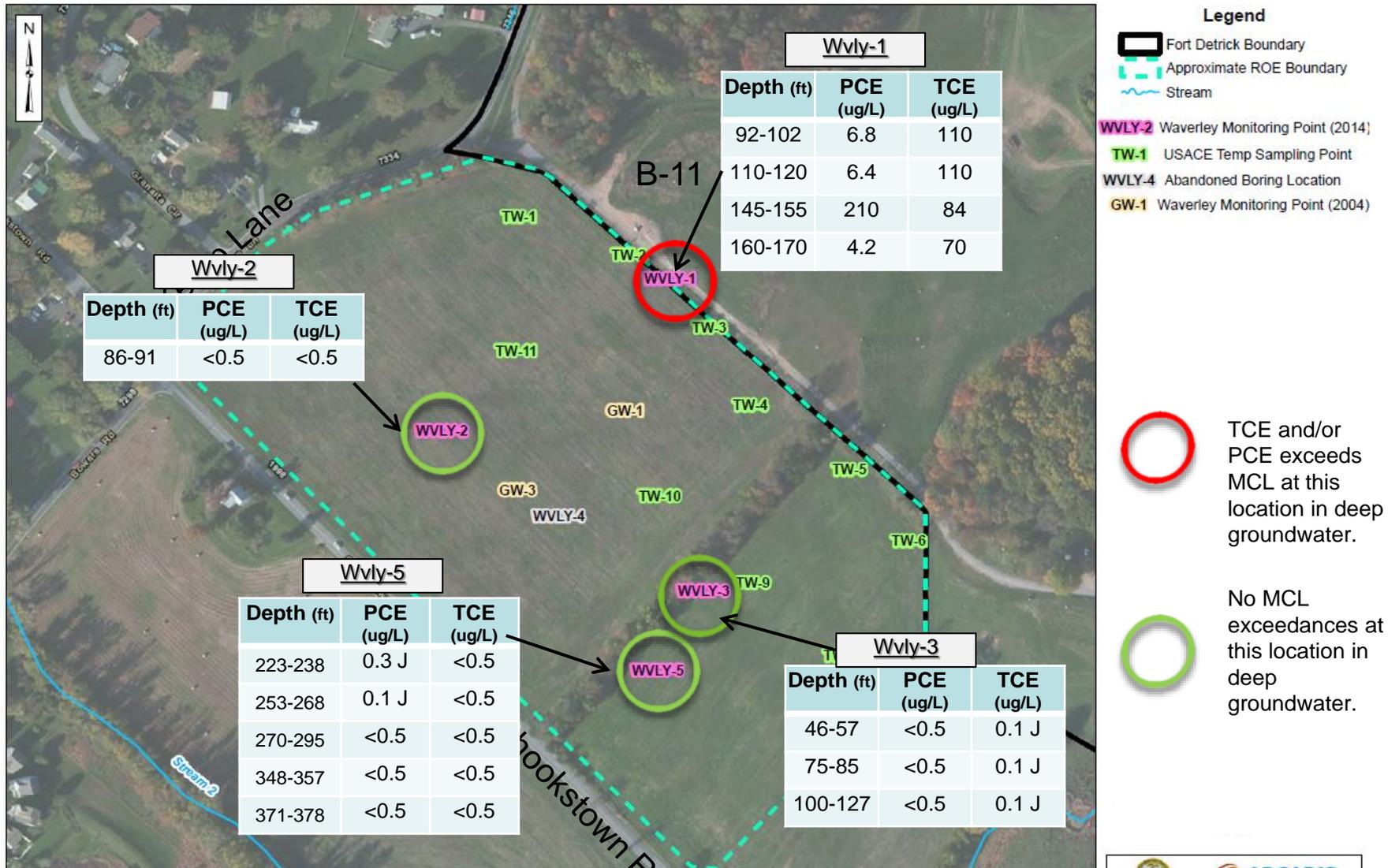
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# Deep Water Sample Results at the Waverley Property



# Summary of Deep Water Packer Test Results



Note: Packer sample and permanent monitoring point results can vary significantly (sometimes higher and sometimes lower) so packer sample data is considered screening level data until the permanent points are sampled.

