

Marine Corps Base (MCB) Camp Lejeune Restoration Advisory Board (RAB) Meeting Minutes

MEETING DATE: February 21, 2024

LOCATION: Coastal Carolina Community College, Business Technology Building, Jacksonville, North Carolina

ATTENDEES:

Laura Spung/MCB Camp Lejeune	Laarni Cooper/NAVFAC
Thomas Richard/MCB Camp Lejeune	Matt Louth/CH2M
David Towler/MCB Camp Lejeune	Dan Hockett/CH2M
Jennifer Tufts/EPA	Angela Moore/NCDEQ
Laura Bader/RAB Co-Chair	
Rob Johnson/RAB member	
Thomas Mattison/RAB member	

FROM: Matt Louth/CH2M

DATE: February 21, 2024

I. Welcome and Introductions

Mr. Richard began the meeting, introduced the team, and explained the purpose of the RAB.

II. Site 111 (Camp Davis South Forward Arming and Refueling Point Activity) Per- and Polyfluoroalkyl Substances (PFAS) Remedial Investigation (RI)

Objective: The purpose of this agenda item is to review the Site 111 setting and background, present the Site 111 PFAS investigations, including the Site Inspection (SI), off-base drinking water evaluation, expedited investigation in deeper aquifers, and the RI; review historic supply wells; and provide a schedule for ongoing activities.

Overview: A presentation was reviewed by Mr. Hockett.

An overview of Site 111 was presented. Site 111 is a World War II era anti-aircraft training area, with two air strips constructed in 1942-1943. Camp Davis was closed by the Army in 1944. The Greater Sandy Run Annex was added to Camp Lejeune in the 1990's, including Marine Corps Outlying Landing Field Camp Davis. In the 2010's, the area was used for Forward Arming and Refueling Point exercises, with P-19 usage with possible residual aqueous film forming foam (AFFF) in water lines of emergency response vehicles, which may have resulted in inadvertent AFFF deployment.

Site 111 is located in the southeast-most part of Camp Lejeune and includes approximately 350 acres. The groundcover at the site is pavement surrounded by grass, with wetlands to the west/northwest and east/northeast. The site is generally flat within the runway area and is surrounded by ditches. Big Shakey Swamp, to the north/northwest, is approximately 10 feet lower in elevation. Surface water flows overland in multiple directions. The nearest surface water migration pathways are drainage ditches that surround the south runway and discharge to Big Shakey Swamp. The lithology is characterized by sands with variable layers of clays from ground surface to approximately 40 feet (ft) below ground surface (bgs), clay from approximately 40 ft bgs to 55 ft bgs, fine sands from approximately 55 to 110 ft bgs,

representing the upper Castle Hayne aquifer, and limestone deeper than 110 ft bgs, representing the lower Castle Hayne aquifer.

An overview of the Camp Davis SI was presented. The initial investigation was conducted in 2020 and included 14 new wells: 8 at Camp Davis South and 6 at Camp Davis North. Soil samples were collected at 15 locations. Results for soil were below the screening levels (SLs). Results for groundwater samples from Camp Davis North were below the screening criteria used for the SI. Results from two groundwater samples at Camp Davis South were above the screening criteria used for the SI (maximum PFOA concentration was 808 nanograms per liter [ng/L] and maximum PFOS concentration was 13,344 ng/L).

Site 111 is located within 1 mile of the Base boundary and groundwater flow direction was not fully evaluated as part of the SI; therefore, the Navy and the Marine Corps conducted an evaluation of potential off-Base drinking water receptors. Letters were sent to 630 parcel owners within one mile of Camp Davis South with fact sheets. Up to 70 parcels with a potential drinking water well were identified and 11 property owners requested sampling, including two public utility supply wells. All PFOA/PFOS results were below US EPA lifetime health advisories in use at the time. PFOA and PFOS were detected in one drinking water sample. As a result, an expedited evaluation of the presence of absence of PFAS in the deeper aquifer (the Castle Hayne aquifer) was recommended.

For the expedited evaluation of the deeper aquifer, 13 new monitoring wells were installed and sampled: 3 in the surficial aquifer, 4 in the upper Castle Hayne (UCH) aquifer, and 6 in the lower Castle Hayne (LCH) aquifer. Additionally, 8 existing surficial aquifer monitoring wells installed as part of the SI were sampled. Groundwater flow was determined to be north/northwest in the surficial aquifer and southeast in both the UCH and LCH aquifers, with a strong (30 ft) downward potential. In the surficial aquifer, analytical results were similar to the SI, with two wells with exceedances of screening levels (maximum PFOA detected was 849 ng/L and maximum PFOS detected was 29,200 ng/L). There were no exceedances of screening levels in the Castle Hayne groundwater. Results will be incorporated into the RI report.

Mr. Johnson indicated two water supply wells were installed across Route 50 by the local water utility. The wells were temporally turned off during initial investigation activities. Mr. Richard noted the Base was aware of the wells and has been working closely with the water utility regarding the groundwater monitoring and both are sharing information. PFAS with regional screening levels have not been detected in samples from the off-Base water supply wells.

The Remedial Investigation Approach for soil and groundwater was reviewed. Data needs included downgradient delineation in the surficial aquifer near BW-FARP-S-MW03; horizontal and vertical delineation in the surficial aquifer around BW-FARP-S-MW07, and additional soil data surrounding the release area (BW-FARP-S-MW07). To resolve these data needs, 18 new surficial aquifer monitoring wells were installed to bracket the water table; 1 new monitoring well was installed and screened immediately above the clay unit (~40 ft bgs); groundwater samples were collected from 11 existing and 19 new surficial aquifer wells, 4 UCH aquifer wells, and 6 LCH aquifer wells; co-located surface (0-1 ft bgs) and subsurface (immediately above the water table) soil samples were collected from 7 new locations. Samples were analyzed for 18 PFAS compounds listed in USEPA Method 537.1.

Project action limits (PALs) are comparison values used to guide decision-making based on project data results, such as delineation target and laboratory detection limits. The PALs for the Site 111 RI are the Regional Screening Levels (RSLs) from EPA for human health, based on peer-reviewed toxicity levels, and Ecological Screening Values (ESVs) for ecological receptors, based on literature values, but less widely adopted. The RSLs are conservatively based on a hazard quotient of 0.1 to account for the potential of multiple contaminants of concerns. The Navy approved the use of the May 2023 RSLs. The ESVs are

generally higher than the RSLs, except for some receptors in soil and sediment. The specific PALs for the Site 111 RI were presented.

The Remedial Investigation Approach for surface water and sediment was also reviewed. Data needs included drainage ditches surrounding the site that have not yet been investigated but contain flowing surface water that potentially originates from groundwater discharge. To resolve these data needs, 14 co-located surface water and sediment samples were collected at locations within the drainage ditches. Based on the results, possible areas of groundwater discharge were evaluated through a temperature study or other groundwater-to-surface water assessment techniques.

RI activities included continuous water level monitoring in 30 monitoring wells to support the development of a groundwater flow model and drilling conducted in Summer 2022, during which 10 monitoring wells were installed outside of the MILCON project to replace the air strip (8 proposed monitoring wells were delayed until after MILCON was complete) and sample collection. In soil, 7 surface soil and 7 subsurface soil samples were collected. In groundwater, samples were collected from 21 existing monitoring wells and 13 new monitoring wells. Surface water and sediment samples were collected from 14 locations as planned. Based on the analytical results from these samples, additional sampling was recommended, including 6 new surface and subsurface soil samples, 5 new surficial aquifer monitoring wells, 2 new UCH aquifer monitoring wells, and 3 additional surface water and sediment locations. Drilling was conducted in Fall 2023 after MILCON was complete.

Preliminary RI results were presented. Surface soil and subsurface soil samples were collected at a total of 13 locations: 7 in September 2022 and 6 in October 2023. These were evaluated with the 7 surface soil and subsurface soil samples collected during the SI. Results were below laboratory reporting limits in all RI samples except one surface soil sample and one subsurface soil sample from 2022. PFAS was detected at estimated concentrations in 6 or 14 SI soil samples. All SI results were more than one order of magnitude below PALs. No PFAS with RSLs were detected in surface soil collected from 0 to 1 ft bgs; one was detected at SS37. In subsurface soil samples, with depths ranging from 2 to 3 ft bgs to 14 to 15 ft bgs, the only detections were in samples collected from SB34-2-3, and included PFHxS at 1.13 J ng/g (with a PAL of 130 ng/g) and PFOS at 17.8 ng/g (with a PAL of 13 ng/g). Groundwater samples were collected in August-September 2022 and October 2023 and included 37 surficial aquifer monitoring wells, 6 UCH aquifer monitoring wells, and 6 LCH aquifer monitoring wells. PAL exceedances were limited to 12 surficial aquifer monitoring wells. All UCH and LCH aquifer wells were non-detect for PFAS with PALs, except MW18. Additionally, most UCH and LCH wells were non-detect for all analyzed PFAS. In MW18, PFHxS was detected intermittently above the PAL of 39 ng/L, including 62 ng/L in June 2021 and 49.7 ng/L in June 2022; while below the PAL for the other seven sampling events. Surface water and sediment samples were collected at 17 locations. There were only four detections in sediment for all PFAS (SD03, SD16, SD17 with PFOS ranging from 0.991 J ng/g to 3.27 J ng/g) and PFHxS in SD16 at 1.26 ng/g. At least one PFAS compound was detected in all surface water locations.

Potentiometric maps were reviewed for the surficial and UCH aquifers based on data collected in October 2023, which show groundwater flowing north/northwest in the surficial aquifer and southeast in the UCH aquifer.

In summary, RI results indicate that soil impacts above the PAL are limited to PFOS in one subsurface soil sample; sediment is not impacted above the PALs; groundwater impacts are confined to a defined horizontal area in the surficial aquifer and vertically down to the confining unit which is noted not to be impermeable; surficial aquifer groundwater flows north-northwest and Castle Hayne aquifer groundwater flows southeast; and surface water impacts attenuate downstream, although surface water samples have not been evaluated downstream from locations that exceed PALs (SW16 and SW17), therefore one additional surface water sample is being collected approximately 3,500 feet downstream).

