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Scoping Summary for the D-Area Groundwater Operable Unit (U)
(RFI/RI Work Plan Characterization)

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Final

April 2021

SAVANNAH RIVER SITE • AIKEN, SOUTH CAROLINA

DISCLAIMER

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and
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1.0 PROJECT PHASE/STATUS OF SCOPING SUMMARY

Groundwater in D Area has been monitored under the approved *Monitoring Work Plan for the DAG OU (WSRC-RP-2003-4150, Revision 1, June 2004)* since 2004. The U.S. Department of Energy (USDOE) has submitted groundwater monitoring reports or data summary letters annually to the U.S. Environmental Protection Agency (USEPA) and the South Carolina Department of Health and Environmental Control (SCDHEC) documenting the monitoring results. In August 2020, representatives from the USDOE, USEPA and SCDHEC (i.e., Core Team) agreed to revise the implementation schedule for the D-Area Groundwater Operable Unit (DAG OU) due to ongoing field investigations/studies. The Core Team agreed to move the submittal of the DAG OU Resource Conservation and Recovery Act Feasibility Investigation/Remedial Investigation (RFI/RI) Work Plan and supporting Sampling and Analysis Plan (SAP) to June 2021 with Core Team scoping scheduled for Spring 2021.

Surface units and shuttered facilities in D-Area OU, as well as past and ongoing DAG OU activities, were discussed during the November 2020 Core Team meeting (Reference Power Point Presentation: *D-Area Historical Overview and Groundwater Status Update* SRNS - STI-2020-00483; *Summary of D-Area Remedial Actions* (U) SRNS-TR-2020-00410). The comprehensive review of past investigations and closures was intended to prepare the Core Team for further discussion on the path forward for the DAG OU RFI/RI Work Plan.

A Work Plan scoping meeting with the Core Team was held on April 14, 2021. This scoping summary supported the Core Team discussions for the development of the RFI/RI Work Plan for the DAG OU, which is currently scheduled for submittal on June 14, 2021. The objectives of the Work Plan scoping meeting were to review the conceptual site model and existing understanding of the nature and extent of contamination for the D-Area Groundwater (DAG) Operable Unit (OU) and reach Core Team agreement on the following: (a) the adequacy of current groundwater data for defining problem[s] warranting action and identification and evaluation of likely response actions; (b) uncertainties driving the need for additional groundwater characterization; (c) the general content of the RCRA Facility Investigation/Remedial Investigation (RFI/RI) Work Plan for the DAG OU; and (d) the administrative path for the DAG OU.

2.0 D AREA HISTORY AND BACKGROUND

Savannah River Site (SRS) encompasses 803 square kilometers (km^2) (310 square miles [mi^2]) of South Carolina coastal plain uplands along the Savannah River in Aiken, Barnwell, and Allendale counties. SRS is owned by the USDOE. SRS produced special nuclear materials for the U.S. Department of Defense between 1952 and 1988. The reactors that were used to produce the nuclear materials required heavy water as a moderator to control the speed of neutrons in the reactor. The heavy water was produced in D Area at the

SRS. D Area also contained the heavy water rework facility to purify the SRS inventory of used reactor moderator. Other D Area operations included the 484-D Powerhouse that provided electricity and steam for the D-Area facilities and other areas at SRS.

D Area is located in the southwest quadrant of the SRS, approximately (~) 914-meters (m) (3,000-feet [ft]) east of the nearest site boundary, the Savannah River. The DAG OU, which is located in the Savannah River Floodplain and Swamp watershed, encompasses groundwater beneath D Area, west and southwest to the Savannah River (Figure 1). Groundwater flow is to the southwest in both the Upper Three Runs Aquifer (UTRA) (Figure 2) and Gordon Aquifer (GA) (Figure 3).

The groundwater in D-Area has been contaminated with TCE, PCE, tritium, beryllium, and other metals from surface or facility sources associated with the D-Area Operable unit (DAOU). The DAOU is comprised of multiple waste units and facilities associated with the former operation of the 484-D Powerhouse and the production and rework of heavy water moderator for reactor operations. Most of the sources of the groundwater contamination associated with the DAOU have been addressed under remedial and/or removal actions.

2.1 Completed Source Remediation

DAOU consists of the following three main facility areas: the 484-D Powerhouse (Powerhouse Subunit), the D-Area Heavy Water Facility (Bubble Tower Subunit), and the Moderator Processing Facility (Moderator Processing Subunit) (Figure 4). Non-time critical removal (NTCR) actions were completed for the facilities associated with the Bubble Tower Subunit and the Moderator Processing Subunit, and these facilities are no longer a source of tritium or TCE contamination to groundwater. An *Early Action Record of Decision Remedial Alternative Selection for the D-Area Operable Unit (SRNS-RP-2010-00162, Rev. 1.2, July 2011)* integrated the results of the completed removal actions and selected land use controls (LUCs) as the final action for the Bubble Tower Subunit, Moderator Processing Subunit, the northern 25% section of the 489-D Coal Pile Runoff Basin [CPRB] (part of the Powerhouse Subunit), and miscellaneous units (i.e., D-Area Asbestos Pit, and the D-Area Process Sewer Lines as Abandoned inside the area fence).

The Powerhouse Subunit consists of the 484-D Powerhouse building, the 484-17D Coal Storage Area (DCSA), and the 489-D CPRB and associated ancillary facilities for coal and ash storage, runoff, and disposal. The 488-D D-Area Ash Basin (488-DAB) and the D-Area Rubble Pit (DRP) are no longer operational and remedial actions for these surface units were completed under the D-Area Expanded Operable Unit project. The *Record of Decision Remedial Alternative Selection for the D-Area Expanded Operable Unit (WSRC-RP-2004-4007, Revision 1, August 2004)* documents the selection of a low permeability geosynthetic cover system installed over the 488-DAB, and LUCs and groundwater monitoring for the 488-DAB and the DRP.

A coal pile located at the 484-17D DCSA south of the 484-D Powerhouse created acidic leachate from the 484-17D DCSA to collect in the 489-D CPRB. The leachate infiltrated into the vadose zone and collected in the 489-D CPRB. The coal pile was removed following shutdown of the 484-D Powerhouse. The 2020 NTCR action at the 484-17D DCSA to amend the acidic soils by the addition of lime (calcium carbonate) to a depth of 1.2 meters (4 feet) below ground surface to raise the pH of the soils to more natural levels (approximately a pH of 5.5 or higher) within the majority (approximately 4.9 hectares [12 acres]) of the 484-17D DCSA (*Removal Site Evaluation Report / Engineering Evaluation / Cost Analysis (RSER/EE/CA) for the D-Area Coal Storage Area (484-17D) (U)* SRNS-RP-2018-00813, Revision 1). The removal action was completed in December of 2020. Post-action pH soil sampling is anticipated in 2022. Improvements in groundwater conditions (i.e. increased pH, lower metal concentration) are not expected to be evident on the order of a decade. The 484-17D DCSA is currently listed on FFA Appendix K.1: D&D Facilities to be Decommissioned. The final action for the 484-17D DCSA will be addressed by the DAOU ROD scheduled for issuance in January 2046.

The 489-D CPRB previously received runoff from the 484-17D DCSA. A NTCR action was completed for the 489-D CPRB northern 25% section in 2011. The southern 75% section of the 489-D CPRB was addressed under a NTCR action in 2017 to remove coal fines and contaminated sediments from the basin and will remain open as a storm water retention structure.

In 2013, the 488-1D Ash Basin, 488-2D Ash Basin, and the 488-4D Ash Landfill were included as subunits of the DAOU.

- A NTCR action was conducted for the 488-1D Ash Basin to consolidate ash in the eastern portion of the basin and install a geosynthetic cover and vegetative layer compliant with the SCDHEC Class Three Solid Waste Landfill Cover requirements. The western portion of the 488-1D Ash Basin was graded for stormwater runoff.
- A time critical removal action was conducted for the 488-2D Ash Basin to dewater and remove bulk ash from the basin and consolidate in the 488-4D Ash Landfill. Fill was placed in the 488-2D Ash Basin and the basin regraded, sloped appropriately and converted to a storm water detention structure.
- A NTCR action was conducted for the 488-4D Ash Landfill to consolidate excavated ash from the 488-2D Ash Basin and install a geosynthetic cover and vegetative layer compliant with the SCDHEC Class Three Solid Waste Landfill Cover requirements over the landfill.

A second Early Action ROD for the DAOU including the 488-1D Ash Basin, 488-2D Ash Basin, 488-4D Ash Landfill and southern 75% section of the 489-D CPRB was issued in July 2020. The final ROD for the DAOU to include the remaining Powerhouse Subunit waste units and D&D facilities is currently scheduled for issuance in January 2046.

2.2 Additional Activities

Treatability Study for Groundwater Injection and Effluent Discharge Canal Treatment

The presence of a low-pH plume in the groundwater is expected to last for decades under natural groundwater conditions. The low-pH groundwater is currently discharging into the D-Area Effluent Discharge Canal which later converges with Beaver Dam Creek and flows through the Savannah River floodplain to the Savannah River (Figure 6)[1]. If the pH of the aquifer can be raised to more normal, less acidic conditions, the groundwater and surface water conditions in the D-Area Effluent Discharge Canal would improve.

An ongoing treatability study will inject potable water into the Upper Three Runs Aquifer (UTRA) upgradient of the low-pH, metals, and sulfate plume to create a hydraulic head and displace the low-pH groundwater in the aquifer (*Treatability Study Work Plan for Groundwater Injection and Discharge Canal Treatment at the D-Area Groundwater Operable Unit [SRNS-TR-2018-00128, Revision 1, January 2019]*). Field start occurred in December 2019 with the installation of five of the injection wells. Due to the abundance of potentially less accepting sediments encountered (clays and fine sediments), injection testing on the wells was conducted before moving forward with the installation of the remaining injection well field. Once results showed there was enough flow into the wells with short tests, five additional injection wells were installed in 2021. The potable water injections are to begin into the currently installed injection wells later in 2021. Two calcium carbonate marble chip reactive structures were installed in 2020 downgradient within the D-Area Effluent Discharge Canal. Surface water samples are currently being monitored for pH and metals upgradient, in-between, and downgradient of the reactive structures. The recent treatability study status and data have been submitted in the first annual data report in January 2021 (*Treatability Study Data Report for Groundwater Injection and Discharge Canal Neutralization at the D-Area Groundwater (OU) (U)*, SRNS-TR-2021-00005). The treatability study results will be used to support the development of the DAG OU Corrective Measures Study/Feasibility Study (CMS/FS).

The combined (or synergistic) effects of the two actions have not been estimated or considered but will be apparent from the measurements using the parameters described in the treatability study, the 484-17D DCSA RSER/EE/CA, and the DAG OU groundwater and surface water monitoring.

[1] The D-Area Effluent Discharge Canal is a subunit of the "Savannah River and Floodplain Swamp Integrator Operable Unit (Including Beaver Dam Creek, D-Area Effluent Discharge Canal, and Ash Area Adjacent to and Easterly of D-Area Ash Basins 488-1D and 488-2D)". As noted in the FFA, although the D-Area Effluent Discharge Canal is not a subunit of the DAG OU, a separate schedule for the "D-Area Effluent Discharge Canal and Ash Area Adjacent to and Easterly of D-Area Ash Basins 488-1D and 488-2D" may be developed by the Core Team pending the results of the DAG OU remedial investigation process.

Per- and Poly-Fluorinated (PFAS) Groundwater Contamination

PFAS constituents are an emerging contaminant and can be sourced from historical use of fluorinated aqueous film-forming foam (AFFF). AFFF was historically used at two known locations in D-Area (Figure 18). Fires were extinguished with AFFF at the 411-1D/411-3D Fire Training Area in the DAOU Bubble Tower subunit. In addition, a one-time fuel fire was extinguished using AFFF at the 715-D Former Gas Station. The DAG OU monitoring wells downgradient of these two locations were sampled in 2020 and analyzed for 14 PFAS constituents. The presence of PFAS contamination in the groundwater at both locations within D-Area was confirmed (Table 1). Characterization of the PFAS plume is currently ongoing as the total extent has not yet been determined.

3.0 LAND USE

The DAG OU is located in a future industrial land use zone of SRS as defined by the Land Use Control Assurance Plan. No current or future development of the DAG OU is planned. There is no current or projected future use of the groundwater as a drinking water source.

4.0 D-AREA GROUNDWATER OPERABLE UNIT

Commingled plumes of TCE, PCE, tritium, beryllium, and other metals are present in the groundwater at D-Area above maximum contaminant levels (MCLs). Groundwater flow in the UTRA and the underlying GA are both to the west to southwest towards the Savannah River. A schematic of the DAG OU conceptual site model is provided in Figure 6.

A flow and transport groundwater model was developed in 2002 to support the DEXOU, provide a baseline for D-Area groundwater understanding, and to show nature and extent of existing groundwater contamination. The model supported the development of the *Monitoring Work Plan for the DAG OU (WSRC-RP-2003-4150, Revision 1, June 2004)* which prescribed annual or semi-annual monitoring of wells and surface water stations. Annual or semi-annual monitoring of wells and surface water stations have provided long-term trend data of the tritium, TCE, and metals plumes that have been reported in groundwater monitoring reports or data summary letters annually since 2004. The current monitoring network includes 101 monitoring wells and 14 surface water stations over an area of approximately 600 acres (Figure 8). This network supports the monitoring of the highest concentrations of the various plumes and relative geometry of each plume as described below.