Waverley Property

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# Packer Sampling versus Monitoring Point Sampling

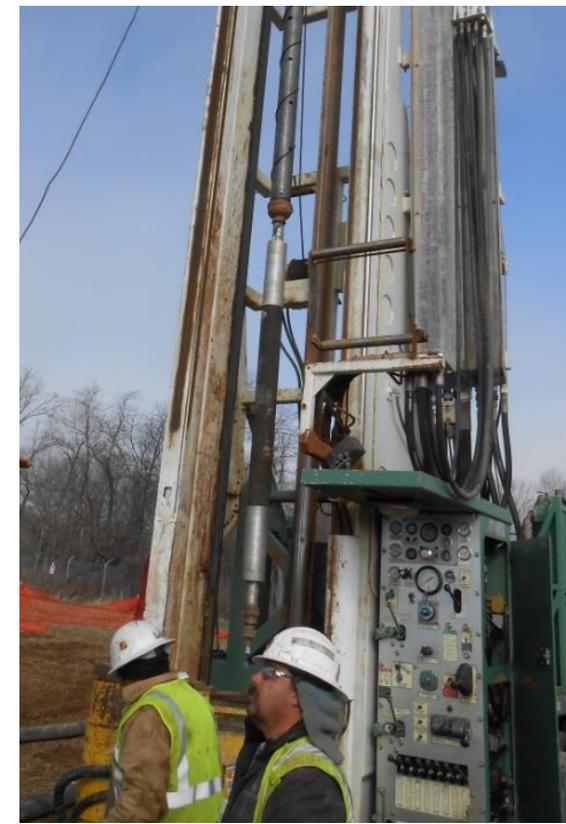
## Packer sampling

- Conducted during drilling activities using inflatable packers to isolate fractures, purge test intervals, and collect groundwater samples for laboratory analysis.
- Results are considered “screening level” suitable for deciding construction specifications, but not as reliable as data from a completed monitoring location.

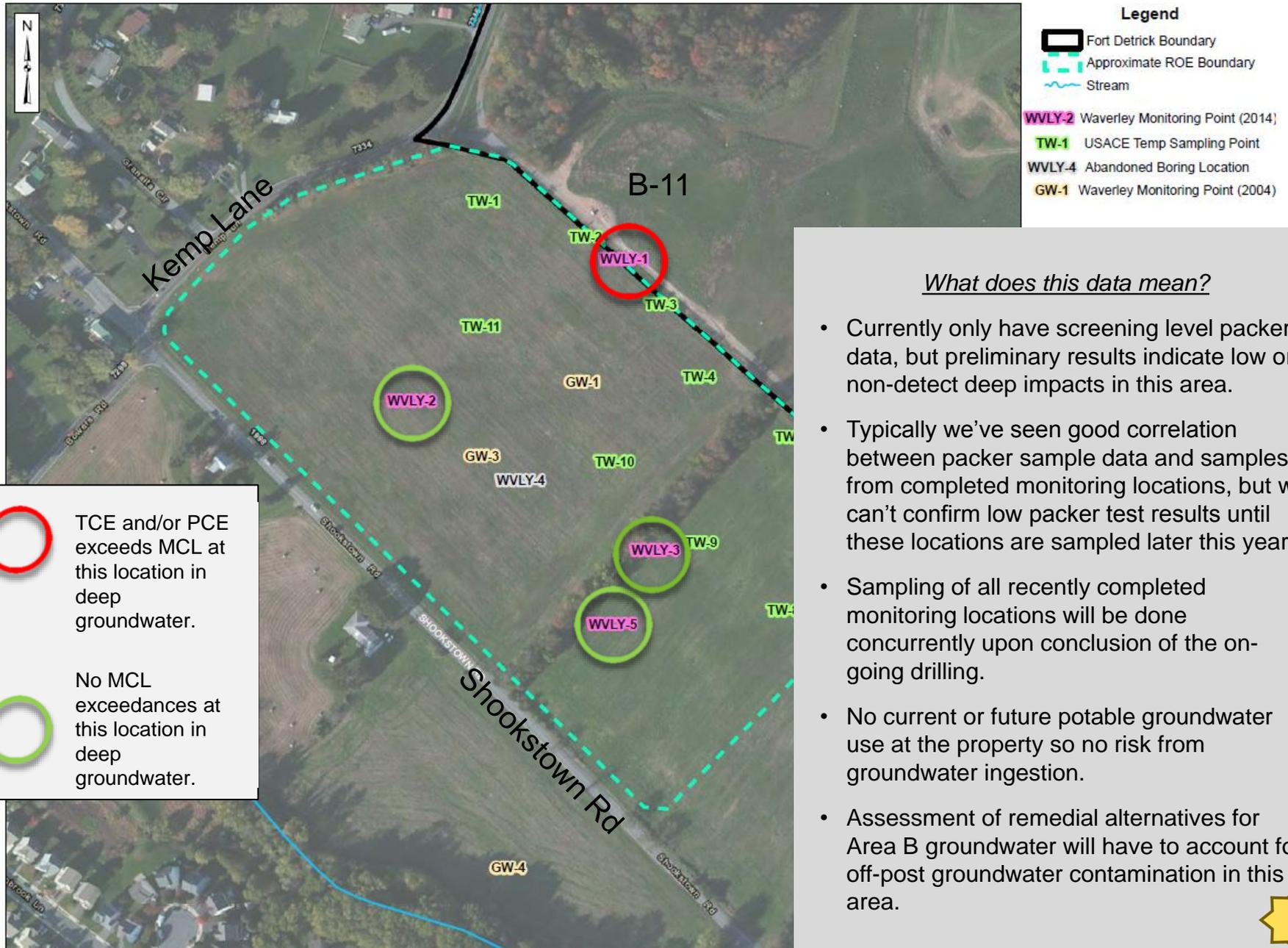
## Permanent Monitoring Point sampling

- Once a permanent point is built and the grout is allowed to set, the location is pumped and surged to “develop” it. This removes silt and fine-grained material from the vicinity of the screen to establish a reliable monitoring point.
- The location is allowed to settle for a week before sampling to allow the groundwater to return to steady-state conditions.
- Permanent locations provide reliable and reproducible data that can be validated and used to characterize nature and extent of contamination and evaluate risks.