During the off-Base drinking water sampling activities in 2020/21, the presence of 1940's-era supply wells were discovered. In 2021, the locations of 10 of these supply wells were investigated. Five had been abandoned and the wellheads removed; one was visible above-grade but appeared obstructed around 80 ft bgs (likely abandoned); one had a well head removed but it was unclear if the well was abandoned; two were visible above-grade and sealed, with unknown statuses; and one was located off-Base. In October 2023, the four historic supply wells that were not confirmed as abandoned were re-developed and abandoned. During this process, two of the wells were confirmed as previously abandoned.

The schedule for the RI was reviewed. The last surface water sample was collected today (February 21, 2024) and a second round of groundwater, surface water, and sediment sampling is planned for April 2024. The draft RI report is planned for submittal in Winter 2024 and the final RI report is anticipated in Spring 2025.

IV. RAB Business

Mr. Richard announced if there is a need for election for new co-chair and Ms. Bader agreed to continue to be the co-chair.

The next RAB meeting is planned for May 22, 2024, and will include a site tour.



CAMP LEJEUNE

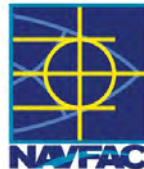
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Site 111 (Camp Davis South Forward Arming and Refueling Point Activity) Per- and Polyfluoroalkyl Substances (PFAS) Remedial Investigation

MCB Camp Lejeune

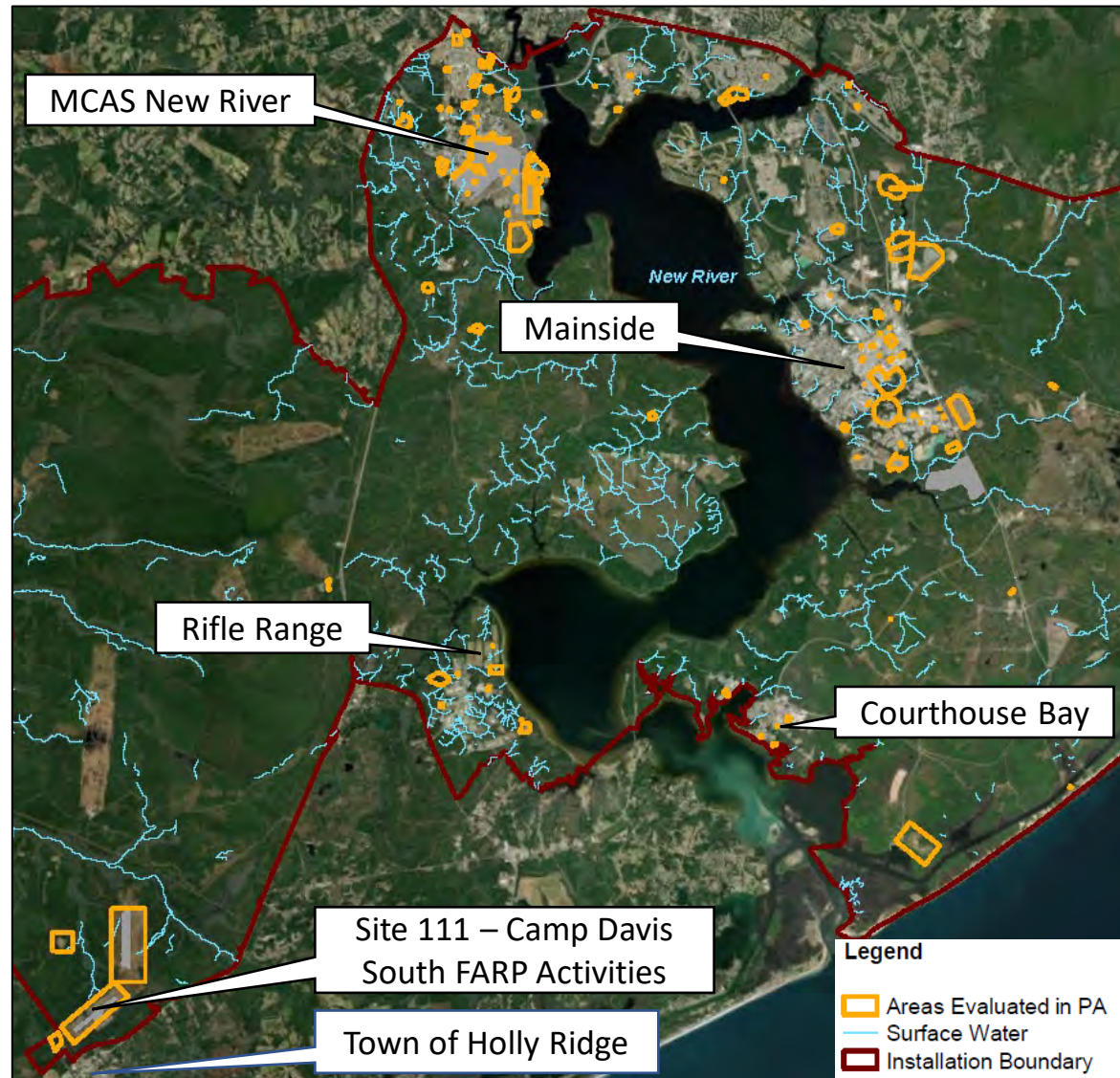
Restoration Advisory Board Meeting

February 21, 2024



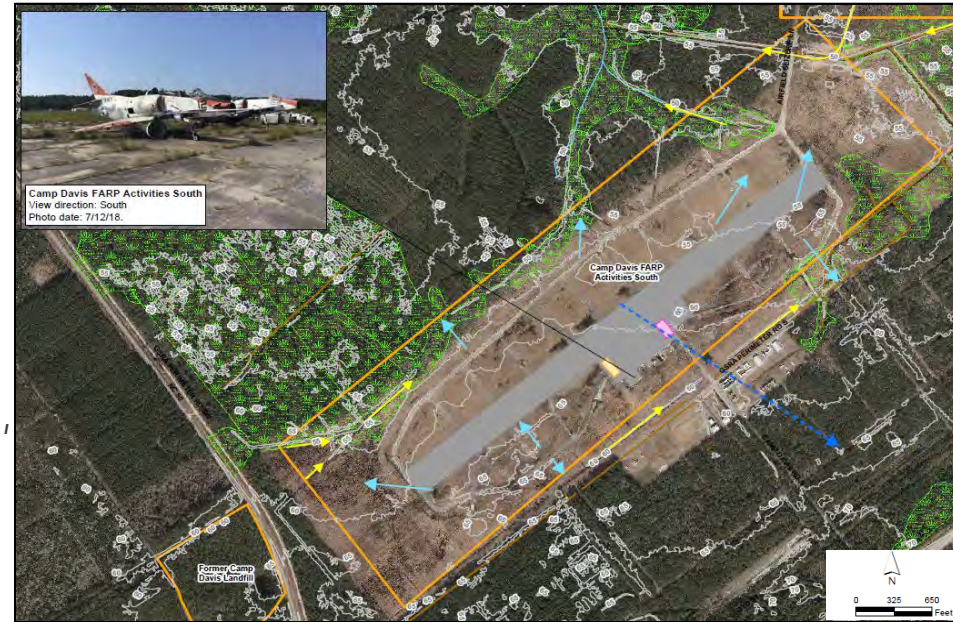
Objectives

- Review Site 111 setting and background
- Present Site 111 PFAS investigations
 - Site Inspection (SI)
 - Off-base drinking water evaluation
 - Expedited investigation in deeper aquifers
 - Remedial Investigation (RI)
- Review Historic supply wells
- Provide schedule



Site 111 Setting

- **Location:** Southeast-most part of Camp Lejeune
- **Area:** Approximately 350 acres
- **Ground cover:** Pavement surrounded by grass, wetland to the west/northwest and east/northeast
- **Topography:** Generally flat within the runway area surrounded by ditches. Big Shakey Swamp, to the north/northwest is approximately 10 feet lower in elevation.
- **Surface water:** Overland flow in multiple directions, nearest surface water migration pathways are drainage ditches that surround the south runway and appear to discharge to either Juniper Swamp (to the northeast) or Big Shakey Swamp.
- **Lithology**
 - 0--40 ft: Sands with variable layers of clays (Surficial)
 - ~40--55 ft: Clay
 - ~55--110 ft: Fine sands (Upper Castle Hayne)
 - >~110 ft: Limestone (Lower Castle Hayne)



Background

- WWII era anti-aircraft training area
 - Two air strips constructed in 1942-43
 - Camp Davis closed by Army ~1944
- Greater Sandy Run Annex added to Camp Lejeune in 1990's
 - Includes Marine Corps Outlying Landing Field Camp Davis
- Used for Forward Arming and Refueling Point exercises in the 2010's
 - P-19 usage with possible residual aqueous film forming foam (AFFF) in water lines of emergency response vehicles
 - Inadvertent AFFF deployment



Photo By: Cpl. Jackeline M. Perez Rivera, July 17, 2014, The Globe



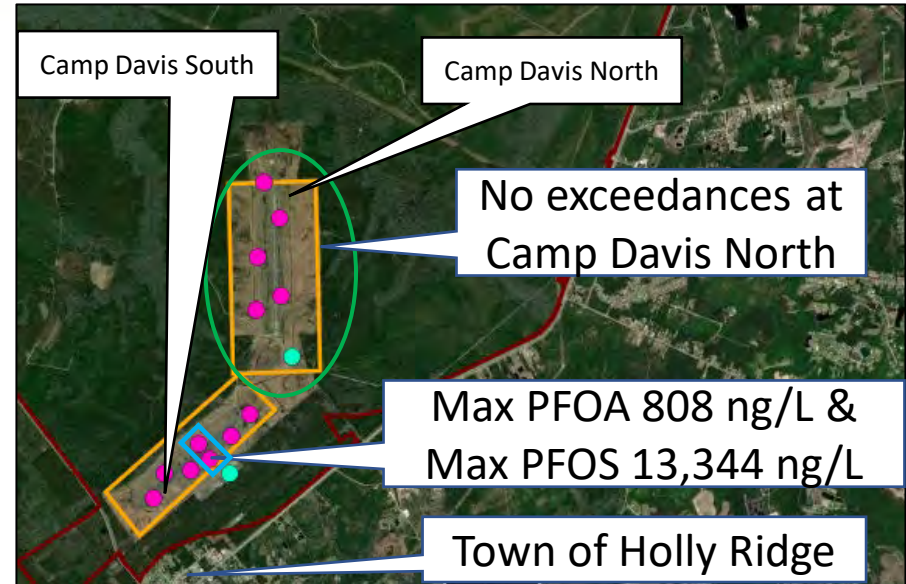
P-19 aircraft rescue and fire fighting vehicles