VOC Plume: The VOC Plume (mainly TCE [Figure 9]) extends from the Bubble Towers Subunit southwest under the 484-17D DCSA, 488-4D Ash Landfill and portions of the Ash Basins, and westward into the D-Area wetlands and comprises an area of approximately 148 hectares (366 acres). The maximum TCE concentration in 2020 was 128 µg/L at monitoring well DCB 62, exceeding the 5 µg/L MCL. Concentrations downgradient of DCB 62 are less than 100 µg/L. The plume area estimated at or above 100 µg/L is approximately 5.7 hectares (14 acres). Concentrations farther downgradient into the D-Area wetlands drop to levels ranging from non-detect to above the MCL, with a maximum 2020 concentration of 23.1 µg/L at well DCB 55. The vast majority of the TCE plume is restricted to the UTRA as only one GA monitoring well exhibits concentrations above the MCL (DRW001D) (Figure 10). A cross-sectional view of the TCE plume is provided in Figure 11. Surface water concentrations within the DAOU footprint are generally non-detect with occasional detections less than the MCL.

Overall, VOC (TCE and PCE) concentrations are decreasing slightly, with plume attenuation believed to be primarily based on advection and dispersion. PCE has been detected above MCLs in a small number of the groundwater monitoring wells; however, PCE concentrations are much lower than TCE with a 2020 maximum concentration of 7.56 µg/L at well DCB080. VOC degradation products are minimal to non-existent, and detected concentrations remain below respective MCLs. Most concentrations of TCE in the UTRA source area are decreasing, indicating depletion of the source and attenuation of the TCE plume. Increases displayed at DCB 26AR are most likely due to plume migration from the higher concentrations upgradient. Intermediate wells (i.e., DCB 27C and DCB 28) show decreasing concentrations and indicate that the plume is not growing in extent. In addition, downgradient wells also display steady or decreasing trends which also supports that the plume is not growing in extent and does not pose an immediate threat to surface water or the D-Area wetlands.

Metals Plume: The low-pH and metals plumes extend to the southwest from the DRP, 484-17D DCSA, and 489-D CPRB. Exposure of coal to rainwater for up to 59 years has caused the dissolution of iron sulfide (pyrite; a mineral commonly found in coal), leading to the creation of sulfuric acid. As a result, the soils underneath the 484-17D DCSA, associated storm water runoff in the 489-D CPRB, and groundwater underlying the area have been acidified. The groundwater downgradient of the DRP, 484-17D DCSA, and 489-D CPRB has a pH less than 4.5 with some areas as low as 3 to 3.5 (Figure 5), considerably lower than the background groundwater in D-Area (pH ~ 5.2). This acidification has resulted in the leaching of metals from both the coal and the natural minerals in the underlying soils, leading to a sulfate and metals groundwater plume in the UTRA. Acidic groundwater (pH < 4) is currently discharging downgradient into the D-Area Effluent Discharge Canal.

Metals including aluminum, beryllium, cadmium, chromium, cobalt, iron, lead, manganese, nickel, and uranium generally exceed their respective MCLs or Regional Screening Levels (RSLs). The beryllium plume correlates with the low-pH plume (Figure 5). The maximum beryllium concentration during 2020 was 132 µg/L at well DCB 23C, above the 4 µg/L MCL. The beryllium plume covers an area of approximately 75.7 hectares (187 acres). In general, the highest beryllium concentrations, as well as other metal concentrations, are located directly downgradient of the source areas. The plume is in the UTRA (Figure 12) and GA concentrations are below the MCL (Figure 13). Figure 14 shows a cross-sectional view of the beryllium plume. Surface water downgradient of the 484-17D DCSA in the D-Area Effluent Discharge Canal displays low-pH levels (pH < 4.0) and elevated metal concentrations. Current 2020 sampling of GA wells show that the GA is not impacted by low-pH groundwater and metal concentrations are below MCLs/RSLs. Metal trends show lingering contaminant concentrations that are likely due to ongoing acidic pH levels in the vadose zone and in groundwater. Some wells show increasing concentrations due to some plume migration vertically or horizontally, although overall plume footprints have minimally changed.

Tritium Plume: The tritium plume extends from the Moderator Processing Facility to the southwest towards the 488-D Ash Basin and 488-4D Ash Landfill and towards the west into the wetlands and comprises an area of approximately 53.4 hectares (132 acres) (Figure 15). The maximum concentration in 2020 was 174 pCi/mL at well DCB 26AR, exceeding the 20 pCi/mL MCL. The highest concentration area (≥100 pCi/mL) comprises an area of approximately 49.4 hectares (121 acres) near the recognized source area and downgradient towards the 488-D Ash Basin. Concentrations downgradient towards the D-Area wetlands drop to levels ranging from non-detect to slightly below the MCL, with a maximum 2020 concentration of 19.1 pCi/mL at well DWP 8. The GA has not been impacted by the tritium plume (Figure 16). A cross-sectional view of the tritium plume is provided in Figure 17.

Tritium contamination originated from the Moderator Processing Facility. Historical monitoring well data shows tritium maximum levels were above 1,400 pCi/mL during 2001. In 2011, the tritium source in the vadose zone was remediated by detritiation of concrete and soil under a removal action; therefore, declining tritium concentrations in groundwater near the source are expected to continue. Tritium contamination above MCLs is only present in the UTRA as concentrations at GA wells are either non-detect or are less than the MCL. Overall tritium concentrations are decreasing. Surface water samples remain either non-detect or at levels far below the MCL.

PFAS Plume: The presence of PFAS contamination in the groundwater at the 411-1D/411-3D Fire Training Area in the DAOU Bubble Tower subunit and at the 715-D Former Gas Station was confirmed during groundwater sampling in 2020 (Table 1). 19 monitoring wells in D-Area were analyzed for 14 PFAS constituents. The highest concentration found of the 14 PFAS constituents analyzed for was perfluorononanoic acid (PFNA) at a concentration of 1,910 nanograms per liter (ng/L) at well DCB 62 located downgradient of the 715-D Gas Station (Figure 18). PFNA is associated with legacy AFFF. The PFAS constituents perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA) were also detected above the current USEPA Health Advisory limit of 70 ng/L with maximum concentrations of 607 ng/L (well DCB 62 for PFOS) and 113 ng/L (well DRW 1 for PFOA).

Characterization of the PFAS plume is currently ongoing. The PFAS plume is expected to be at least 28 hectares (70 acres). SRS is proposing to conduct expanded monitoring well and surface water sampling events at current monitoring stations (Figure 19) as well as an additional soil and groundwater characterization effort at new locations and monitoring stations that will include sampling throughout the UTRA and into the GA (Figure 20; Tables 4 and 5).

Additional Monitoring Wells and Surface Water Stations: 19 additional monitoring wells were installed throughout D-Area in the UTRA and GA during 2020 and 2021 to further supplement the DAG OU monitoring network. Seven additional surface water stations were also installed to support the DAG OU Treatability Study and/or further supplement the DAG OU monitoring network. Results from most of these locations have been collected in 2020. The locations of these new stations are provided in all the maps and cross sections, as applicable, and highlighted in Figure 8.

D-Area Groundwater Operable Unit			
Problem(s) Warranting Action	**Remedial Action Objectives**	**Scope of Problem(s)**	**Likely Response Actions**
• Groundwater contains levels of VOCs (TCE and PCE) above the 5 µg/L MCLs. • Groundwater contains levels of metals (aluminum, beryllium, cadmium, chromium, cobalt, iron, lead, manganese, nickel, and uranium) that exceed their respective MCLs or RSLs. • Groundwater contains levels of tritium above the 20 pCi/mL MCL. • Groundwater contains levels of PFAS constituents above the current USEPA drinking water lifetime health advisory limits.	• Prevent human exposure to groundwater contaminated with TCE, PCE, metals, and tritium above their respective MCLs or RSLs. • Reduce the concentrations of TCE, PCE, metals and tritium to below MCLs or RSLs and attenuate the contaminant plumes to the extent practicable. • Prevent human exposure to groundwater or surface water contaminated with PFAS constituents above the USEPA drinking water lifetime health advisory limits.	• The VOC (TCE and PCE) plume occupies an area of about 148 hectares (366 acres) within the UTRA and GA. • The commingled metals plumes (aluminum, beryllium, cadmium, chromium, cobalt, iron, lead, manganese, nickel, and uranium) occupy an area of about 173 hectares (428 acres) within the UTRA. • The tritium plume occupies an area of about 53.4 hectares (132 acres) within the UTRA. • The PFAS plume is expected to be at least 28 hectares (70 acres). It is presently known to be downgradient of both the 715-D Former Gas Station and the 411-1D/413-D Fire Training Area. Further extent is to be determined at existing and new sample locations.	Comprehensive Response • No Action • Monitored Natural Attenuation with LUCs Contaminant Specific Response[1] • Targeted bioremediation (VOCs only) • pH Adjustment (Metals only) • Phytoremediation (Tritium only) • PFAS reduction by carbon treatment; resin capsulation, etc. (or other emerging remediation technologies)

[1] A combination of contaminant specific responses and/or MNA with LUCs would be required to address all problems warranting action. Because contaminants will be left in place, LUCs will be a component of the final remedial action. Consideration of MNA parameters to support a possible MNA remedy will be discussed in the SAP.

Uncertainties
• The extent of the PFAS contaminant plume is uncertain. Groundwater sampling completed in 2020 has identified plumes emanating from both the 715-D Former Gas Station and the 711-D/713-D Fire Fighting Training Facilities; however, the full extent downgradient has not yet been determined (Figure 18). This uncertainty will be addressed by additional groundwater sampling within the DAG OU monitoring network (Figure 19) and also the additional groundwater and soil investigation proposals (Figure 20 and Tables 4 and 5). The PFAS data will be presented in the annual DAG OU monitoring reports and letters. • It is uncertain if PFAS contamination in groundwater is impacting surface water and sediment. This uncertainty will be managed by sampling surface water and sediment in co-located points upstream and downstream of potential PFAS contaminated groundwater discharge(s). • The vertical and horizontal extent of contamination of VOCs in the GA is uncertain. This uncertainty will be managed by additional sampling, and/or installation of a monitoring well between DRW-001D and DCB-45D. • The effectiveness of the ongoing treatability study and the recent 484-17D removal action in improving groundwater conditions through displacement of low-pH groundwater in the UTRA by the injection of potable water and reduction of acidic leachate is uncertain at this time. These uncertainties may impact the final remedial selection and will be managed by considering the results of the treatability study and NTCR action in the CMS/FS.

5.0 OPERABLE UNIT STRATEGY

A conference call was held between USDOE, USEPA, and SCDHEC on August 12, 2020 to determine an appropriate change to the DAG OU schedule due to ongoing actions including the NTCR action to neutralize acidity in the 484-17D DCSA vadose zone soils and the groundwater treatability study described in Section 2.2, and delays caused by Covid-19. The RFI/RI/BRA for the DAG OU is currently scheduled for submittal on December 10, 2024. DAG OU monitoring of groundwater and surface water will continue until the CMS/FS submittal.

The current DAG OU schedule is provided below:

Item	Current Date
Field Start of the DAG OU Work Plan Characterization (Completed)	January 14, 2020
Work Plan/SAP, Submittal	June 14, 2021
RFI/RI/BRA, Submittal	December 10, 2024
CMS/FS, Submittal	March 10, 2026
SB/PP, Submittal	November 10, 2026
ROD, Submittal	July 15, 2027
ROD, Issuance	March 28, 2028
Remedial Action Start	June 21, 2029