**Note that data presented tonight is from packer sampling. Permanent monitoring points will be sampled later this year and data may be available for the next RAB.**



# Summary of Deep & Shallow Test Results



# Combined Summary of Deep & Shallow Test Results



The Army's preliminary observations to date are consistent with the original conceptual site model :

- **Groundwater impacts south of the Detrick property line do not extend far beyond the property line and concentrations drop off quickly in this direction by orders of magnitude.**

To confirm preliminary observations, samples from permanent monitoring points are needed (Dec 2014).

**Next Steps:** To complete Remedial Investigation for all on- and off-post Area B study areas and to assess remedial alternatives in a Feasibility Study, all on-going and proposed work and human health risk assessment must be completed and submitted for EPA and MDE for review (~ mid/late 2016). Note that potential groundwater pilot treatability studies are being discussed with EPA and MDE.

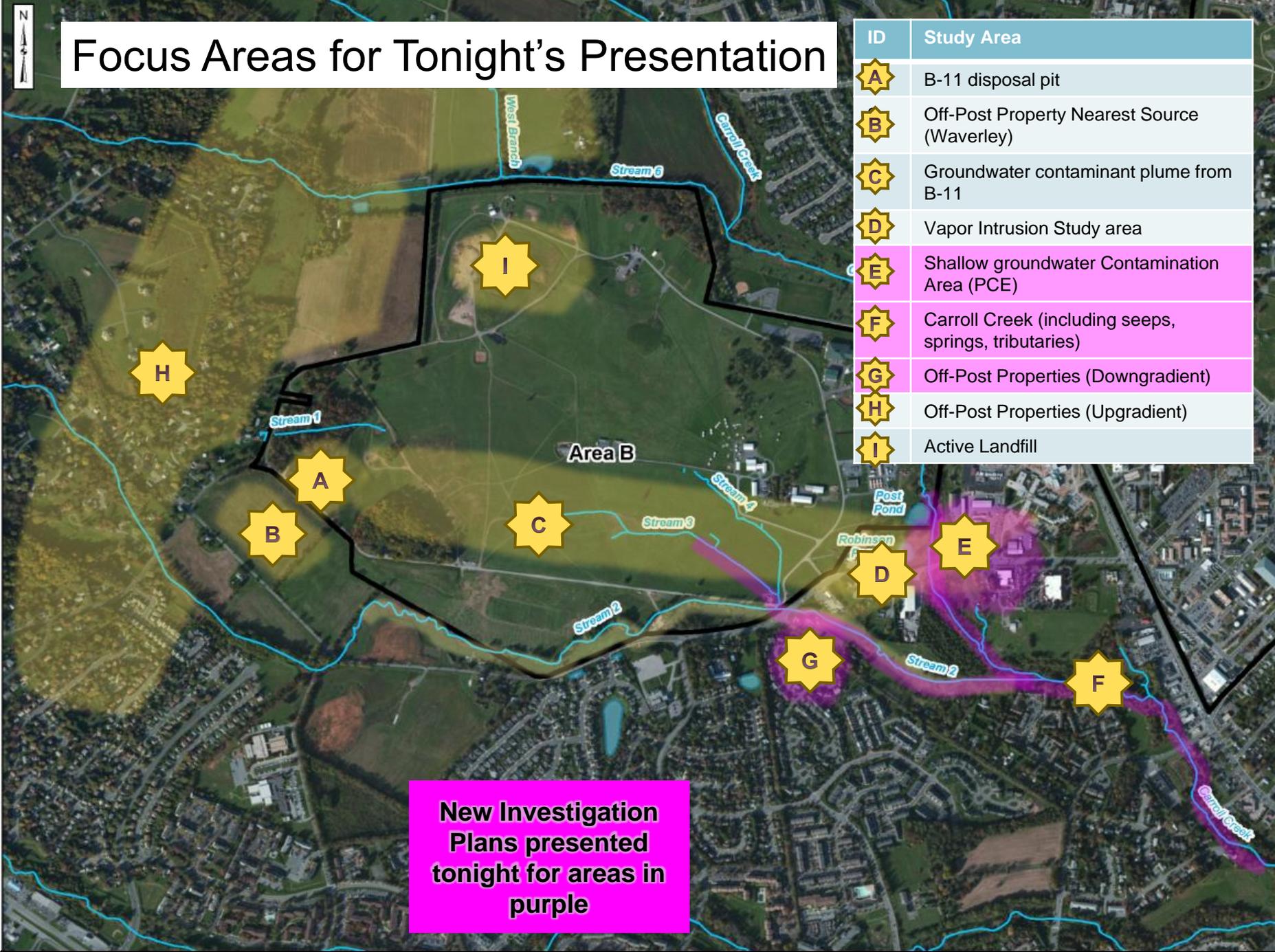