Camp Davis Site Inspection (SI)

- Initial investigation in 2020
 - 14 new wells, 8 at Camp Davis South and 6 at Camp Davis North
 - Collect soil samples at 15 locations (pink symbols)
- Results for soil were below the screening levels (SL)
- Results for groundwater samples from Camp Davis North were below the screening criteria used for the SI
- Results from two groundwater samples at Camp Davis South were above the screening criteria used for the SI

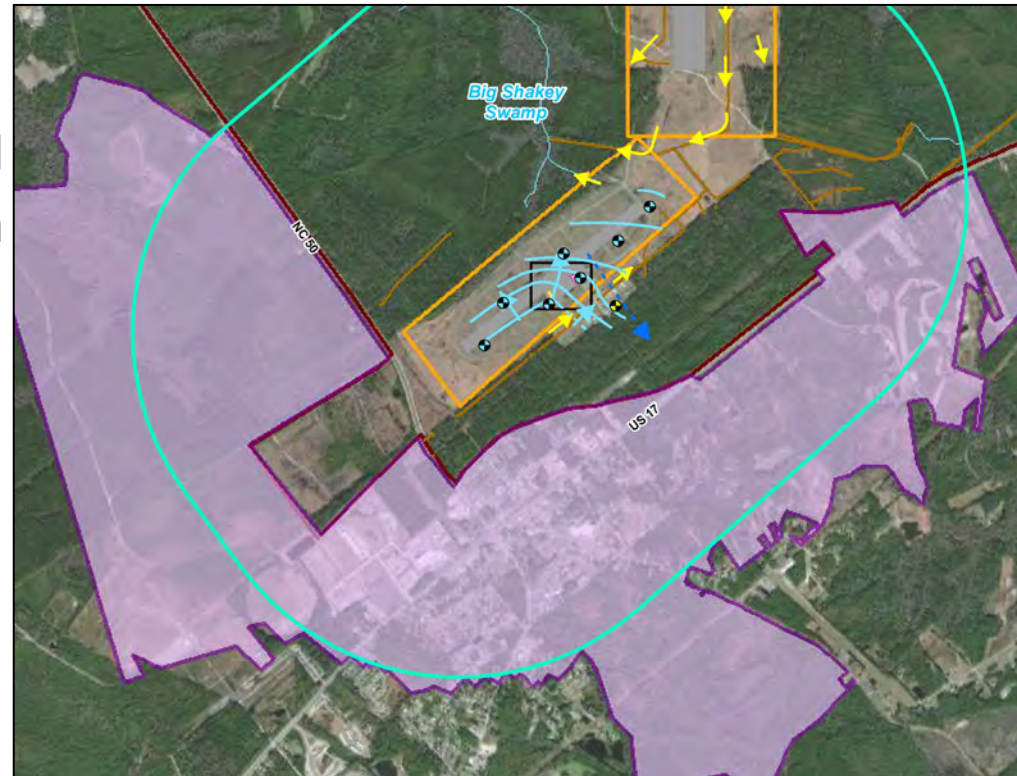
Compare Groundwater SLs from SI to current SLs used in RI (ng/L)

	SI (2020)	RI* (2023)
PFOA	40	6
PFOS	40	4
PFBS	600	600
* Additional PFAS evaluated for RI		



Off-Base drinking water wells evaluation

- Site 111 located within 1 mile of base boundary
- Groundwater flow direction not fully evaluated
- Navy and Marine Corps conducted evaluation of potential off-Base drinking water receptors
- Letters sent to 630 parcel owners within 1-mile of Camp Davis South with fact sheets
- Up to 70 parcels with a potential drinking water well identified and 11 property owners requested sampling
 - 2 public utility supply wells
- All PFOA/PFOS results were below US EPA lifetime health advisory in use at time
 - PFOA/PFOS detected in 1 drinking water sample
- Expedited evaluation of presence or absence of PFAS in deeper aquifer (Castle Hayne) recommended due to identification of off-base drinking water receptors

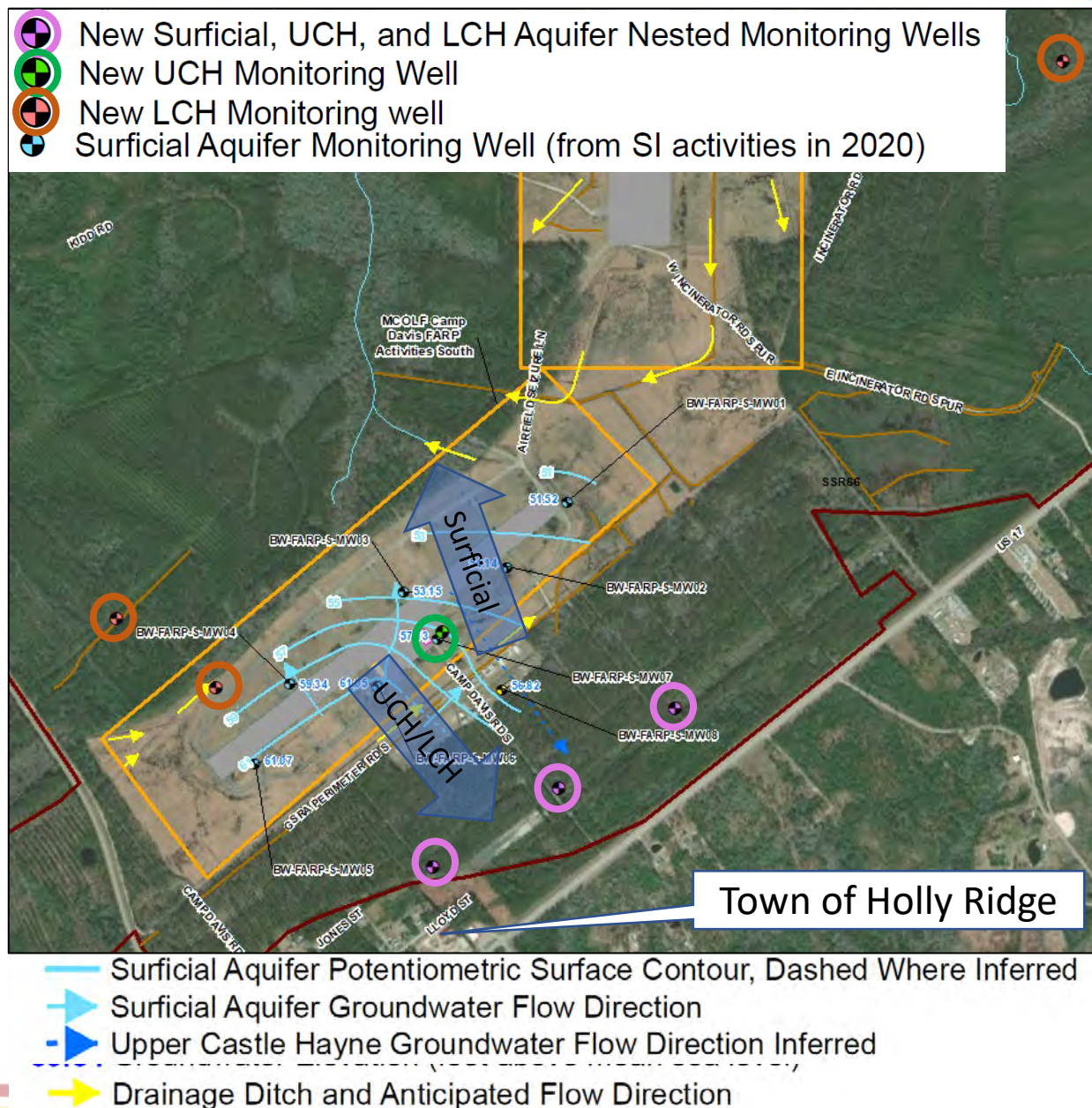


Parcels within Sampling Area
1-mile PFAS Release Buffer

Surficial Aquifer Groundwater Flow Direction
Upper Castle Hayne Groundwater Flow Direction Inferred
Drainage Ditch and Anticipated Flow Direction