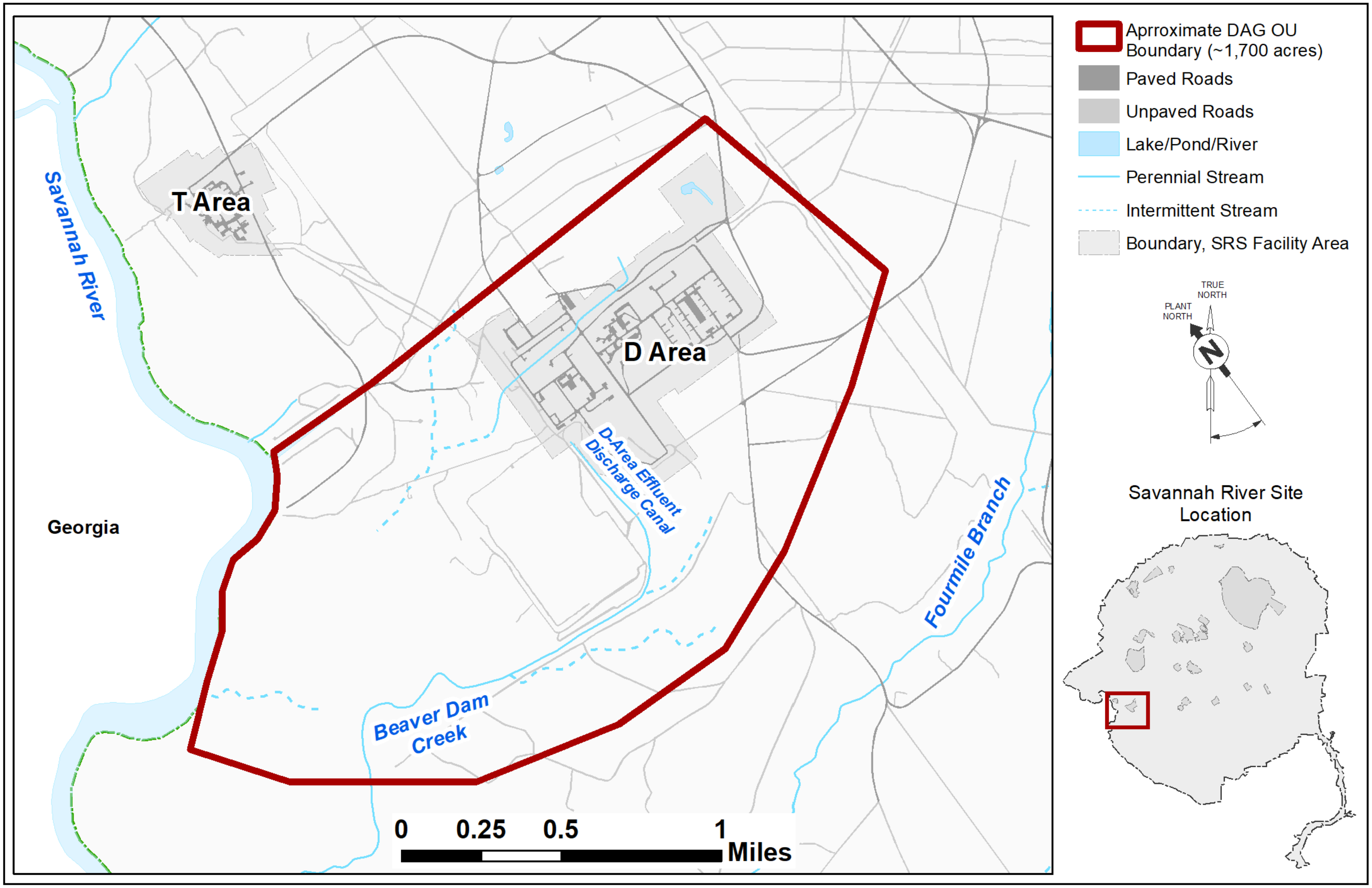

Figure 1. DAG OU Location

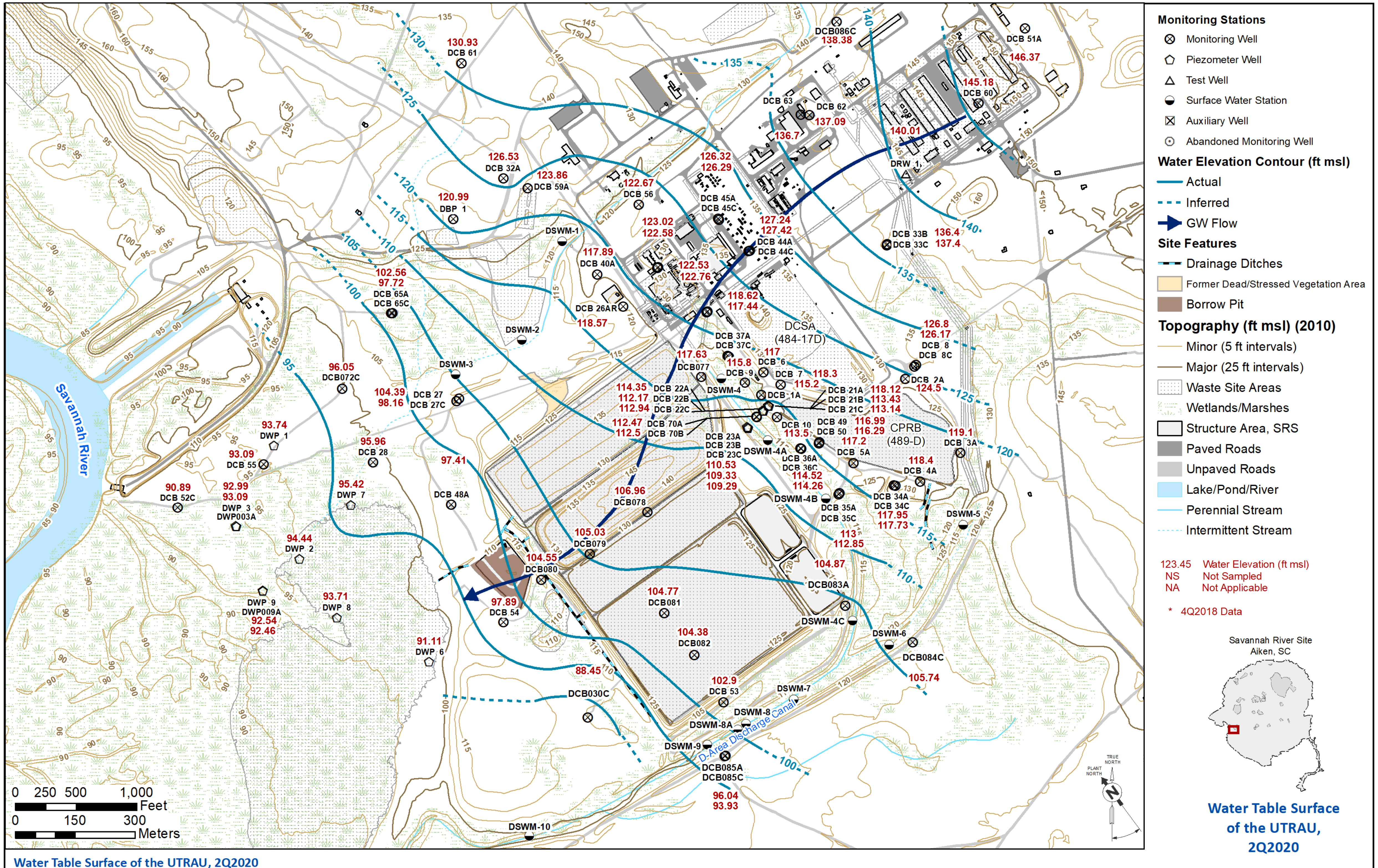

Figure 2. DAG OU Upper Three Runs Aquifer Groundwater Flow Direction (2Q2020)

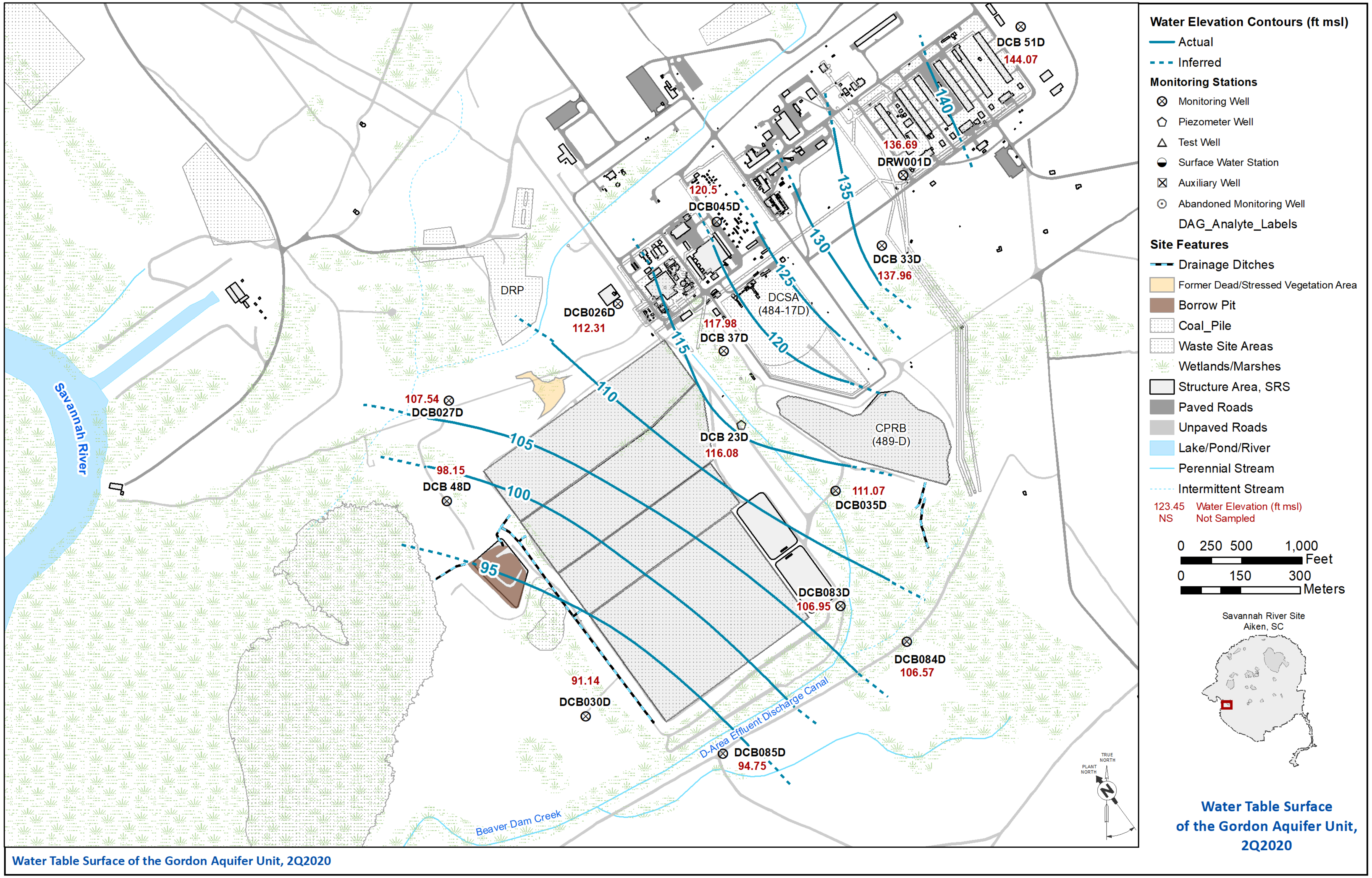

Figure 3. DAG OU Gordon Aquifer Groundwater Flow Direction (2Q2020)