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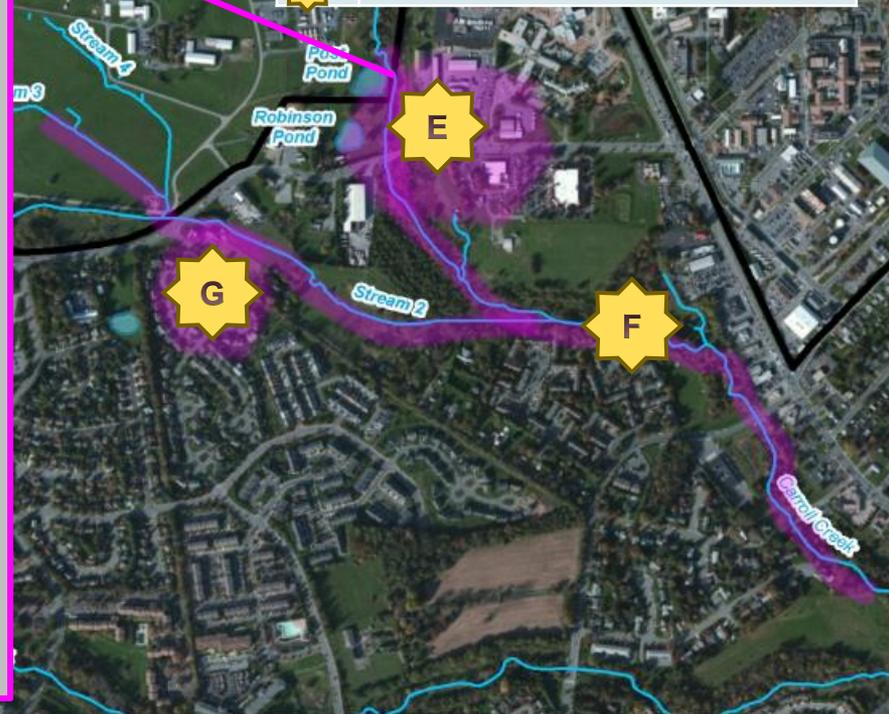
**New Investigation Plans presented tonight for areas in purple**

# 2014-2015 Additional Data Gap Work

## Shallow PCE Groundwater Contamination Area on County Property

- Drill up to 8 new permanent monitoring points.
- Collect 2 rounds of VOC groundwater samples from new monitoring points.
- Sample all 34 existing piezometers for VOCs, including the location on County property with the PCE MCL exceedance.
- Complete soil gas sampling around existing buildings.
- Special lab analysis of samples to try to “fingerprint” PCE concentrations in on- and off-post groundwater.
- Synoptic groundwater gauging event across entire Area B study area (~150 measurement locations) including new points on County property.
- Work requires right-of-entry agreement (pending)

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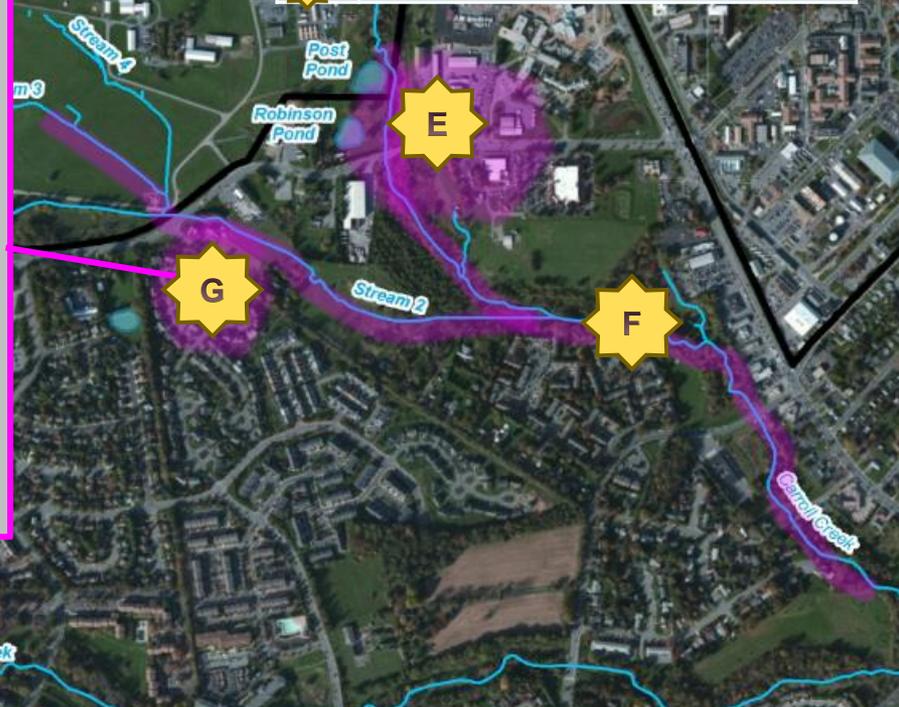
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## Downgradient Off-Post Areas along Shookstown Rd