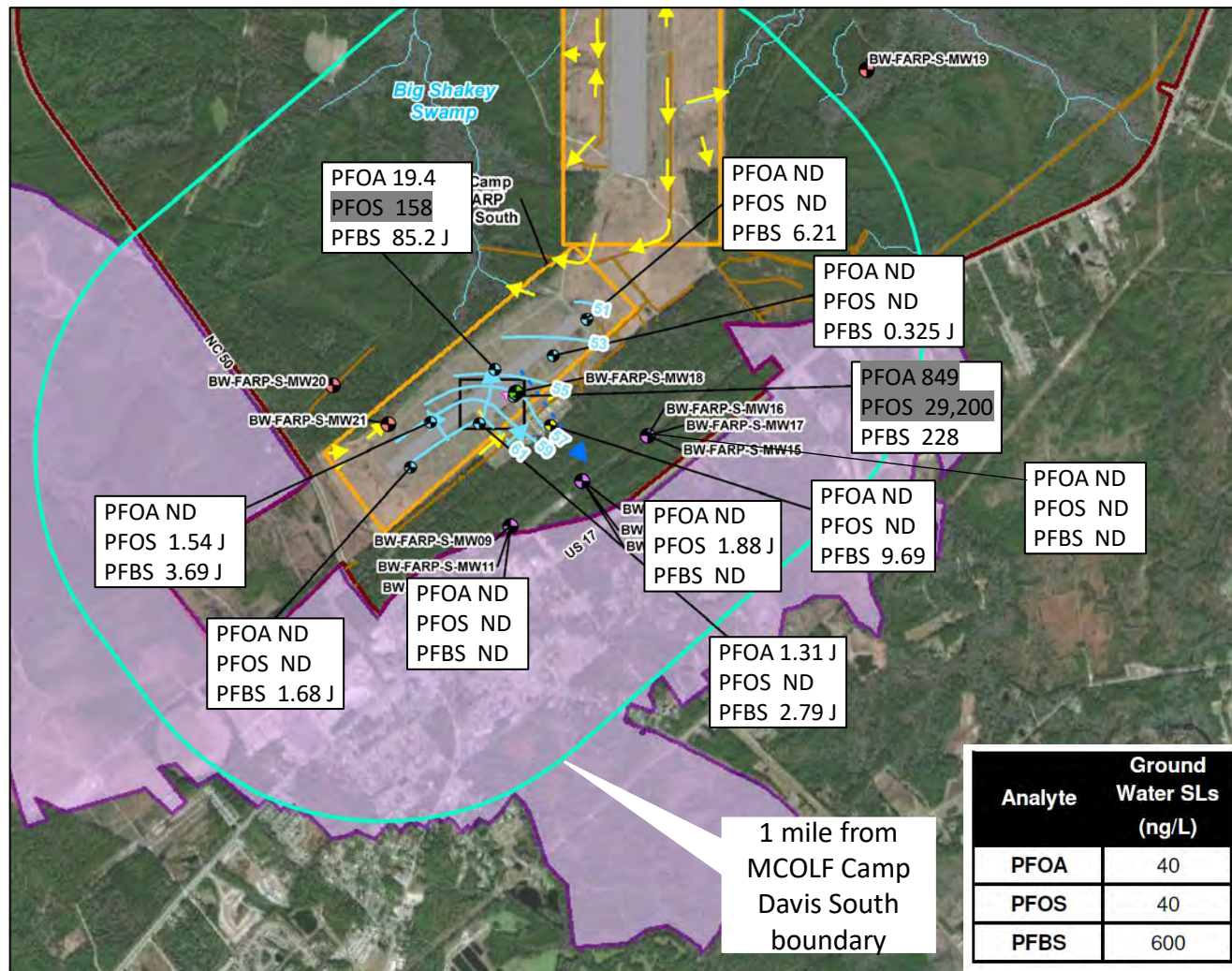
Expedited evaluation of deeper aquifer

- Installed and sampled 13 new monitoring wells
 - 3 Surficial
 - 4 Upper Castle Hayne (UCH)
 - 6 Lower Castle Hayne (LCH)
- Sampled 8 existing Surficial wells from SI
- Groundwater flow
 - Surficial - north/northwest
 - Upper Castle Hayne – southeast
 - Lower Castle Hayne – southeast
- Strong (30 ft) downward potential



Site 111 Surficial GW Results

- Similar to SI results
- Two exceedances of screening levels



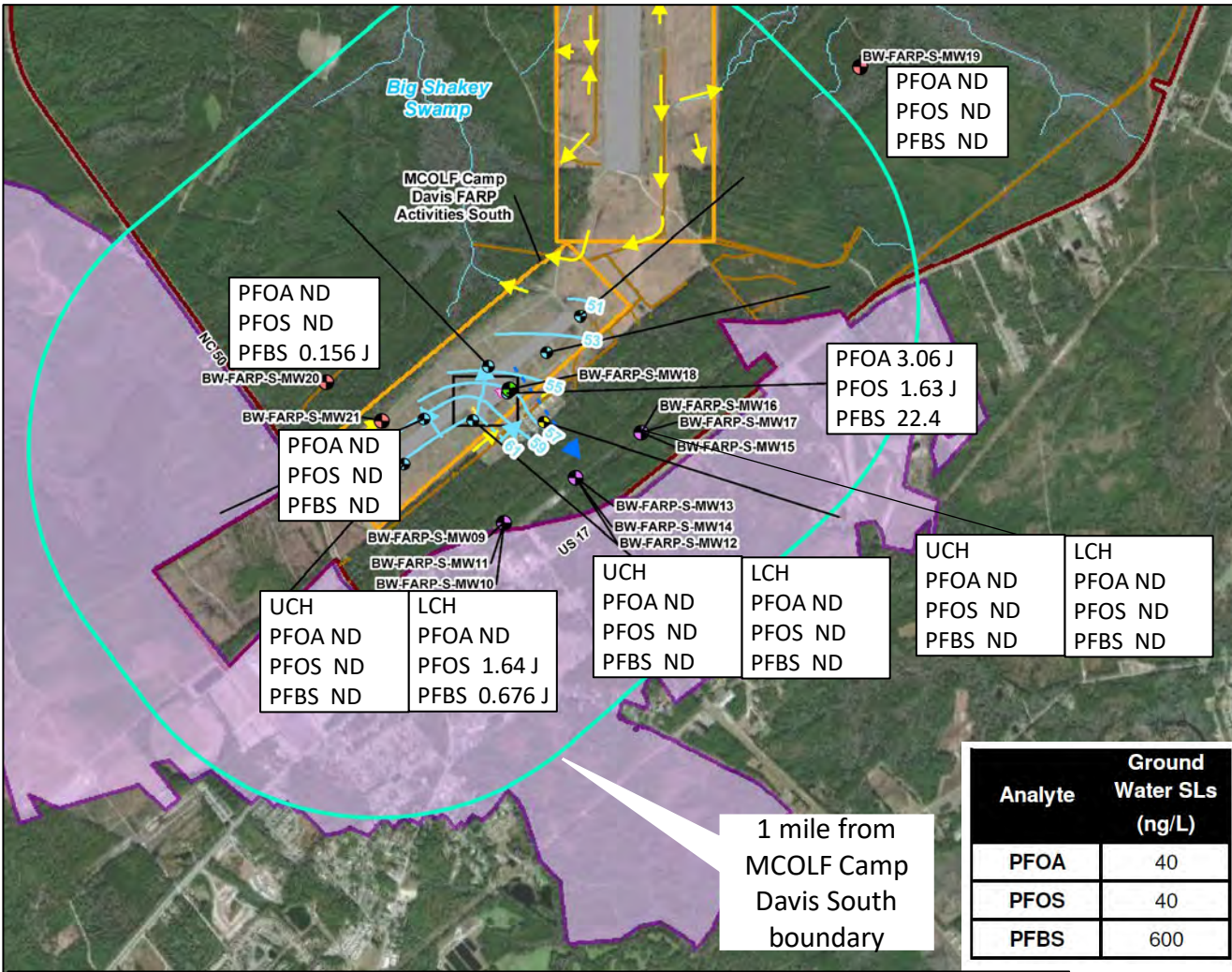
- New Surficial, UCH, and LCH Aquifer Nested Monitoring Wells
- New UCH Monitoring Well
- New LCH Monitoring well
- Surficial Aquifer Monitoring Well (from SI activities in 2020)

- Potential PFAS Release Area
- Stormwater Utility Line
- Surface Water

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Site 111 Castle Hayne GW Results

- No exceedances of screening levels
- Results will be incorporated into the RI report



Analyte	Ground Water SLs (ng/L)
PFOA	40
PFOS	40
PFBS	600

- New Surficial, UCH, and LCH Aquifer Nested Monitoring Wells
- New UCH Monitoring Well
- New LCH Monitoring well
- Surficial Aquifer Monitoring Well (from SI activities in 2020)

- Potential PFAS Release Area
- Stormwater Utility Line
- Surface Water

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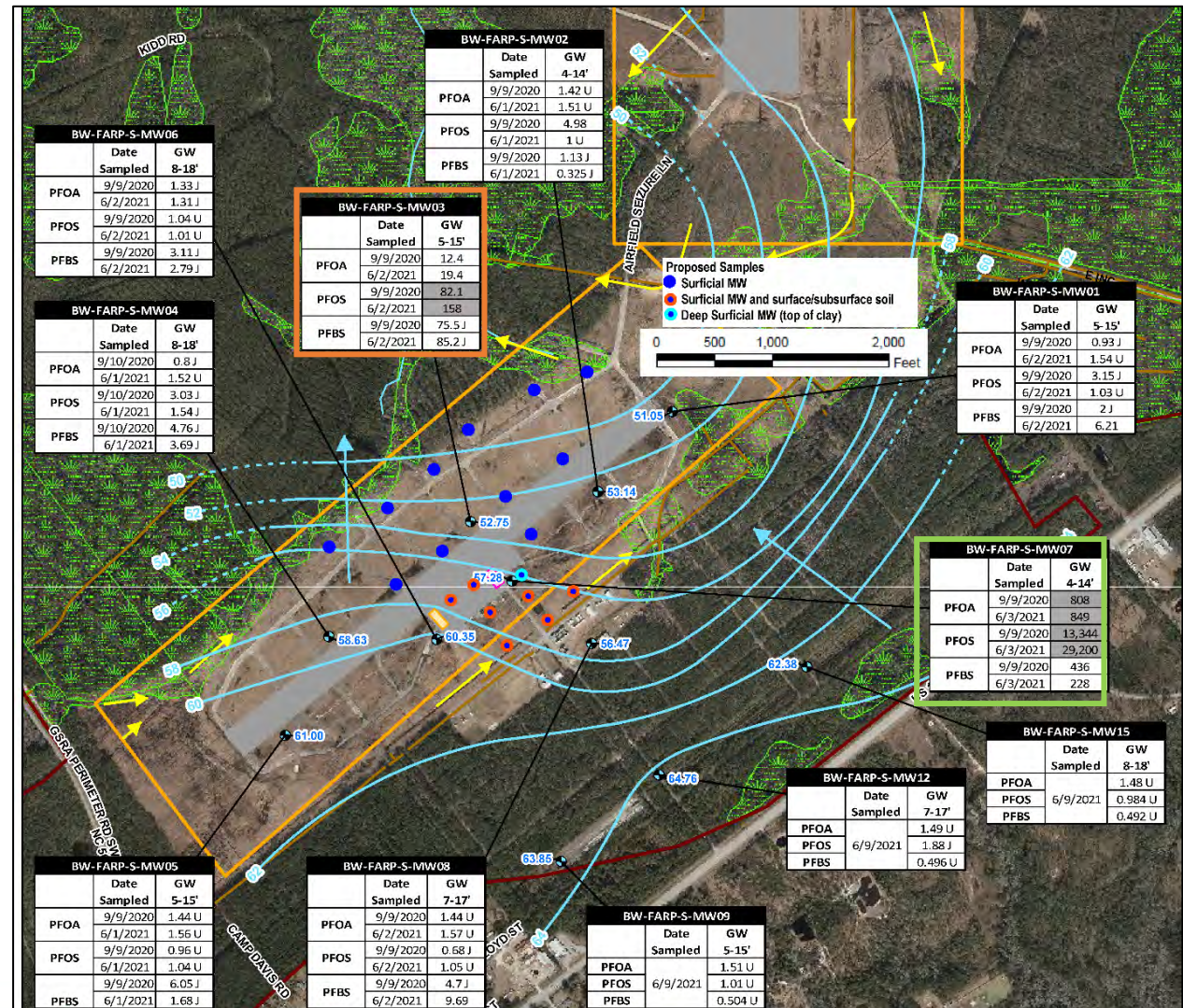
Remedial Investigation Approach - Groundwater and Soil

