



## **Scoping Summary for D-Area Ash Basin Wetlands (NBN) in Support of the Savannah River and Floodplain Swamp Integrator Operable Unit**

**(Focused Corrective Measures Study / Feasibility Study Scoping)**

**SEMS Number: 69**

**SRNS-RP-2024-00281**

**July 2024 (FINAL)**

**SAVANNAH RIVER SITE • AIKEN, SOUTH CAROLINA**

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## 1.0 PROJECT PHASE AND STATUS OF THE D-AREA ASH BASIN WETLANDS

In 2022, the United States Department of Energy (USDOE) proposed a wholistic remedial approach to address several of the remaining coal ash and coal fines operable units (OUs) at the Savannah River Site (SRS). The list of units included the D-Area Ash Basin Wetlands (DABW). The U.S. Environmental Protection Agency (USEPA) and South Carolina Department of Environmental Services (SCDES)<sup>1</sup> approved the implementation and administrative strategy for the coal ash and coal fines OUs on August 11 and September 22, 2022, respectively. This scoping summary supports the development of a Focused Corrective Measures Study/Feasibility Study (CMS/FS) for the DABW (NBN). A Focused CMS/FS is being prepared for the DABW separate from the other coal ash and coal fine OUs to allow for the inclusion of a site-specific study on the ecological impacts of ash disposition in the DABW.

The Revision 0 Focused CMS/FS associated with the comprehensive ash and coal fines strategy for the DABW is due for submittal to the USEPA and SCDES by October 30, 2024, followed by a Statement of Basis/Proposed Plan (SB/PP) (December 2, 2025) and subsequent Record of Decision (ROD) issuance date in March 2027.

The purpose of the Focused CMS/FS scoping meeting for the DABW is to reach Core Team (i.e., representatives from USDOE, USEPA, and SCDES) agreement on the following:

1. Sufficiency of data to support the CMS/FS,
2. Risk assessment approach,
3. Conclusions of the ecological risk assessment (ERA) based on site-specific studies, and
3. Remedial alternatives (i.e., likely response actions) to be evaluated.

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<sup>1</sup> South Carolina Department of Environmental Services (SCDES) was known as South Carolina Department of Health and Environmental Control (SCDHEC) prior to July 1, 2024.

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## 2.0 BACKGROUND

SRS began early infrastructure development between 1951 and 1955 including the use of coal-fired powerhouses to generate steam and electricity. These powerhouses were located in each industrial/administrative area of the SRS with coal ash (coal combustion products) produced as a waste as a result of boiler operations. For D Area, the coal ash was sluiced from the D-Area Powerhouse into nearby ash basins. The D-Area Powerhouse was the longest running coal-fired powerhouse on SRS operating from 1952 until 2012. Overflow from operations, prior to closure of the D Area ash basins, accounts for the presence of ash within the DABW.

Several SRS ash basins, coal pile runoff basins, and one ash pile have been remediated/certified closed with a final ROD in four SRS areas (A, D, P and R). The remedial actions for these OUs were implemented to meet regulatory requirements due primarily to elevated levels of arsenic (As) and naturally occurring radionuclides that result in unacceptable long-term risks to a future resident or industrial worker from direct exposure to the material. The SRS proposed a comprehensive remedial approach for remaining coal/ash OUs including the DABW in 2022. A comparison table of constituents that drive the human health risk assessment (HHRA) for SRS ash units is provided in Table 1.

The SRS proposed regulatory strategy for the remaining coal ash and coal fines OUs was presented at a Core Team meeting held on April 19, 2022 with a follow-up meeting held on May 23, 2022. As a result of these meetings, SRS submitted the *Preferred Remedial Action and Regulatory Strategy for Remaining Savannah River Site's Coal Ash and Coal Fines Operable Units (U)* (IACD-22-166) in July 2022 to the USEPA and SCDES for regulatory review and approval. SCDES provided comments on the strategy, and SRS provided responses to the comments on September 15, 2022. USEPA and SCDES approved the regulatory strategy and associated comment responses in their letters dated August 11, 2022, and September 22, 2022, respectively. The proposed remedies of No Action or Land Use Controls [(LUCs) were identified as the preferred remedial alternatives for the DABW.

### *D-Area Ash Basin Wetlands*

The DABW is located in the Savannah River and Floodplain Swamp (SRFS) Integrator Operable Unit (IOU) within the Savannah River floodplain downgradient of D Area (Figure 1). The DABW is downgradient, southwest of the 488-D Ash Basin, and a portion of the southern boundary of the DABW is adjacent to Beaver Dam Creek (Figure 2). The area is a mixed compositional bottomland forest that ranges from more frequently flooded areas to areas of open canopy, to a climax swamp forest approaching the Savannah River. Depending on precipitation events, river flood levels, groundwater table fluctuations, portions the DABW hold water. The ash depositional area has an estimated acreage of approximately (~) 90 acres (ac) (36 hectares) (ha) with an estimated volume of ~739,000 cubic yards (yd<sup>3</sup>) (565,006 cubic meters [m<sup>3</sup>]) of ash. The depth to groundwater is ~ 0 (wetland/floodplain) to 15 feet below ground surface (bgs).