- Prior direct push drilling attempts hit shallow rock in this area which prevented collecting shallow water samples.
- Return with rotary drilling to install up to 4 new permanent monitoring points.
- Collect 2 rounds of VOC groundwater samples from the new monitoring points.
- Work requires right-of-entry agreements (pending)



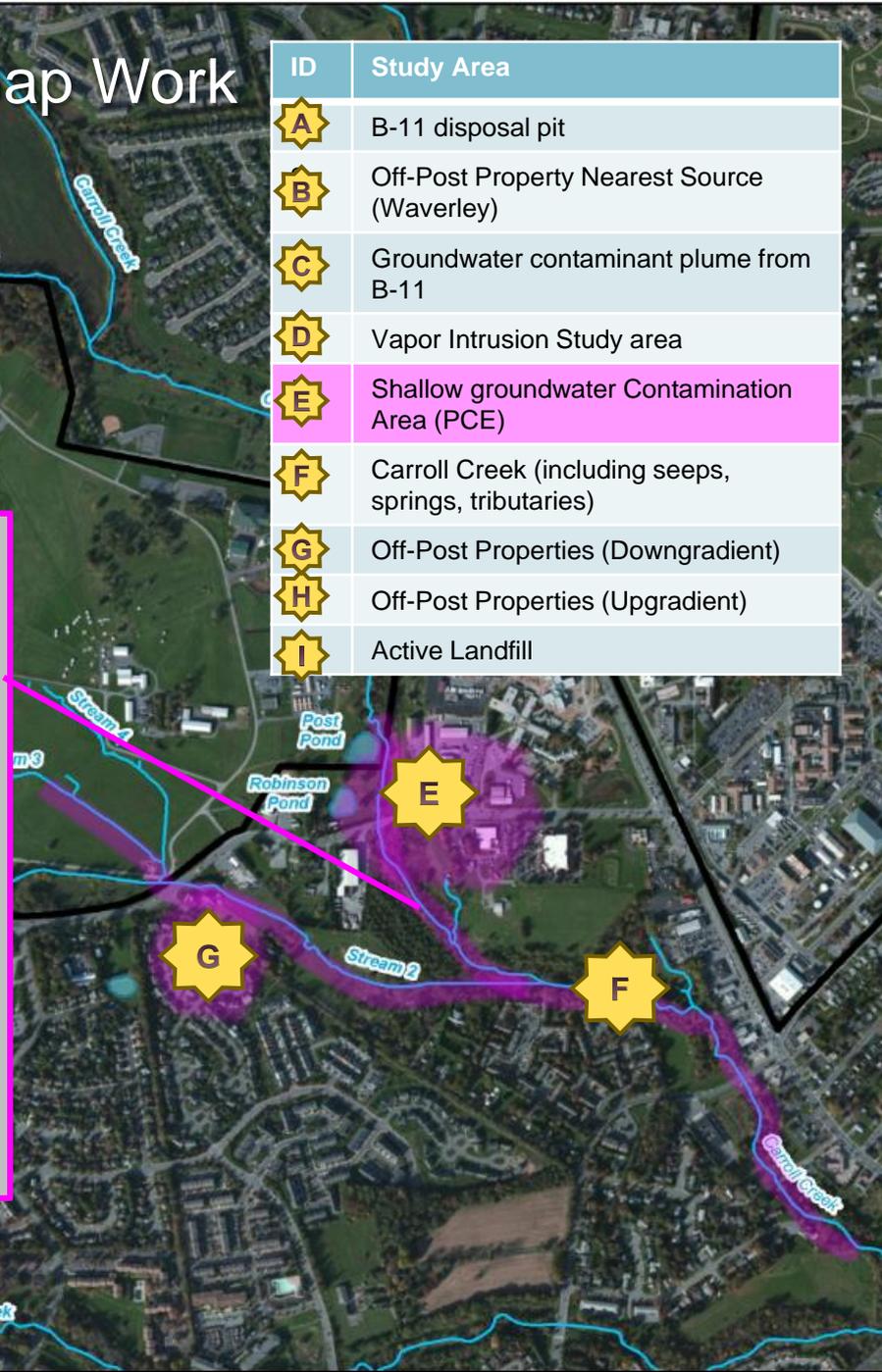
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## Carroll Creek and Tributaries