Data Needs:

- Downgradient delineation in Surficial aquifer from **BW-FARP-S-MW03**
- Horizontal and vertical delineation in Surficial aquifer around BW-FARP-S-MW07
- Additional soil data surrounding release area (BW-FARP-S-MW07)

Approach

- 18 new Surficial monitoring wells bracketing water table
- 1 new monitoring well screened immediately above the clay unit (~40 feet bgs)
- Collect GW samples from
 - 11 existing and 19 new Surficial aquifer wells
 - 4 UCH wells
 - 6 LCH wells
- Co-located surface (0-1 ft) and subsurface (immediately above the water table) soil samples from 7 new well locations
- Analyze samples for 18 PFAS compounds listed in USEPA Method 537.1



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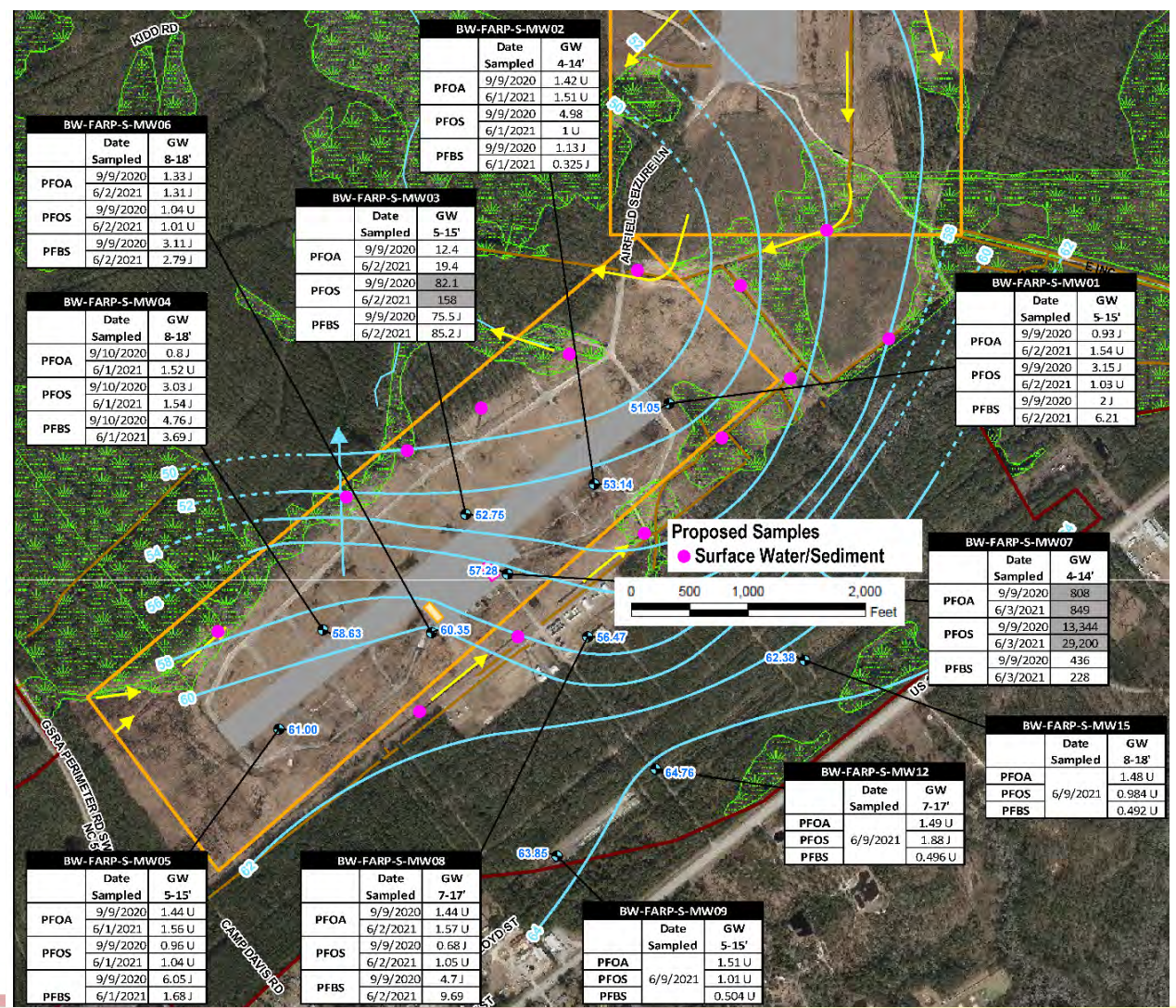
Remedial Investigation Approach – Surface water and sediment

Data Needs

- Drainage ditches surrounding the site have not been investigated but contain flowing surface water that potentially originates from groundwater discharge

Approach

- 14 co-located surface water and sediment samples at locations within drainage ditches
- Based on data, evaluate possible areas of groundwater discharge through temperature study or other groundwater-to-surface water assessment techniques



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RI Activities

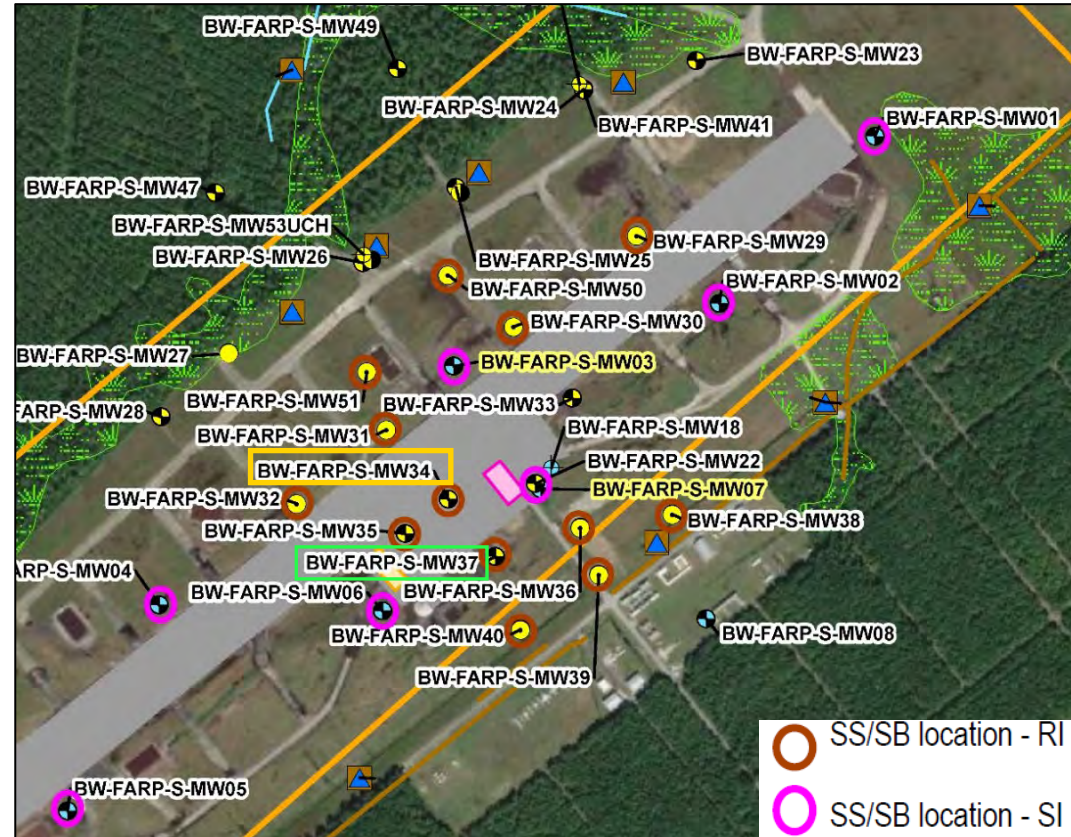
- Continuous water level monitoring in 30 MWs for groundwater flow model
- Drilling in summer 2022
 - Installed 12 MWs outside of the MILCON project (replacing air strip)
 - 8 proposed MWs delayed until after MILCON
 - Collected samples
 - Soil
 - 7 surface soil (SS) and 7 subsurface soil (SB)
 - Groundwater
 - 21 existing MWs
 - 13 new MWs
 - Surface water/sediment (SW/SD)
 - 14 locations
- Based on 2022 results, additional sampling recommended
 - 6 new SS/SB locations
 - 5 new Surficial MWs
 - 2 new UCH MWs
 - 3 additional SW/SD locations
- Drilling in Fall 2023 after MILCON