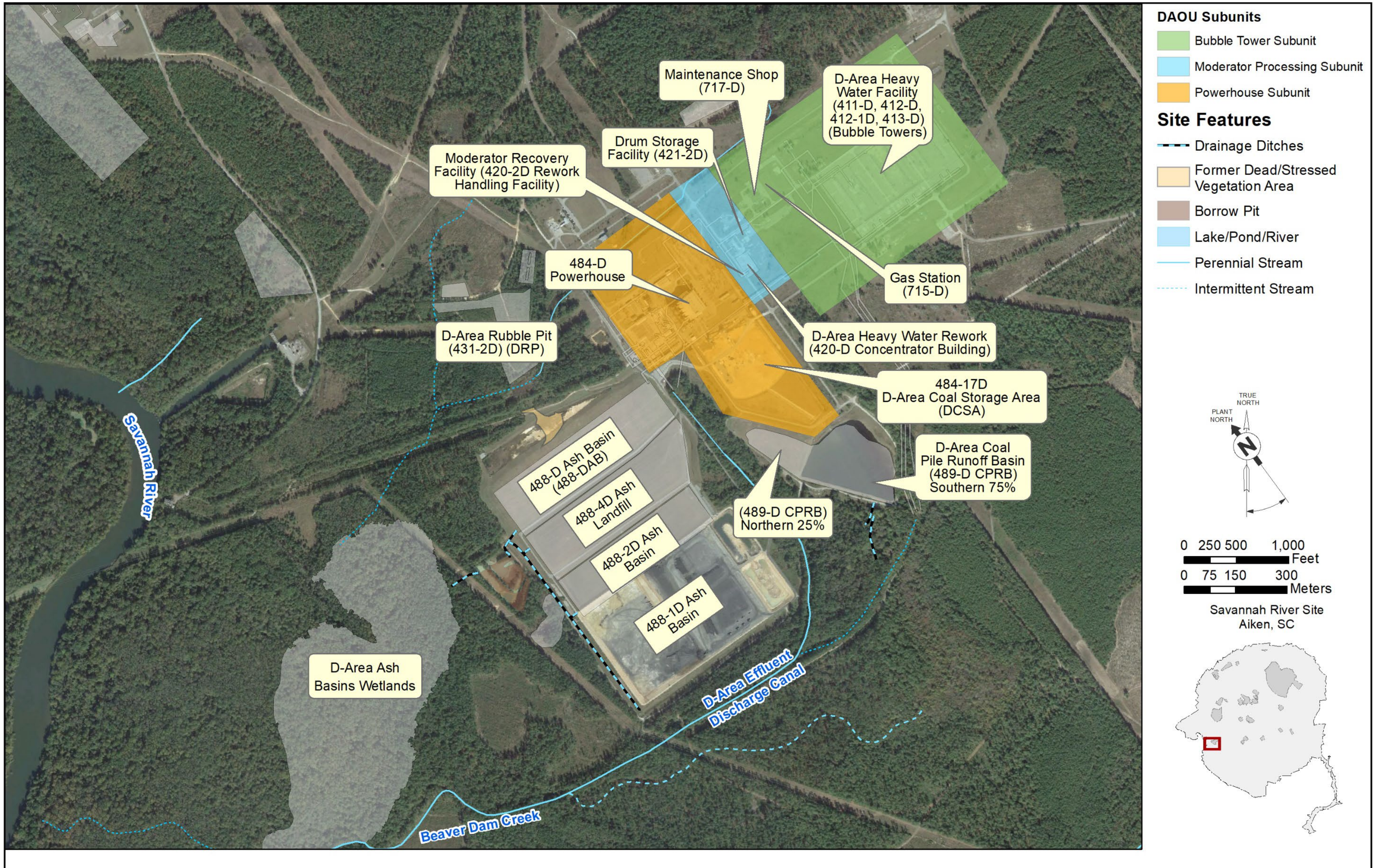

Figure 4. DAOU Subunits and Facilities

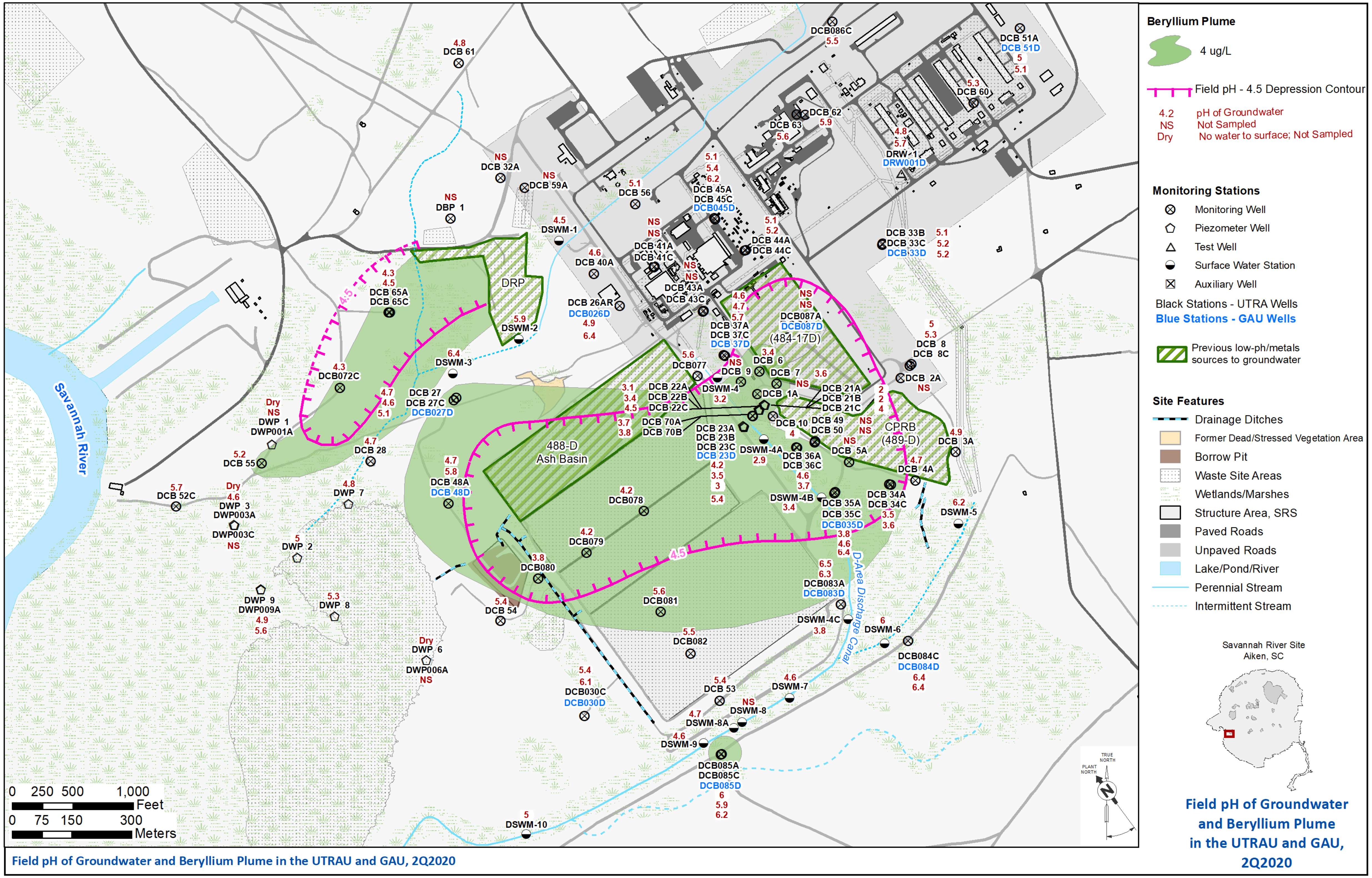

Figure 5. DAG OU Low-pH and Beryllium Plume (2Q2020)