- Complete a second comprehensive stream survey to reassess locations of seeps and springs in the primary discharge area.
- Visual and infrared survey.
- Collect approximately 60 VOC samples from seeps, springs, and surface water locations.
- Work requires right-of-entry agreements (pending)



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# Status of On-going Area B RI Activities

## 2011-2013 RI WP (Original 2010 Work Plan)

- ✓ Existing monitoring point assessment and repair
- ✓ New monitoring point installation (onsite)
- ✓ Direct Push Investigation
- ✓ Spring and Seep Surveys
- ✓ Groundwater/Surface Water Sampling
- ✓ Vapor Intrusion Sampling (2 rounds) at 4 off-post & 1 on-post location.
- ✓ Groundwater tracer study
- ✓ Off-post point survey and sampling
- ✓ CSM Report

99% complete

## 2013-2014 RI Supplemental Data Gap Work

- ✓ Drilling on Waverley Property
- ✓ Deep drilling on County property (SE of Carroll Creek)
- ✓ Vapor intrusion at Daycare property & County Montevue building (ECC).
- ✓ Quarterly sampling (subset of Area B points)
  - > DPT in off-post Lake Coventry and Shookstown Rd areas. (Completed but DPT refusal in some areas)
  - > Deep drilling on Area B [one borehole] (in progress)
  - > Sample new/existing points (pending)

>90% complete

## 2014-2015 Additional Data Gap Work (Pending)

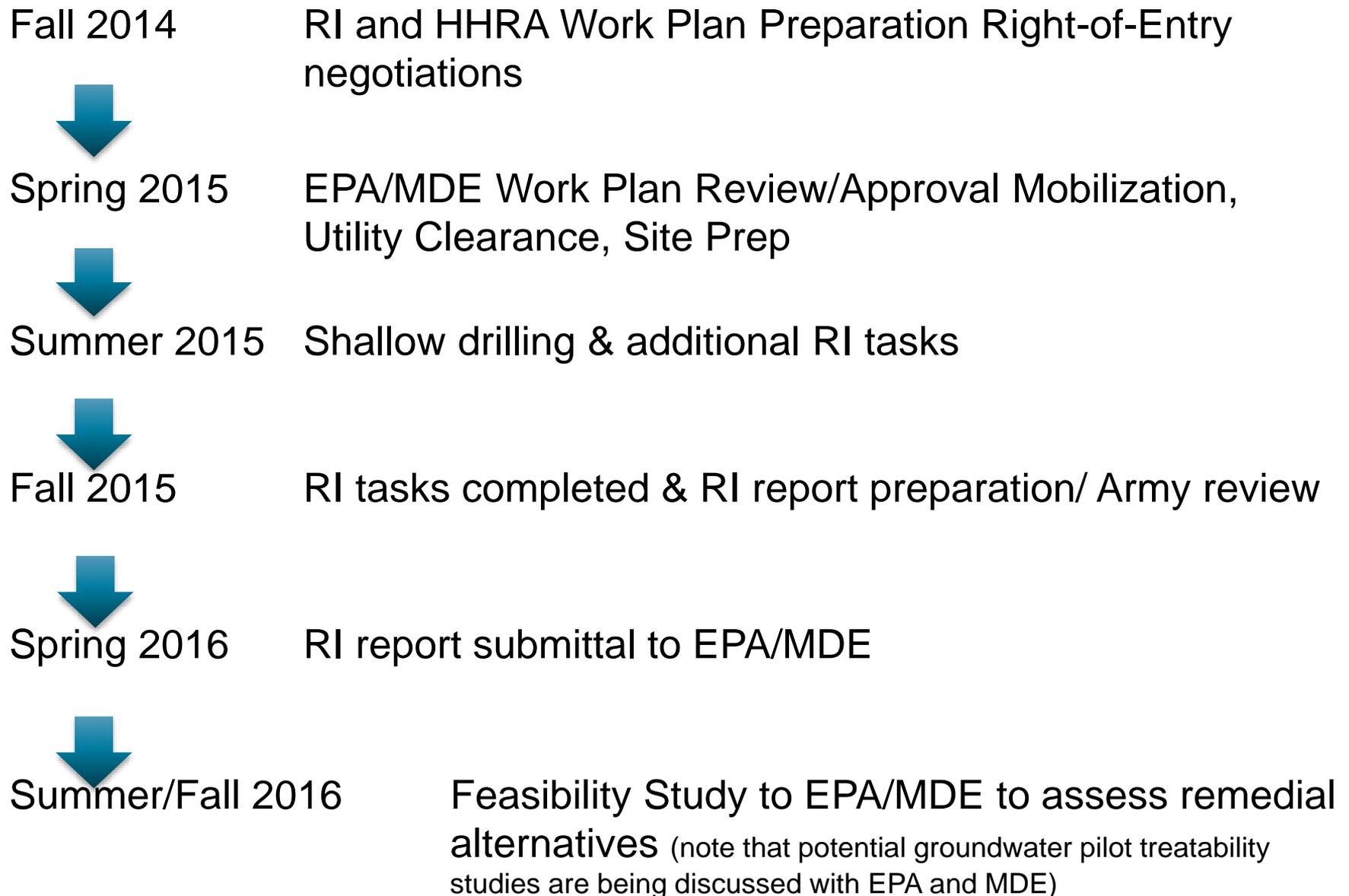
- > Air rotary drilling in off-post Shookstown Rd area where DPT was unsuccessful.
- > Shallow drilling on County Montevue Property to further evaluate shallow PCE detections in this area.
- > Re-Survey & Resample Springs, Seeps, and Surface Water in Carroll Creek primary discharge area.
- > Surface water modeling evaluation.
- > Forensics evaluation of VOC detections at County Montevue property.
- > Follow-on vapor intrusion testing
- > Work Plan pending