MILCON Project to replace air strip

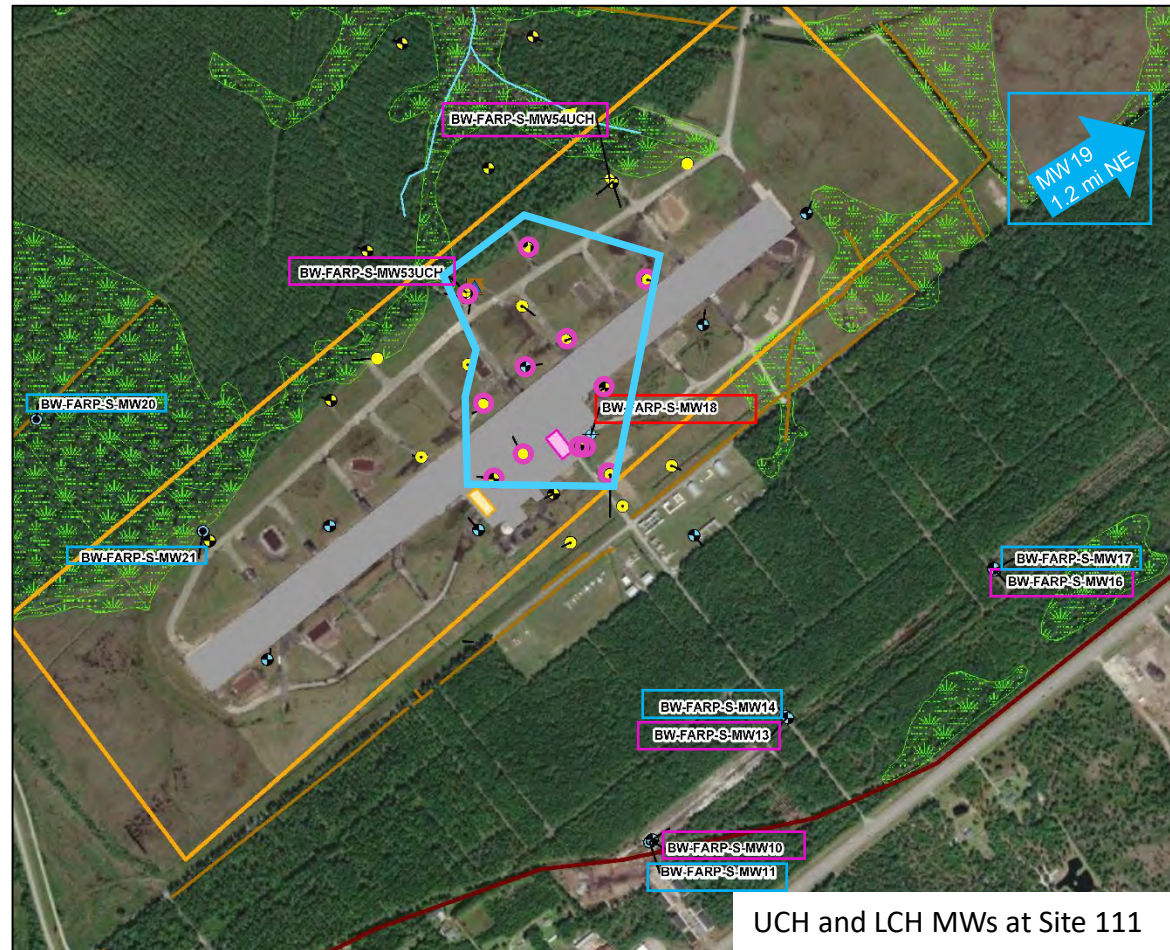
RI Preliminary Soil Results

- Collected SS and SB samples at 13 locations for RI
 - 7 in September 2022
 - 6 in October 2023
 - Plus 7 SS and SB locations from SI
- Results were below laboratory reporting limits in all RI samples except 1 surface soil sample and 1 subsurface soil sample from 2022
 - PFAS detected at estimated concentrations in 6 of 14 SI soil samples. All SI results were more than one order of magnitude below
- Surface soil collected 0-1 ft bgs
 - No PFAS with RSLs were detected in surface soil
 - One detection in SS37
- Subsurface soil depths ranged from 2-3 ft bgs to 14-15 ft bgs
 - Only detections in subsurface soil samples from SB34-2-3
 - PFHxS 1.13 J ng/g (PAL =130 ng/g)
 - PFOS 17.8 ng/g (PAL=13 ng/g)

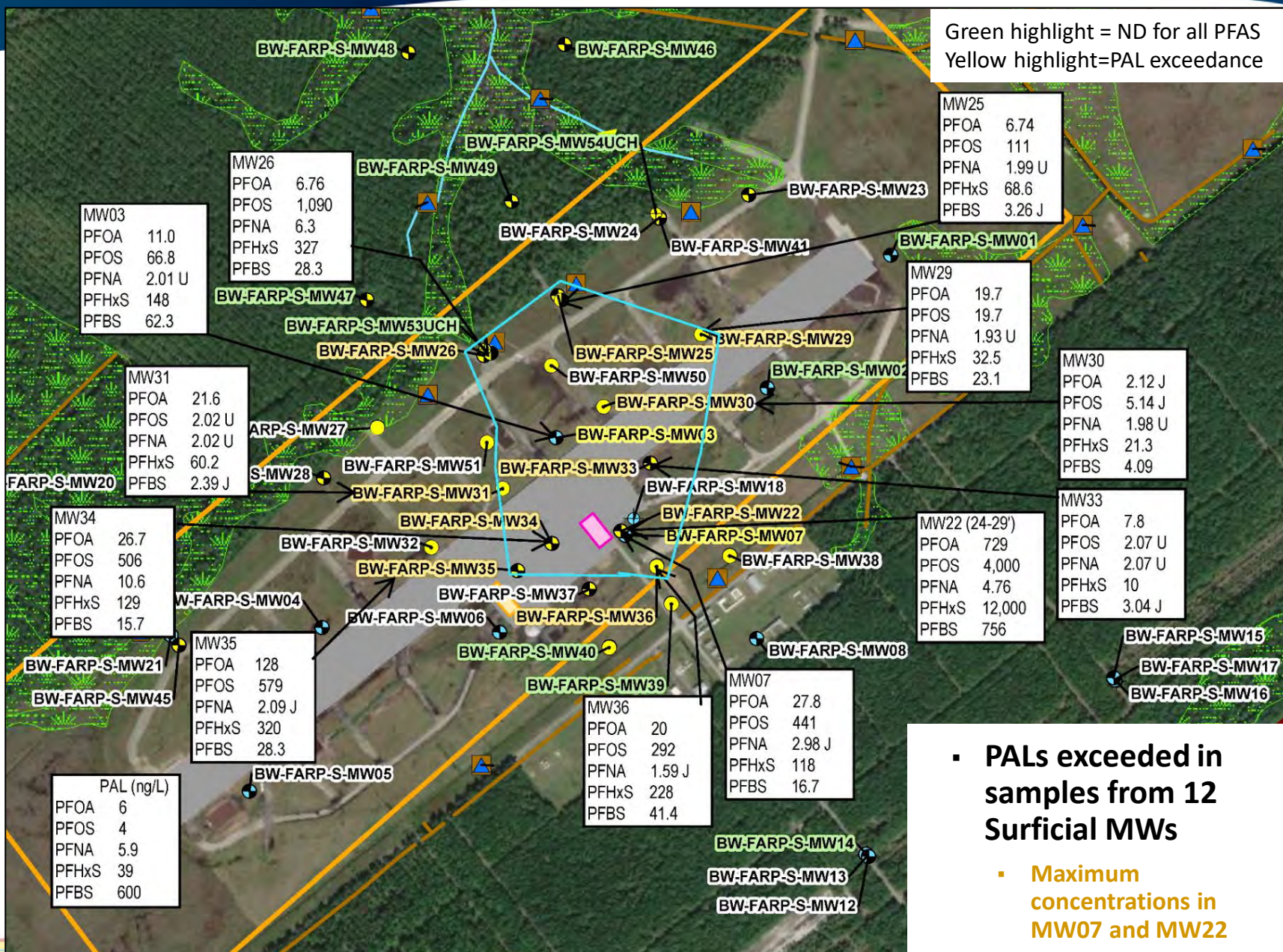


RI Preliminary GW Results – Castle Hayne MWs

- Collected GW samples in August - September 2022 and October 2023
 - 37 Surficial
 - 6 UCH
 - 6 LCH
- Only exceedances of project action limits (PALs) were in 12 Surficial MWs (next slide)
- All UCH and LCH wells were ND for PFAS with PALs, except MW18
 - Most UCH and LCH were ND for all analyzed PFAS
 - In MW18, PFHxS detected above PAL of 39 ng/L intermittently
 - 62 ng/L in June 2021 (before sentinel well sampling started)
 - 49.7 ng/L in June 2022
 - Was below PAL in seven other sampling events