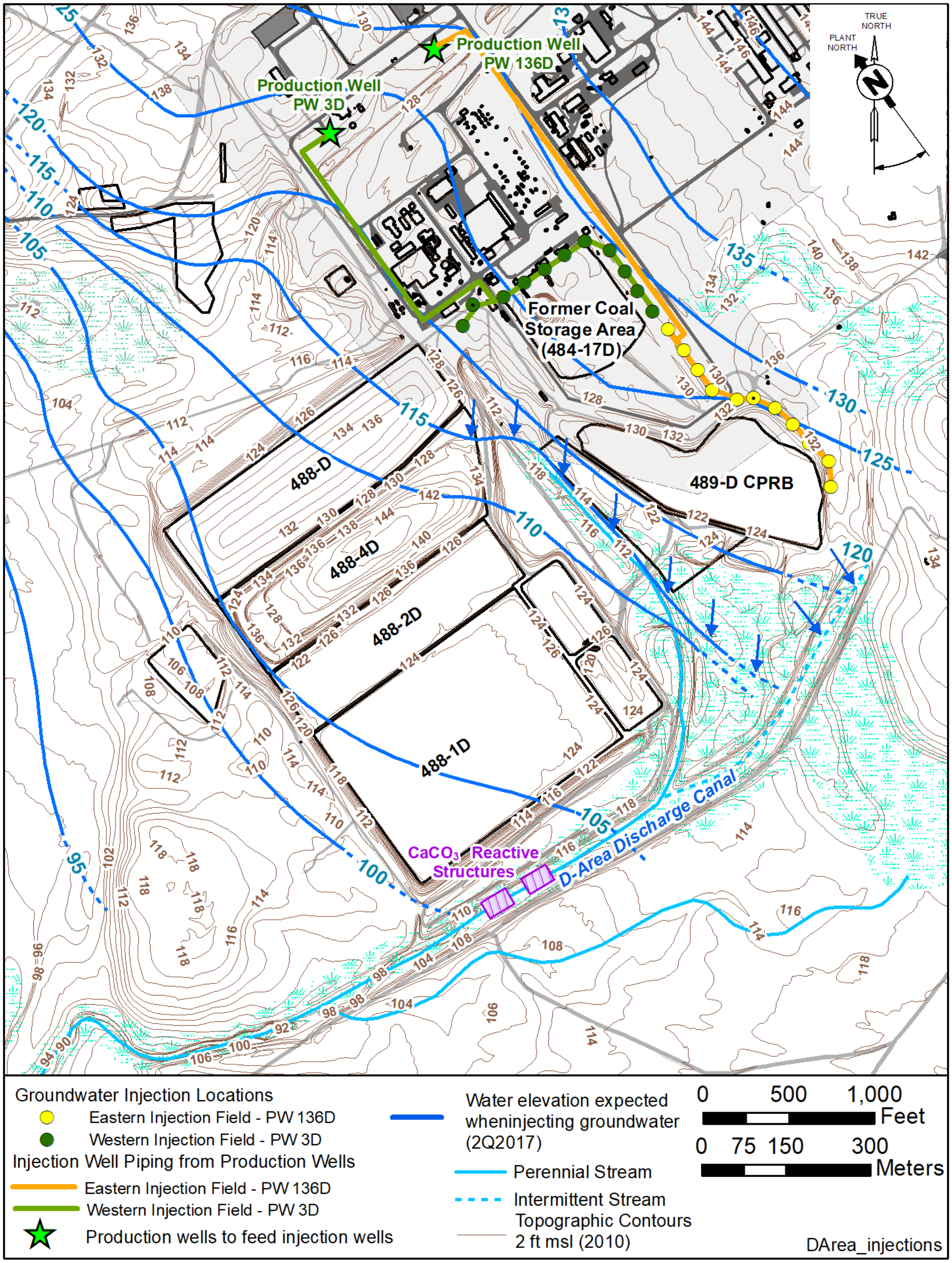

Figure 6. DAG OU Treatability Study and CaCo3 Reactive Structures

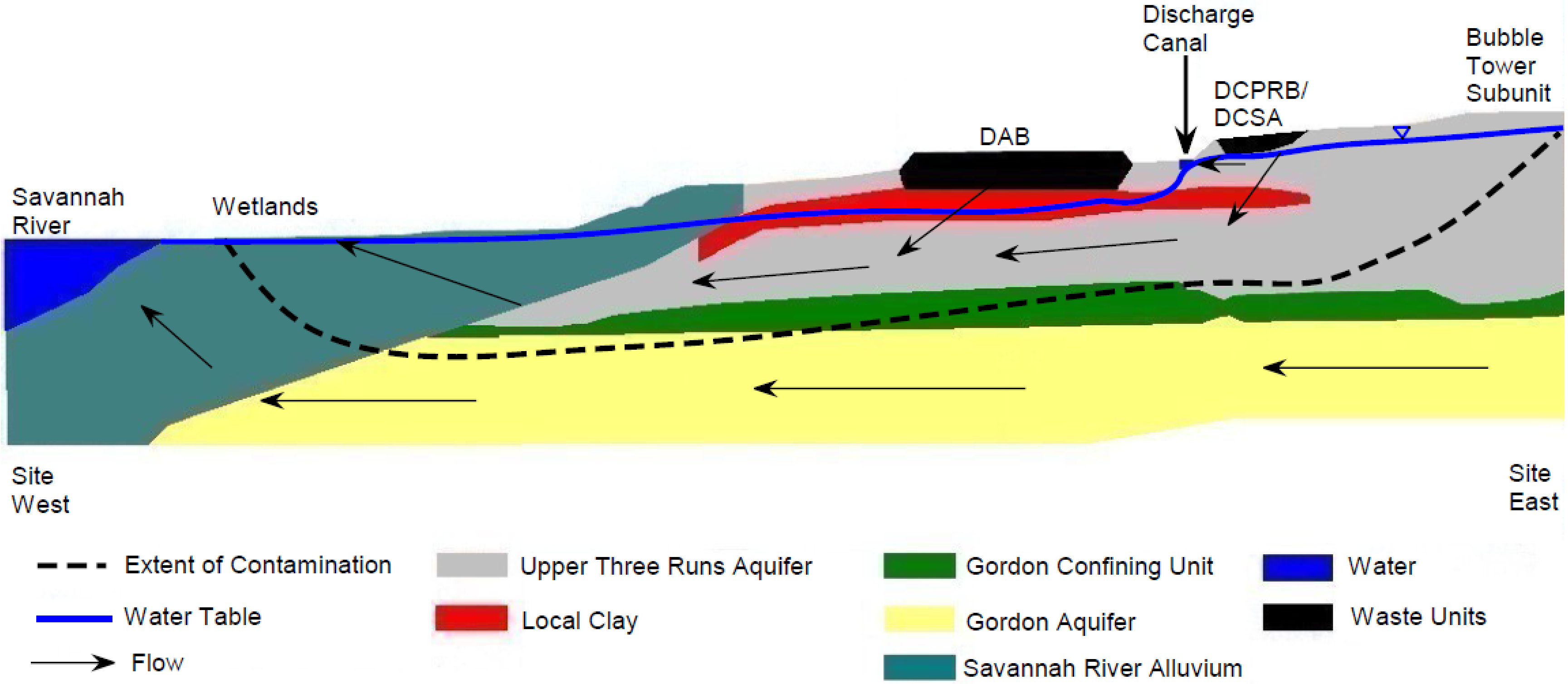

Figure 7. **DAG OU Conceptual Site Model**

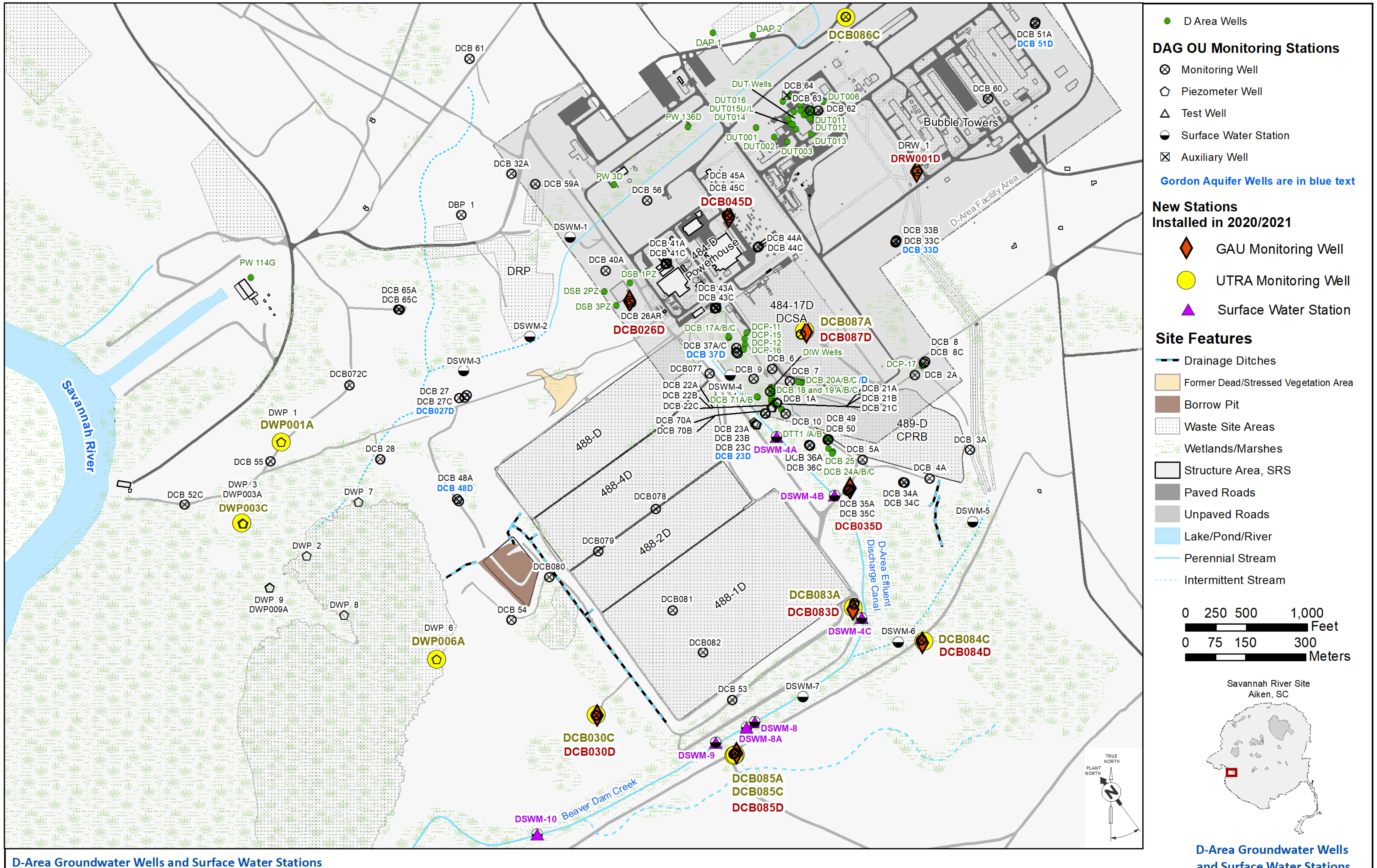

Figure 8. DAG OU Monitoring Network and Additional Wells in D-Area

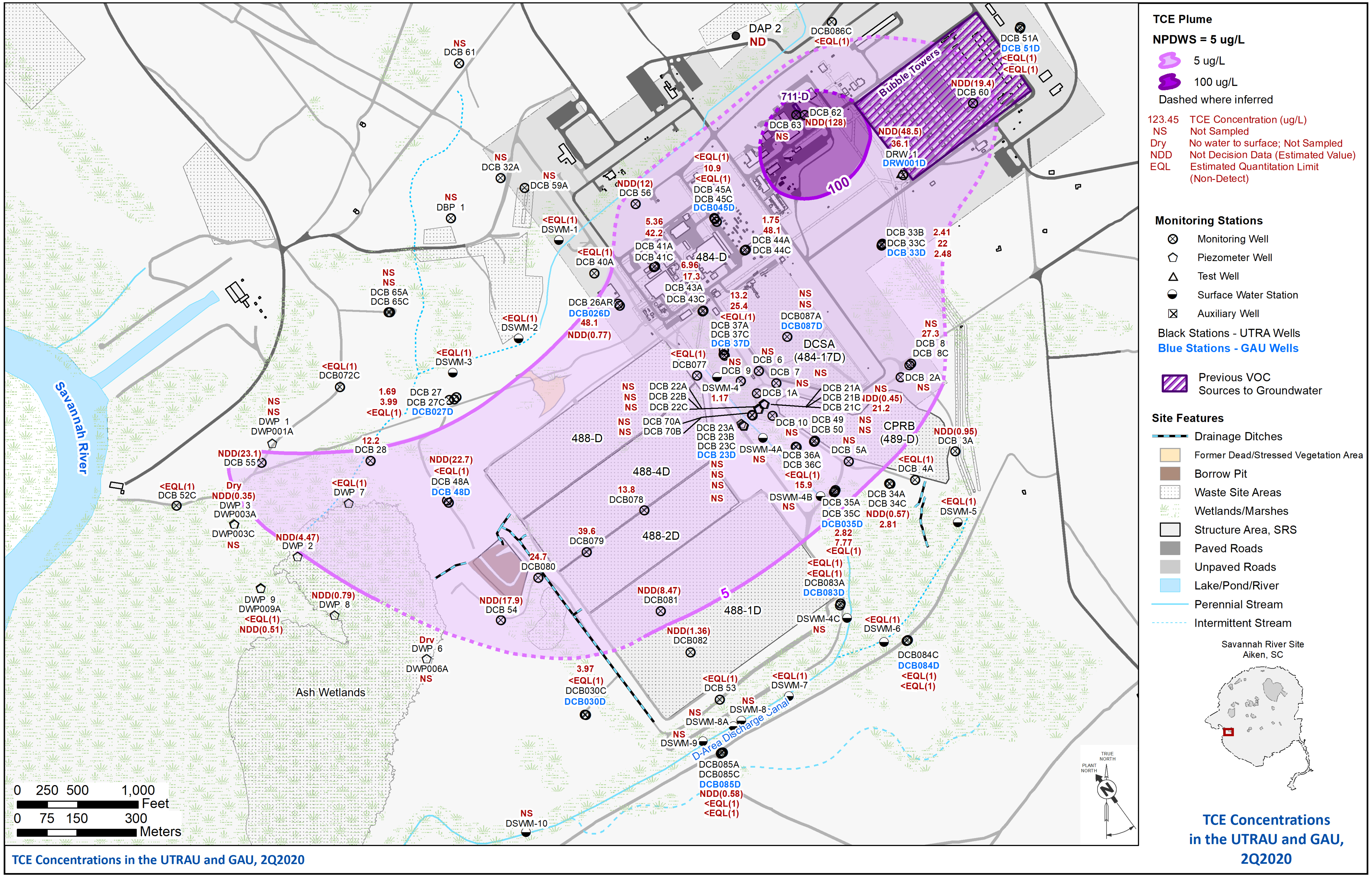

Figure 9. DAG OU TCE Plume (2Q2020)

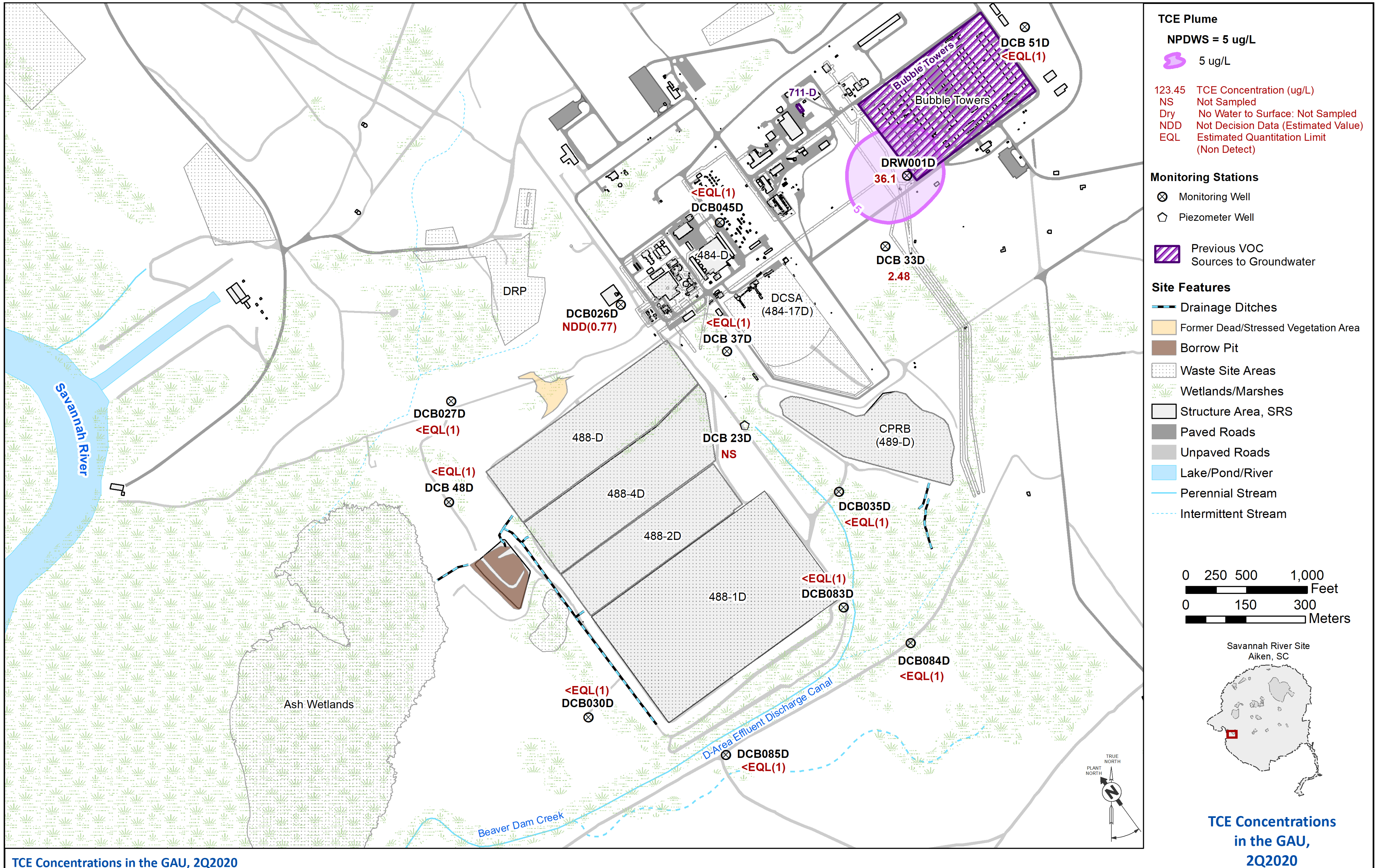

Figure 10. DAG OU Gordon Aquifer TCE Plume (2Q2020)

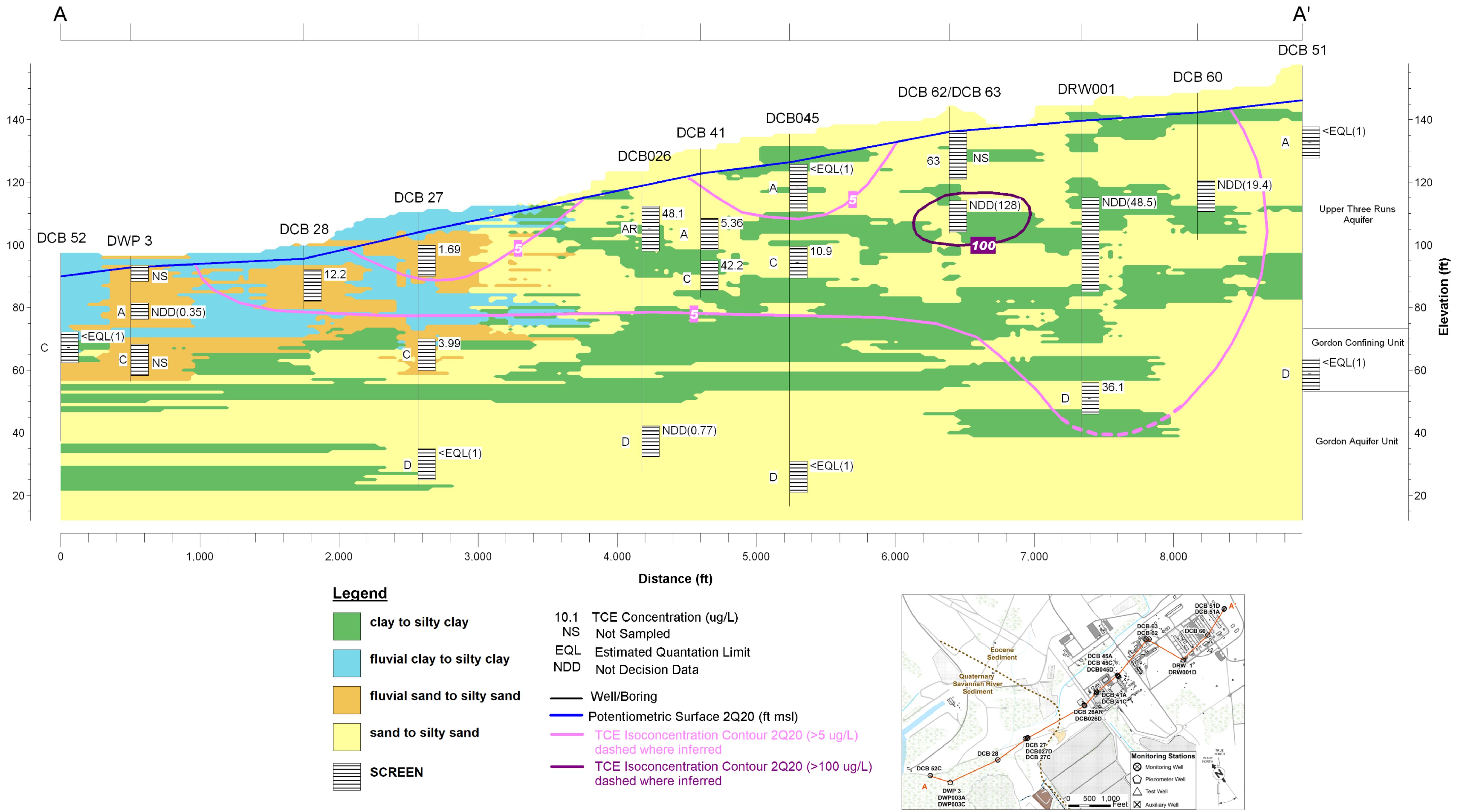

Figure 11. Cross-Section A-A' of the DAG OU TCE Plume (2Q2020)