Pending

## Remedial Investigation Report

- Updated CSM
- Human health & ecological risk assessment
- Spring 2016 to EPA & MDE

# Area B Schedule



# Activities Between Now and Next RAB Meeting

- Complete packer sampling at deep Area B location, review analytical data with EPA/MDE, and construct permanent deep monitoring point.
- Complete first round of sampling for the 8 new deep monitoring points (5 on Waverley property, 2 on County property, and 1 on Area B). **New data possibly available for the next RAB.**
- Continue to work with EPA and MDE to review results from investigation activities completed to date to identify any data gaps the Army must address to stay on track for achieving Final Remedial Investigation under CERCLA.
- Submit work plan and schedule to EPA and MDE for the supplemental off-post Area B tasks presented tonight. This work expected to start in Spring 2015.



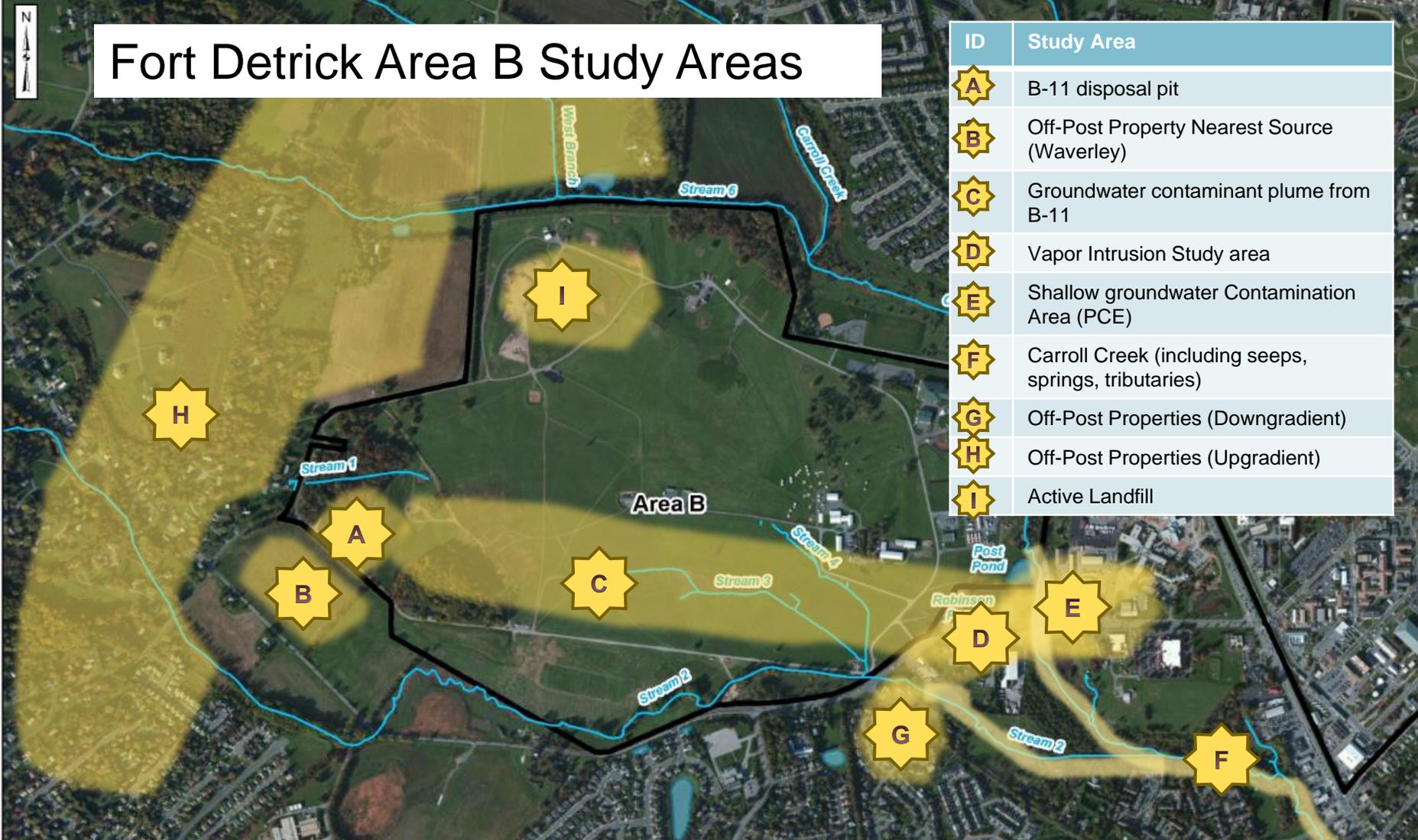
# Questions and Discussion



# Area B 360° Overview Slides

# Fort Detrick Area B Study Areas

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# Area B 360° Overview Slides

Map ID	Study Area	Previous RAB Presentations for Additional Information	Status of 360° Overview Slides
	B-11 disposal pit	See ID#3 for RAB presentations discussing groundwater contamination originating from B-11 area.	<i>Pending</i>
	Off-Post Property Nearest Source (Waverley)	Nov '13, Mar '14, Nov '14 (drilling updates with data)	Updated November 2014
	Groundwater contaminant plume from B-11	Nov '12 (April 2012 data summary) Feb '13 (Sept 2012 data summary; vertical contaminant distribution discussion; karst drilling, geophysical logging, permanent point construction decisions) Mar '14 (dye trace study recap)	<i>Pending</i>
	Vapor Intrusion Study area	May '13 (VI overview)	<i>Pending</i>
	Shallow groundwater Contamination Area (PCE)	Aug '13 (direct push study summary)	<i>Pending</i>
	Carroll Creek (including seeps, springs, tributaries)	Mar '14 (dye trace study recap)	<i>Pending</i>
	Off-Post Properties (Downgradient)	Aug '13, Nov '13 (direct push study summary)	<i>Pending</i>
	Off-Post Properties (Upgradient)	Feb '13 through Aug '14 Mar '14 (dye trace study recap)	<i>Pending</i>
	Active Landfill	See Nov '12, Feb '13 groundwater data near landfill, but not discussed directly.	<i>Pending</i>

# Off-Post Property Nearest Source (Waverley Property)



## Description

- Undeveloped privately-owned property across property line from former B-11 disposal pit (See Map ID A)