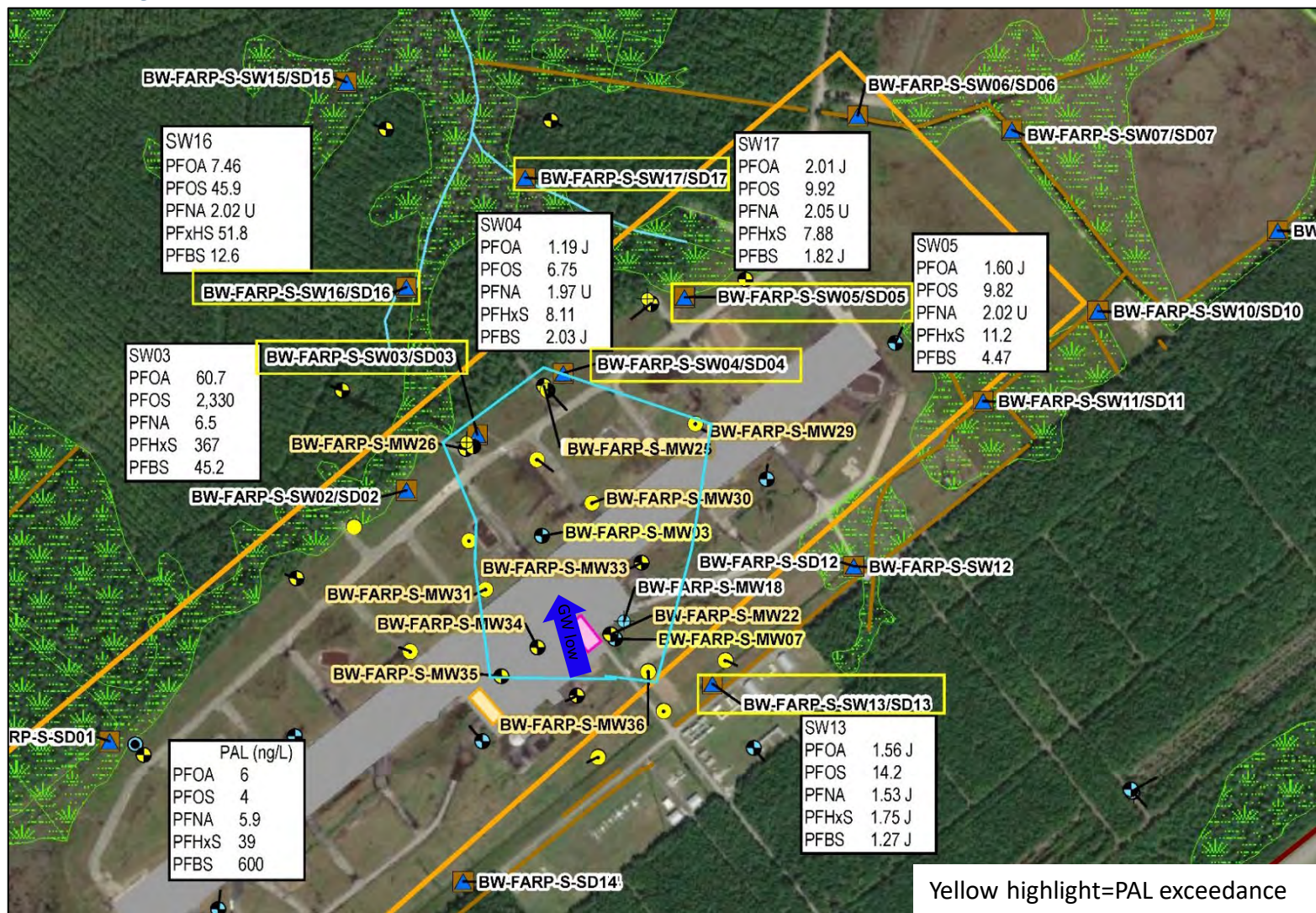


RI Preliminary GW Results – Surficial MWs

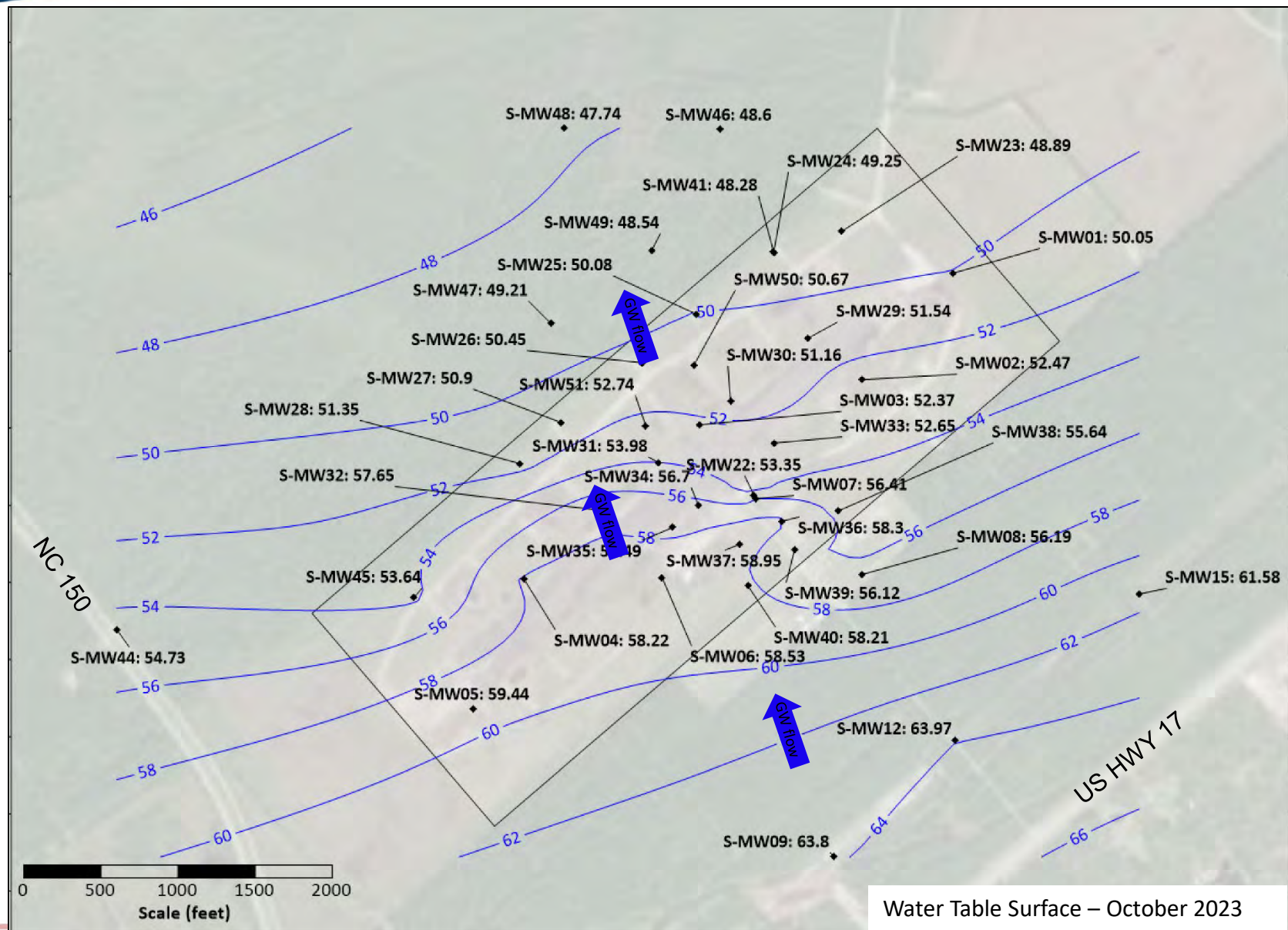


RI Preliminary SW/SD Results

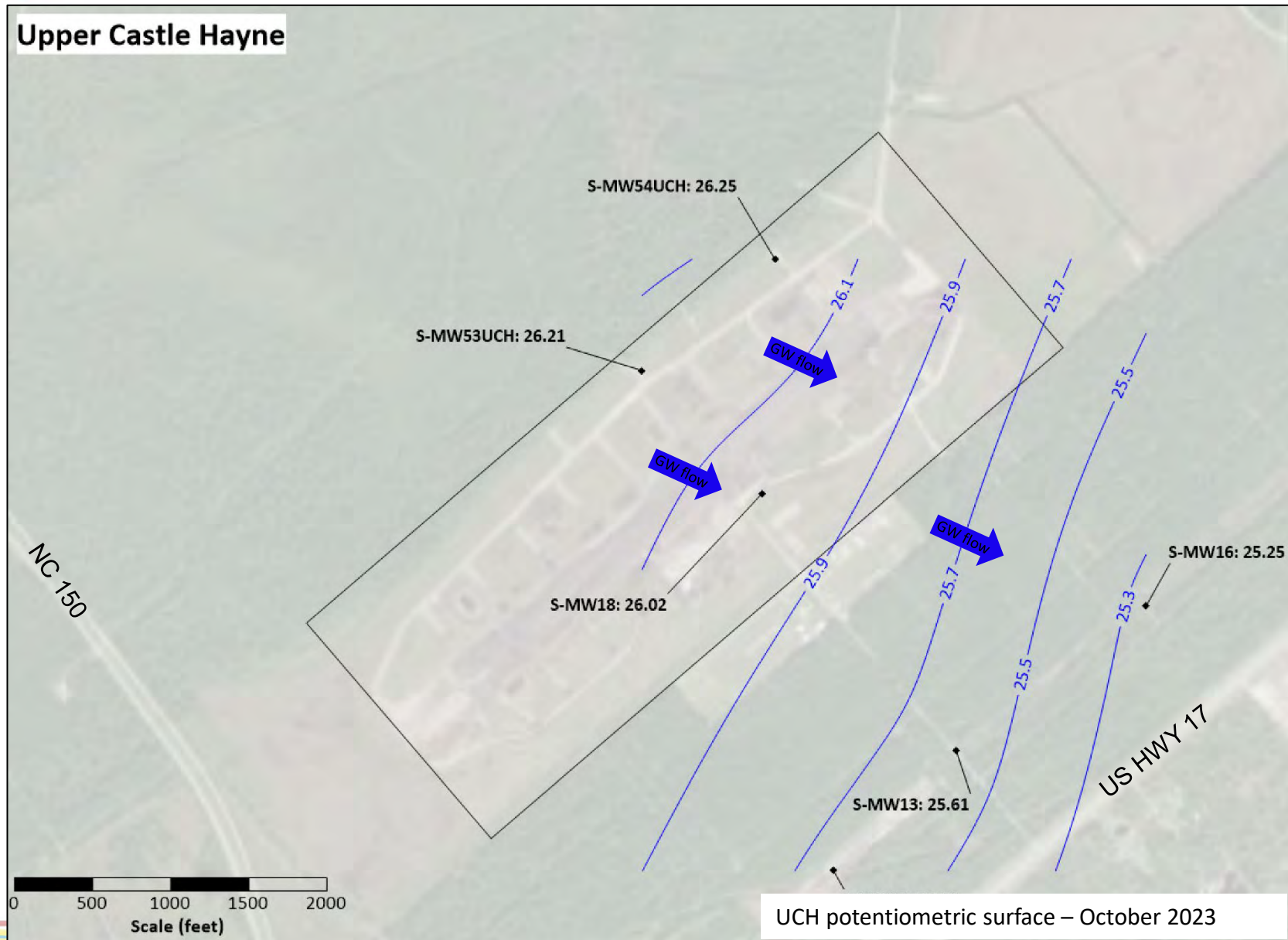
- Collected 17 SW/SD samples
- Only four detections in sediment for all PFAS – in SD03, SD16, SD17 – PFOS range: 0.991 J to 3.27 J ng/g. PFHxS in SD16 – 1.26 J ng/g.
- At least one PFAS detected in all SW samples