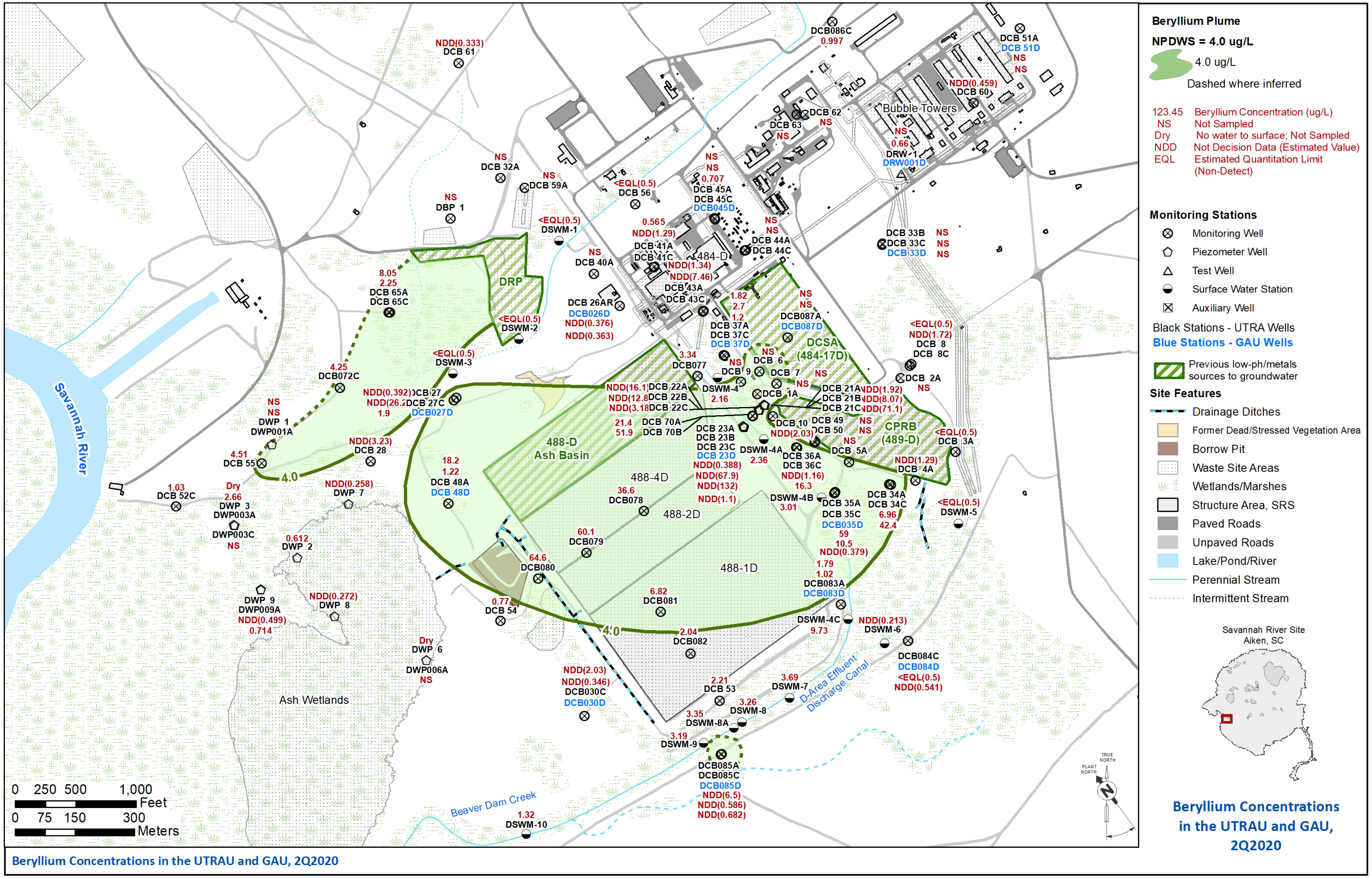

Figure 12. DAG OU Beryllium Plume (2Q2020)

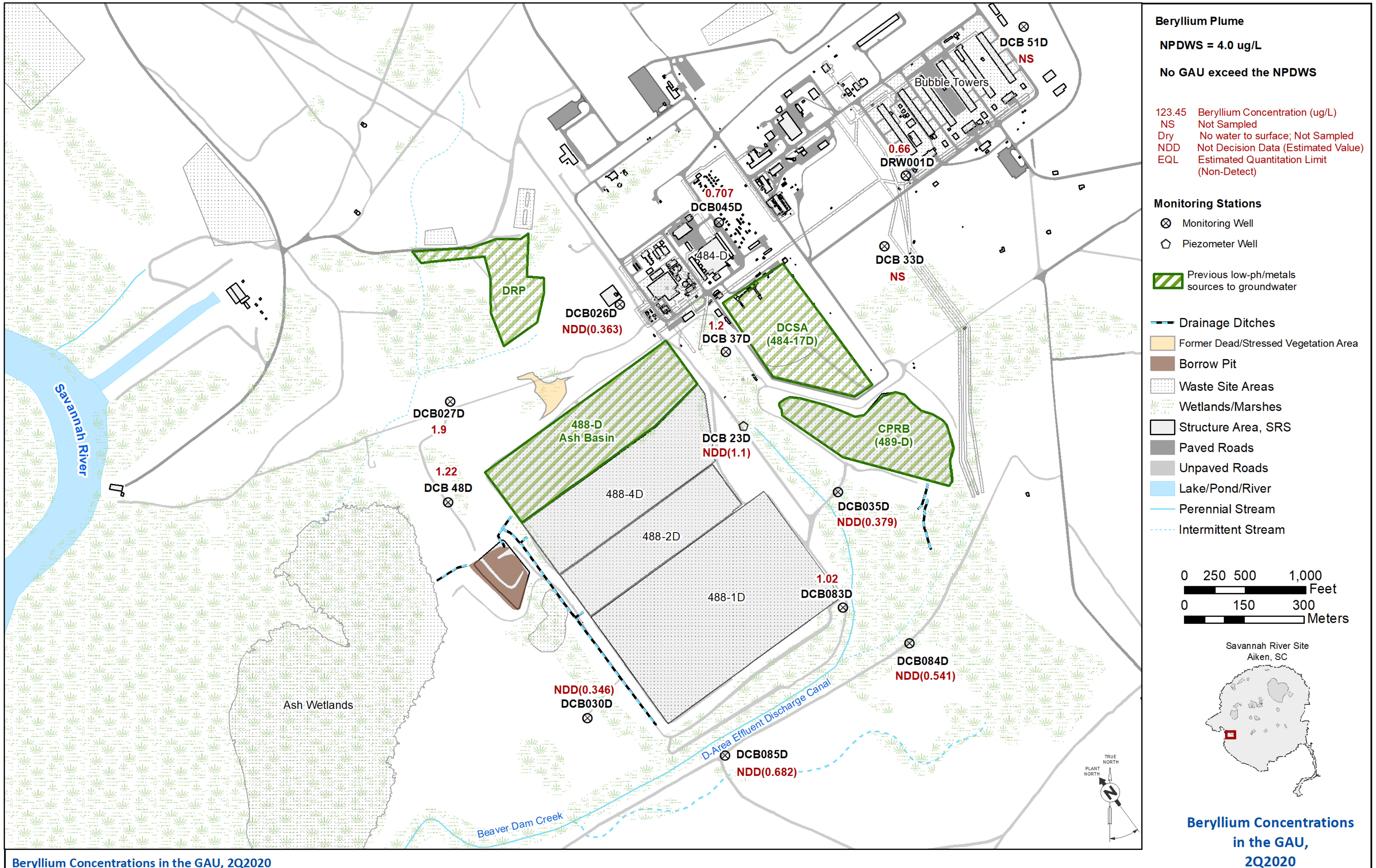

Figure 13. DAG OU Gordon Aquifer Beryllium Plume (2Q2020)

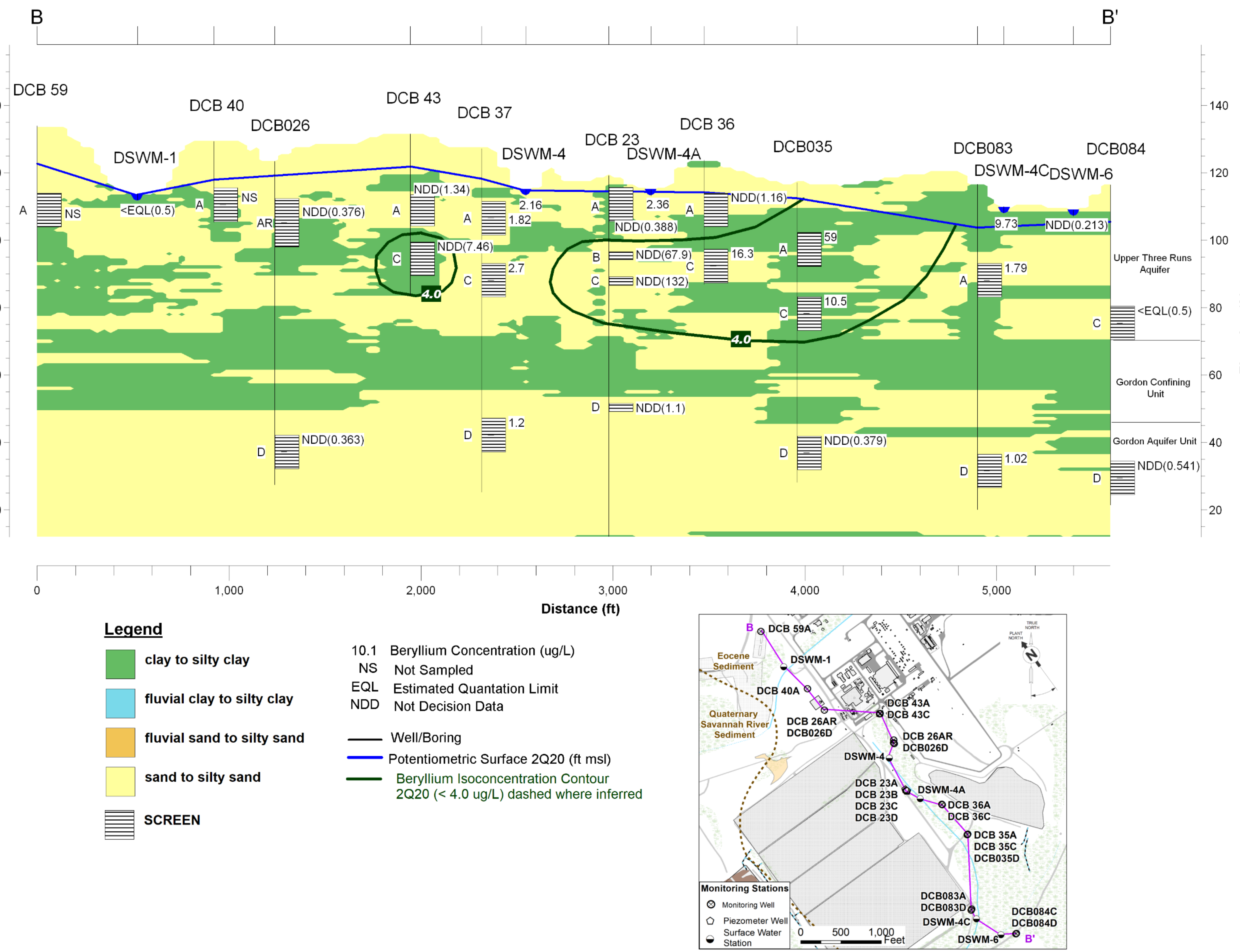

Figure 14. Cross-Section B-B' of the DAG OU Beryllium Plume (2Q2020)

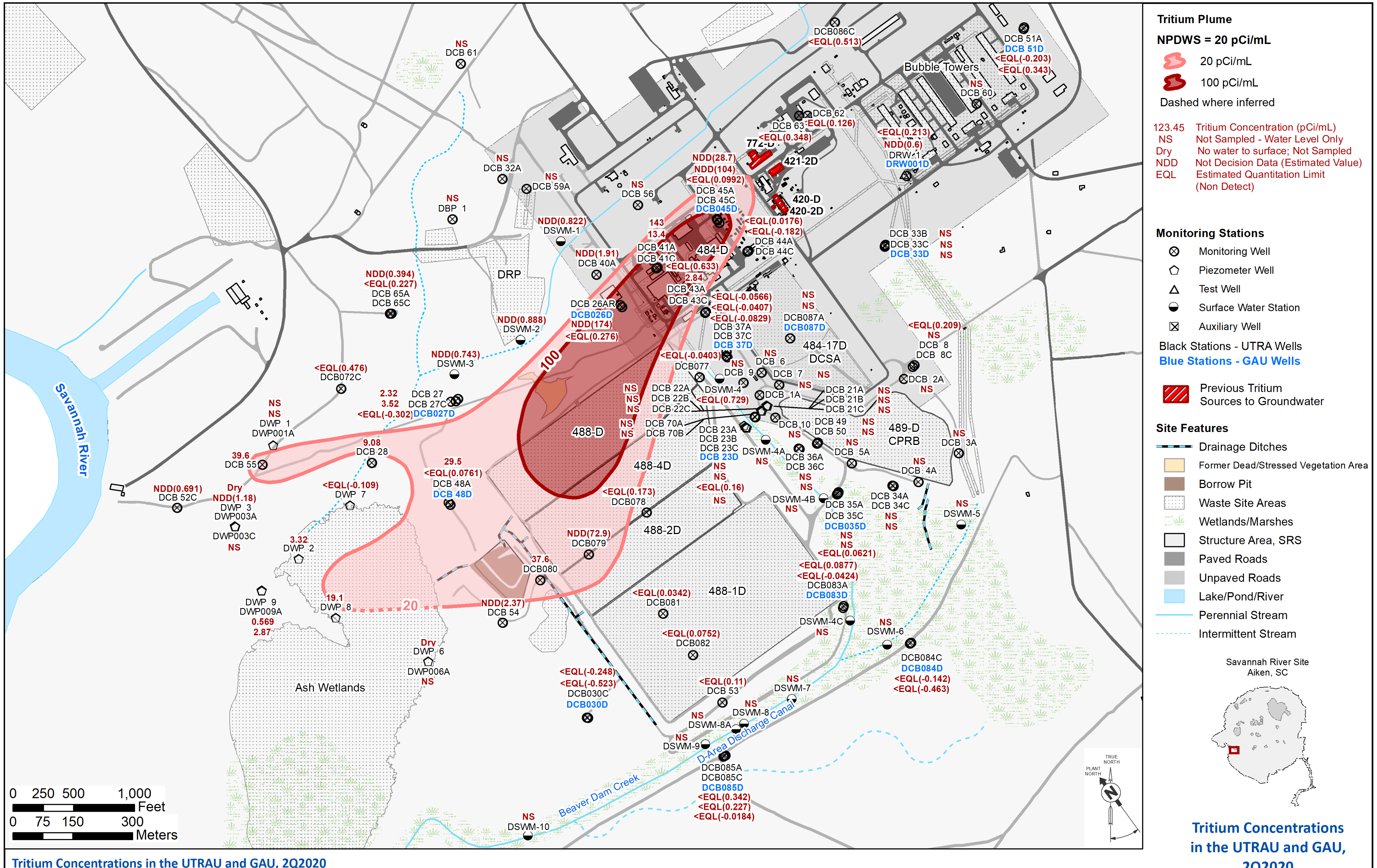

Figure 15. DAG OU Tritium Plume (2Q2020)