- Currently used for agriculture (corn, soybeans)
- Future residential development considered likely.
- Depth to first water is approx. 25-50 ft bgs.

## Relevant Investigation Work Completed

- 2004: seven monitoring points installed to depths up to 100 ft bgs (installed by property owner)
- 2013/2014: eleven monitoring points to ~50 ft bgs installed along the property line; five intermediate/deeper points to 91, 115, 155, 235, and 377 ft bgs (installed by Army)
- Points on property monitored during Area B tracer study.

## Investigation Highlights

- TCE detected above MCL (5 ppb) in four shallow groundwater sample points closest to the across from B-11. Highest concentration was 61.9 ppb.
- Boring Wvly-1 to 170 ft bgs, located ~100 ft from property boundary found TCE at 70 to 210 ppb in four screening packer samples collected during drilling.
- During tracer study, no tracer introduced at B-11 was detected in any monitoring points on this property or other areas to the south and west.
- Wvly-5: Preliminary data from deep packer samples during drilling found trace, estimated concentrations of PCE (0.3 J ppb at 228-233 ft bgs) and non-detect at depth (<0.1 ppb at 348-357 and 371-378 ft bgs). Points constructed and sampling pending.

## Risk & Potential Receptors

- No current risks identified.
- Current and future groundwater use is prohibited, so no potential exposure to contaminated groundwater.
- Groundwater contamination migrates onto the property at depth, so no soil contamination.
- Corn, soybeans not at risk due to depth of groundwater.
- No current vapor intrusion issues, but future development along the property boundary next to B-11 should consider monitoring, vapor barriers, vapor removal systems, or similar approaches to prevent potential exposure.

## Data Gaps & Next Steps

- The five new deep/intermediate points have not yet been sampled (except packer sampling during drilling). Sampling pending.
- 4 of the shallow temporary points with MCL exceedances near property boundary may be converted to permanent points.
- Currently, no other drilling or investigation on this off-post property is planned or recommended (pending EPA/MDE review)
- Draft human health risk assessment & Area B RI report slated for Summer 2016 (pending completion of work in other areas).
- Draft Feasibility Study report to assess remedial alternatives for Area B anticipated in late 2016. Pilot treatability studies may be considered too. Path forward decisions require EPA and MDE concurrence.