Groundwater flow - Surficial

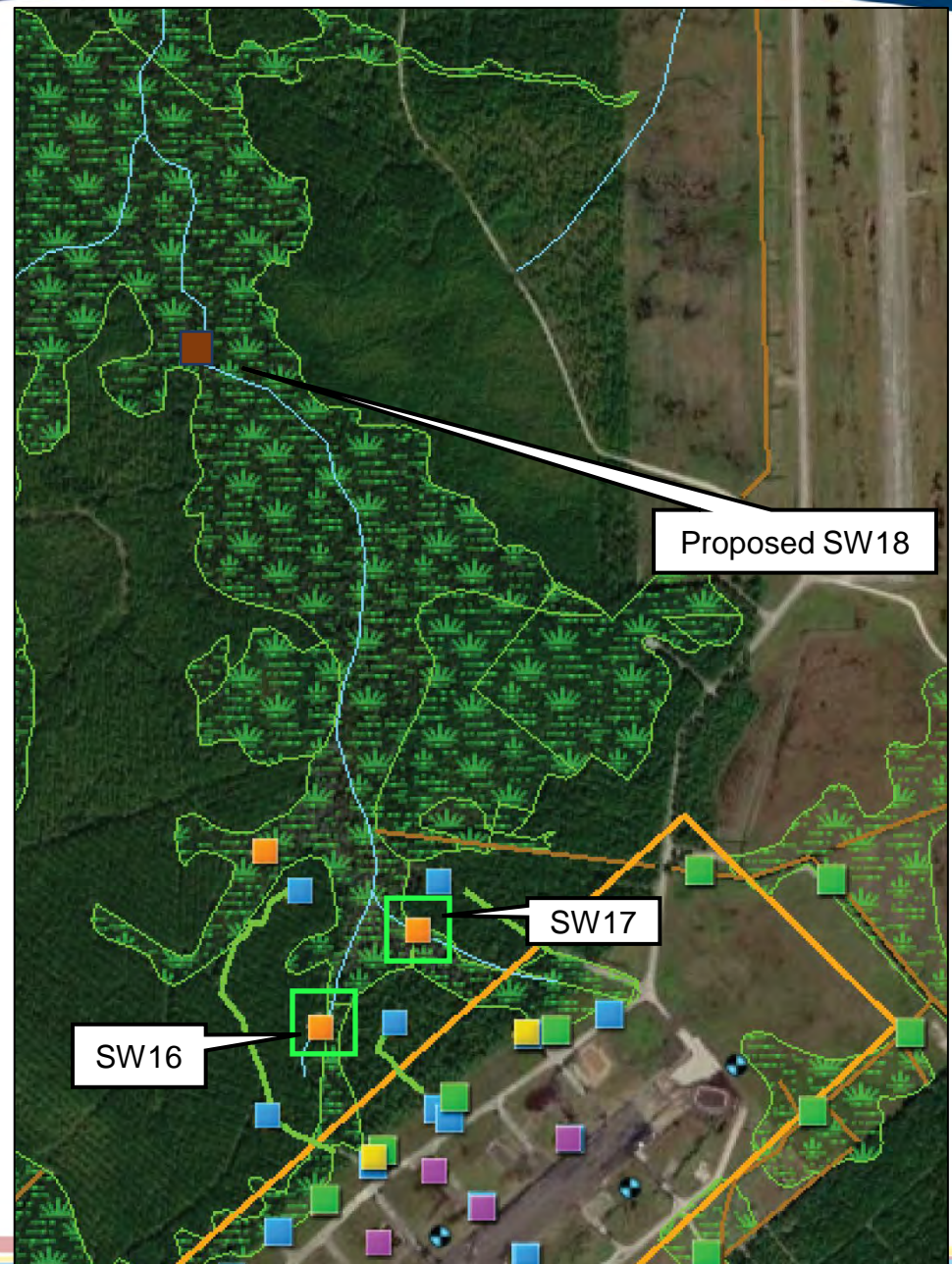


Groundwater flow - UCH



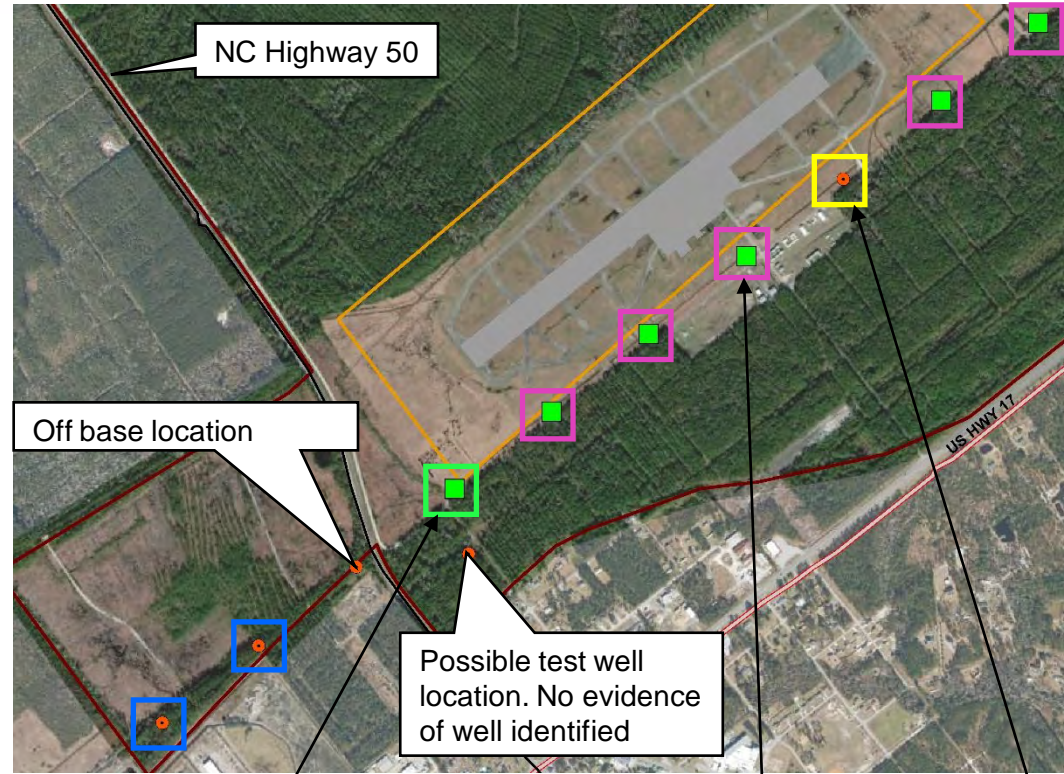
RI Results Summary

- Soil impacts above the PAL limited to PFOS in one SB sample
- Sediment not impacted above PALs
- GW impacts confined to defined horizontal area of the Surficial aquifer, and vertically down to confining unit, while competent, is not impermeable (MW18)
- Surficial GW flows NNW. Castle Hayne GW flows SE.
- Surface water impacts attenuate downstream, but SW has not been evaluated downstream from locations (SW16 and SW17) that exceeds PALs
 - Collecting one additional SW sample downstream from SW16 (~3,500 feet downstream)



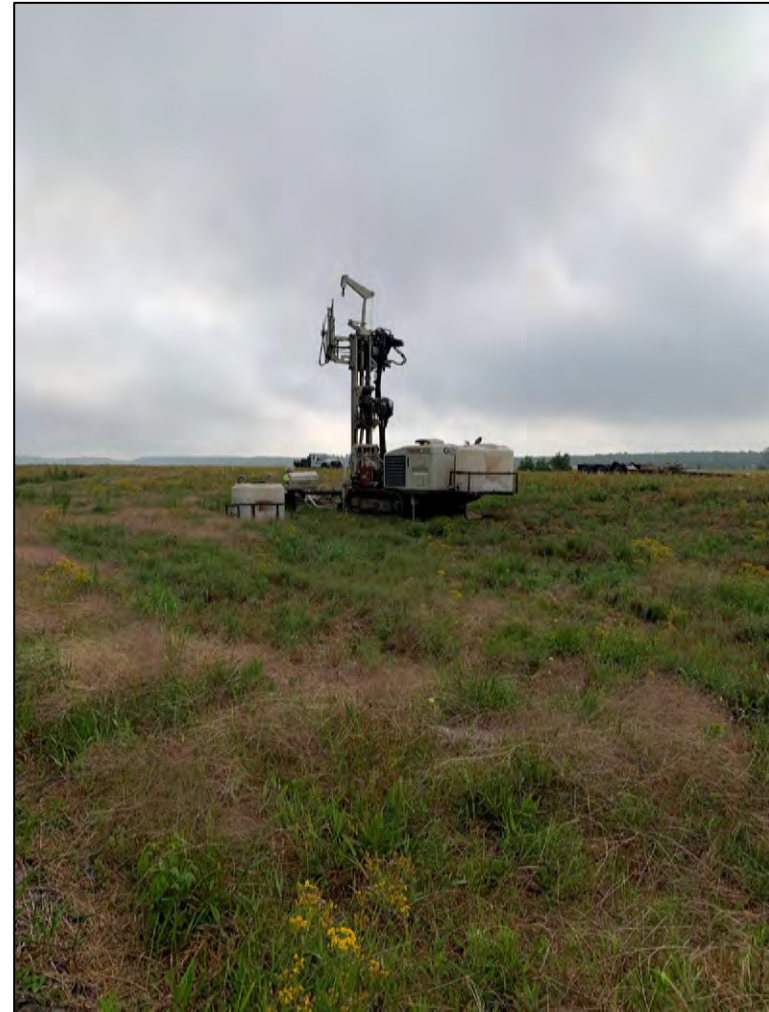
Historic Water Supply Well Abandonment

- During off-Base drinking water sampling activities in 2020/21, presence of 1940's-era supply wells discovered
- In 2021, the locations of 10 of these supply wells on Base were investigated
 - 5 had been abandoned and well heads removed
 - 1 was visible above-grade but appeared obstructed about 80 ft bgs (likely abandoned)
 - 1 with well head removed but uncertain if abandoned
 - 2 visible above-grade and sealed (status unknown)
 - 1 located off-Base
- In October 2023, the 4 historic supply wells that were not confirmed as abandoned were re-developed and abandoned
 - 2 were confirmed as previously abandoned



Schedule

- Collected last surface water sample today
- GW/SW/SD Sampling – Round 2- April 2024
- Draft Report – winter 2024
- Final Report – spring 2025



Questions?