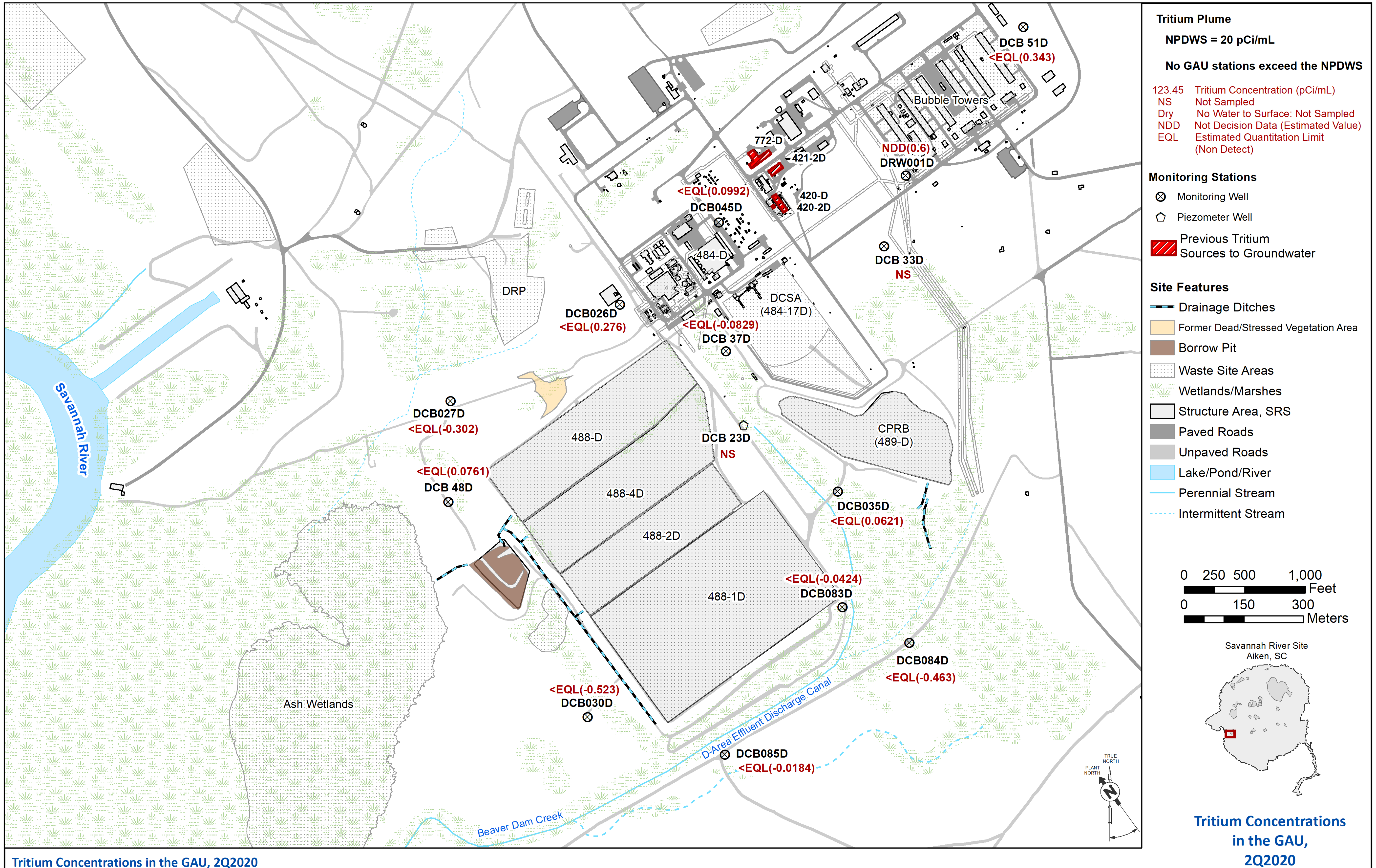

Figure 16. DAG OU Gordon Aquifer Tritium Plume (2Q2020)

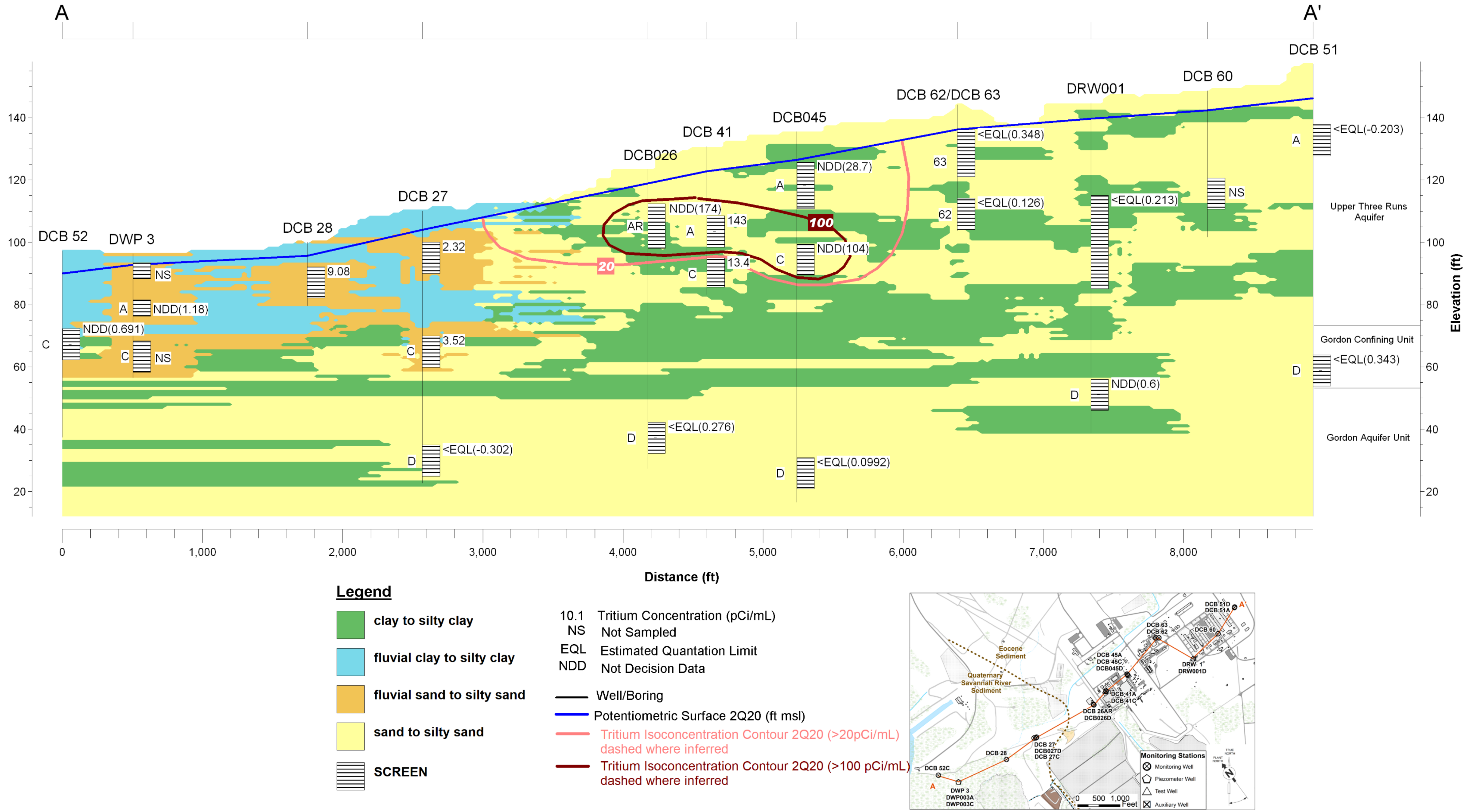

Figure 17. Cross-Section A-A' of the DAG OU Tritium Plume (2Q2020)

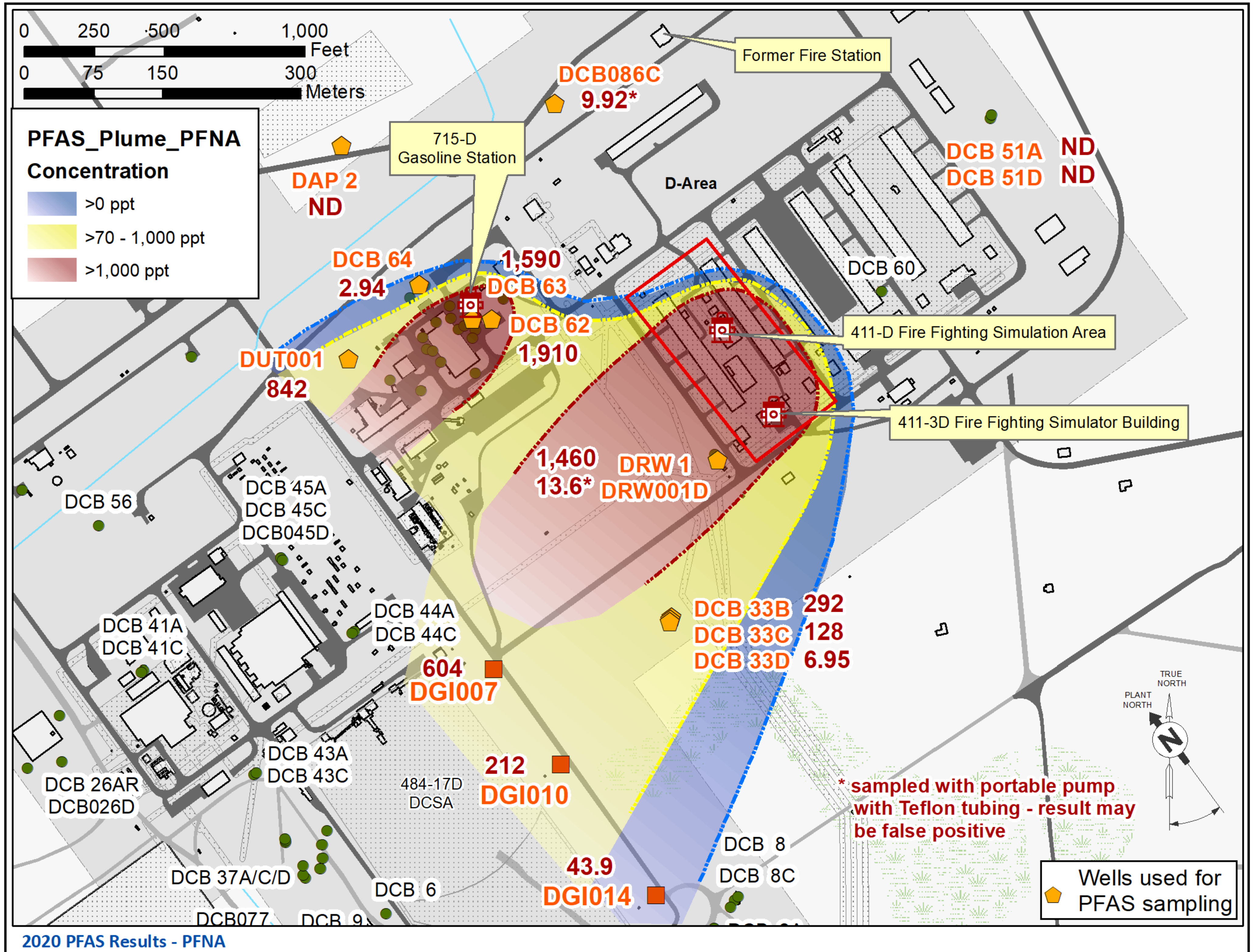

Figure 18. DAG OU PFAS Sources and PFNA Plume

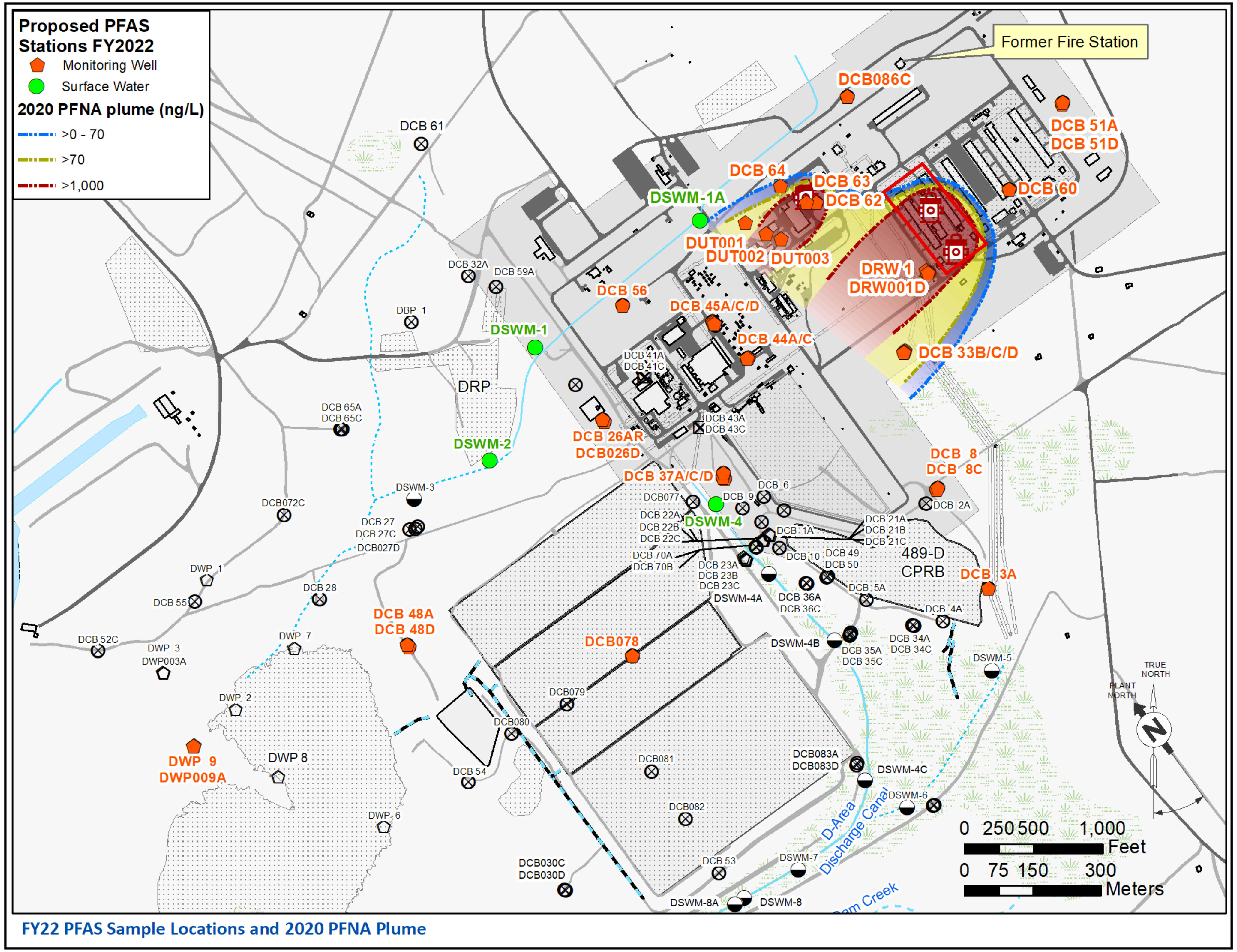

Figure 19. Proposed Additional PFAS Sampling at Existing DAG OU Stations

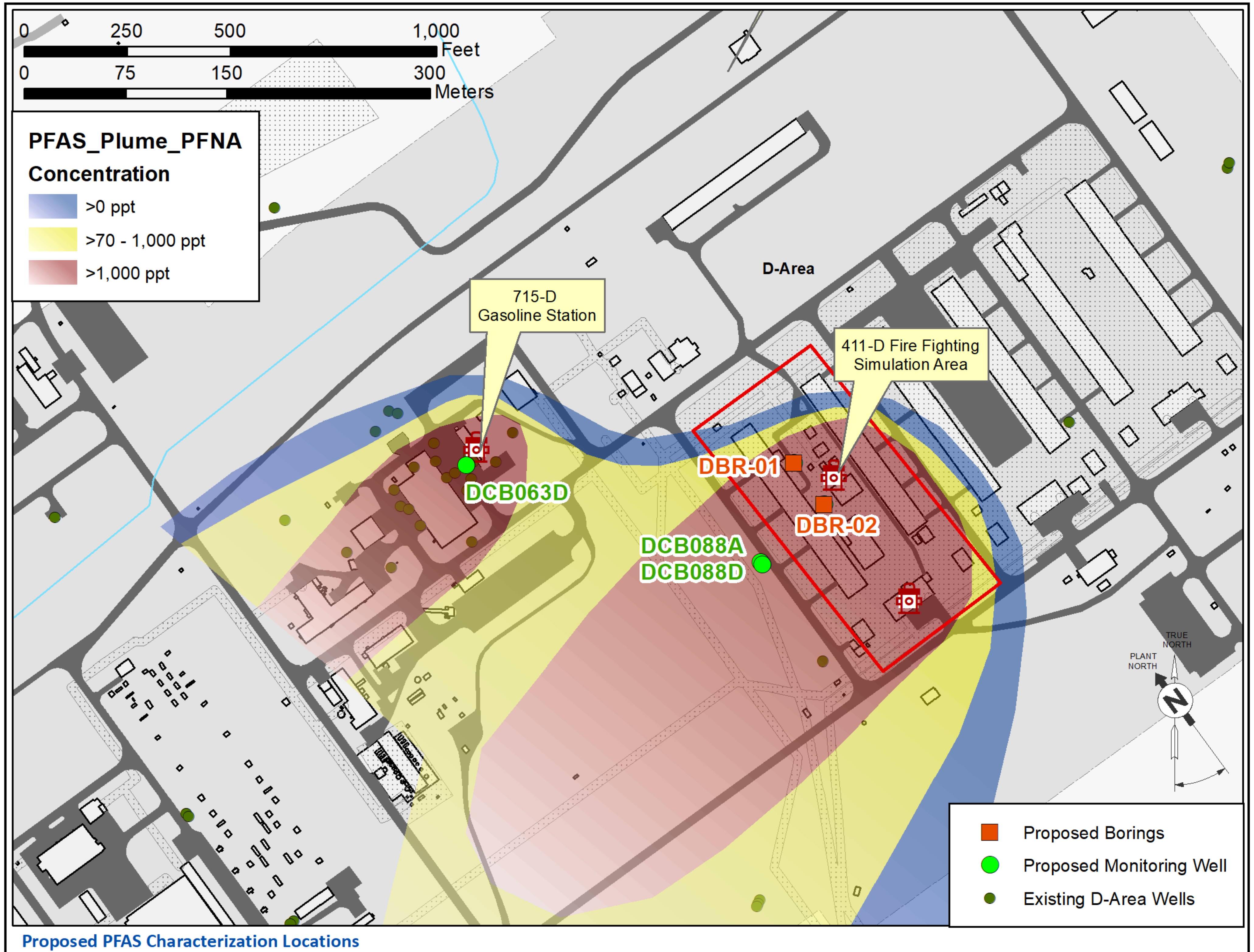

Figure 20. Proposed New Monitoring Wells and Borings for PFAS Characterization

Table 1. DAG OU 2020 PFAS Sampling Results

Sampling Event	Area	Location	Well Pump Type	Station/Sample	NEtFOSAA	NMeFOSAA	PFBS	PFDA	PFDoA	PFHpA	PFHxA	PFHxS	PFNA	PFOA	PFOS	PFTA	PFTrDA	PFUnA
July 2020 Sampling		Building	Grab	DI Water Supply	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
July 2020 Sampling		Background	Peristaltic	DOB 9	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
July 2020 Sampling		Background	Peristaltic	DOL 1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
July 2020 Sampling		Background	Dedicated - VS	DCB 61	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
July 2020 Sampling		Background	Dedicated - VS	DCB 51A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
July 2020 Sampling		Background	Dedicated - VS	DCB 51D	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
July 2020 Sampling		Background	Dedicated - VS	DCB 51D - FD	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
July 2020 Sampling		Background	Dedicated - VS	DCB 51D - SPL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
July 2020 Sampling	715-D Gas Satation	Upgradient	Peristaltic	DAP 2	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.48	ND	ND	ND	ND
July 2020 Sampling	715-D Gas Satation	Upgradient	Portable - VS	DCB086C	ND	ND	ND	0.719	ND	0.758	2.03	17	9.92	3.17	17.8	ND	ND	ND
July 2020 Sampling	715-D Gas Satation	Downgradient	Dedicated - VS	DCB 62	ND	ND	12.6	71	ND	53.4	30.1	135	1910	108	607	ND	ND	ND
July 2020 Sampling	715-D Gas Satation	Downgradient	Dedicated - VS	DCB 63	ND	ND	2.63	72.8	ND	25.3	9.4	32.5	1590	43.8	126	ND	ND	271
July 2020 Sampling	715-D Gas Satation	Downgradient	Dedicated - VS	DCB 64	ND	ND	0.63	ND	ND	0.844	0.822	ND	2.94	2.99	14	ND	ND	ND
July 2020 Sampling	715-D Gas Satation	Downgradient	Portable - VS	DUT001	ND	ND	1.66	12	ND	27.7	19.5	17.4	842	75.3	69.6	ND	ND	16.6
July 2020 Sampling	715-D Gas Satation	Downgradient	Portable - VS	Rinsate Blank - DUT001	ND	ND	0.678	4.43	ND	ND	ND	ND	334	2.84	37.7	ND	ND	2.77
July 2020 Sampling	Training Area	Downgradient	Dedicated - VS	DRW 1	ND	ND	13.6	16.9	ND	44.1	43.8	154	1460	113	445	ND	ND	44.8
July 2020 Sampling	Training Area	Downgradient	Portable - VS	DRW001D	ND	ND	ND	3.54	ND	3.07	2.15	ND	13.6	17.4	4.71	ND	ND	1.57
July 2020 Sampling	Training Area	Downgradient	Dedicated - VS	DCB 33B	ND	ND	1.68	8.62	ND	16.1	15.9	16.1	292	31.9	71.9	ND	ND	81.7
July 2020 Sampling	Training Area	Downgradient	Dedicated - VS	DCB 33C	ND	ND	0.721	1.77	ND	7.04	5.43	4.21	128	28.8	25.5	ND	ND	1.91
July 2020 Sampling	Training Area	Downgradient	Dedicated - VS	DCB 33C - FD	ND	ND	0.703	1.91	ND	6.99	5.57	4.64	128	28.4	24.2	ND	ND	1.83
July 2020 Sampling	Training Area	Downgradient	Dedicated - VS	DCB 33C - SPL	ND	ND	0.59	1.5	ND	5.9	5.4	4.4	110	24	20	ND	ND	1.6
July 2020 Sampling	Training Area	Downgradient	Dedicated - VS	DCB 33D	ND	ND	ND	ND	ND	1.21	ND	ND	6.95	4.42	ND	ND	ND	ND
July 2020 Sampling		Background	Pour	FIELD BLANK - A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
July 2020 Sampling		Downgradient	Pour	FIELD BLANK - B	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
December 2020	Injection Wells	Downgradient	Portable - VS	DGI007	ND	ND	4.34	6.98	ND	15.5	15.6	48.4	604	42.6	128	ND	ND	24.4
December 2020	Injection Wells	Downgradient	Portable - VS	DGI010	ND	ND	2.15	3.72	ND	21.4	21	22.4	212	29.9	75.3	ND	ND	8.78
December 2020	Injection Wells	Downgradient	Portable - VS	DGI014	ND	ND	3.63	ND	ND	15.3	25.7	25.4	43.9	41.9	39.1	ND	ND	ND
December 2020	Pump Tests	Background	Portable - VS	PORT_PMP-TEST1	ND	ND	ND	ND	ND	ND	ND	ND	0.665	ND	ND	ND	ND	1.92
December 2020	Pump Tests	Background	Portable - VS	PORT_PMP-TEST2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Color Key:	Non-Detect	<10 ng/L	>10 ng/L - 70 ng/L	> 70 ng/L - 500 ng/L	>500 ng/L - 1,000 ng/L	>1,000 ng/L - 1,910 ng/L

Table 2. Record of Key Agreements[2]

Date	Description of Agreement
4/14/2021	The Core Team agreed with the adequacy of current groundwater data for defining problem[s] warranting action with the addition of the following in the RFI/RI Work Plan to address uncertainties: • additional sampling and/or installation of a monitoring well in the Gordon Aquifer for VOCs and PFAS. • Sampling surface water and sediment in co-located points upstream and downstream of potential PFAS contaminated groundwater discharge(s). The Core Team agreed to submittal of the RFI/RI Work Plan and SAP in June 2021.

[2] Core Team agreements are documented at each phase and retained for each successive phase in order to maintain a comprehensive list for the life of the project.

Table 3. Key Changes to Scoping Summary[3]

Date	Section	Description of Change	Rationale for Change
4/14/2021	1.0	Updated to reflect meeting held on 4/14/2021	Post-meeting update.
	4.0	Expanded footnote on Problem(s) Warranting Action table to clarify that consideration for MNA parameters to support a possible MNA remedy will be discussed in the SAP.	Support potential MNA remedy.
	4.0	Added two Core Team uncertainties to Problem(s) Warranting Action table to address additional sampling in the Gordon Aquifer for VOCs and PFAS and sampling of PFAS contamination in surface water and sediment.	Additional data collection to include in RFI/RI Work Plan.
	Table 4.	Added placeholder for potential new GA well.	Address uncertainty for vertical extent of VOCs and PFAS in the GA.

[3] Significant changes from the previous version of the scoping summary. Changes may include addition, deletion or alteration of problem statements; refined scope of the problems; selection or refinement of response actions; substantial changes in unit strategy; or the addition of supporting materials. The Key Changes table is not a continuous list, but rather, is updated each time the scoping summary is revised.

Table 4. Proposed New Monitoring Wells

Station ID	Aquifer	Plumes Monitored	Location
DCB088A	UTRA	PFAS	411-D Fire Training Area
DCB088D	GA	PFAS, VOC	411-D Fire Training Area
DCB063D	GA	PFAS, VOC	715-D Gas Station
DCB089D	GA	PFAS, VOC	Exact location to be determined between existing wells DRW001D and DCB045D

Table 5. Proposed Borings for PFAS Characterization

Station ID	Aquifer	Plumes Monitored	Location
DBR-01	UTRA/GA	PFAS	411-D Fire Training Area
DBR-02	UTRA/GA	PFAS	411-D Fire Training Area