The D Area ash basins, and DABW specifically, has been the subject of decades of ecological investigations. In 2022-2024, the DABW was the focus of study to provide critical information supporting the ecological assessment for the DABW. The most recent study was conducted based on results of previous studies and the approach/findings associated with the Wetland Area at Dunbarton Bay, another wetland-related ash depositional area (in this case, a Carolina bay) that supported final action determination from an ecological perspective.

### *Previous Actions*

No previous Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulatory actions have been implemented for the DABW. However, the DABW was investigated as part of the approved *Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation/Baseline Risk Assessment (RFI/RI/BRA) for the D-Area Expanded Operable Unit (DEXOU)* (WSRC-RP-2001-4162, Revision 1) in 2002. A Problem Identification meeting was held in October 2002 that resulted in the DABW subunit of the DEXOU being administratively transferred to the SRFS IOU due to the need for additional ecological data to

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support a final remedial decision for the DABW. The DEXOU RFI/RI/BRA was approved by the USEPA and SCDES on July 17, 2003, and July 21, 2003, respectively.

As previously noted, site-specific studies have been conducted to evaluate ecological impacts of ash disposition at the DABW. The strategy for the DABW Focused CMS/FS document is to use the information and conclusions of the DEXOU RFI/RI/BRA for the HHRA, principal threat source material (PTSM) evaluation, and contaminant migration (CM) analysis, and the results of the 2022-2024 site-specific study to support the ERA conclusion. The conclusions will be verified, as appropriate, through implementation of the approved technical protocols documented in the Environmental Compliance & Area Completion Projects (EC&ACP) Regulatory Document Handbook (SRNS-RP-2022-00330, Revision 0, June 2023).

### **3.0 LAND USE**

The DABW is located within the Savannah River floodplain and is outside of the boundary of any industrial or general support area. No current or future development of the DABW/floodplain area is planned.

### **4.0 PROBLEMS WARRANTING ACTION**

Data supporting the DABW is presented in the RFI/RI/BRA for the DEXOU (as noted in Table 2) and includes the following: 1997 pre-characterization data consisting of surface water (SW) sampling and a wetland survey consisting of 39 water samples along with pH and conductivity readings; DEXOU Phase I sampling conducted from 1998-1999 resulting in eight (8) sediment/soil and seven (7) surface water samples; DEXOU Phase II sampling conducted in 2001, a WP Addendum for DEXOU that resulted in 16 paired sediment/soil and surface water samples; and June 2002 field sampling conducted to identify the 0-1 ft extent of contamination and collection of four (4) sediment/soil samples. Figure 3 shows the sampling locations associated with the DABW.

### *Human Health Risk Assessment*

The human health assessment presented in the DEXOU RFI/RI/BRA was based on the residential scenario only. This hypothetical scenario was based on the assumption that a resident does not live in the wetland proper but has access and utilizes it for recreational purposes. The exposure assumptions were 30 years (24 years adult; 6 years child), 50 days per year and 2 hours per day. Onsite Worker and Industrial Worker scenarios were deemed not likely and therefore were not evaluated in the DEXOU RFI/RI/BRA. The risk assessment resulted in the following human health refined constituents of concern (RCOCs) for the residential scenario: As, Bismuth-214 (Bi-214), Potassium-40 (K-40), Radium-226 (Ra-226), Radium-228 (Ra-228), Thallium-208 (Tl-208), and Thorium-228 (Th-228) with a total cumulative risk (TCR) =  $3.7E-05$ .

In addition, an adolescent trespasser scenario (10 years, 50 days/year, 2 hours (hours)/day) was evaluated to determine if an early action (EA) was warranted (the EA benchmark  $> 1E-04$  risk and/or  $HI > 3$ ). The trespasser TCR =  $9.5E-06$ ; it was concluded that an EA was not warranted.

No human health SW RCOCs were identified in the DEXOU RFI/RI/BRA.

### *HHRA Focused CMS/FS Strategy*

Previously, an RFI/RI/BRA was conducted using a comprehensive set of risk evaluation tables that were required at the time of document preparation. Current streamlining agreements have reduced the complexity (and volume) of these documents. Therefore, a Data Summary Table that provides all of the information per the approved EC&ACP protocols will be populated and presented in the Focused CMS/FS. The table will include the previously identified HH RCOCs only. A draft table is shown in Table 3.

The strategy for the HHRA portion of the Focused CMS/FS is to recalculate the risk for the HH RCOCs identified in the previous DEXOU RFI/RI/BRA using the currently accepted exposure assumptions for the hypothetical resident, industrial worker, and IOU

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onsite worker scenarios. The IOU onsite worker is a Savannah River Ecology Laboratory (SREL) researcher and is deemed the most likely exposure scenario for this wetland/floodplain environment and is consistent with recent BRAs with similar ecological settings (e.g., Lower Three Runs IOU, Wetland Area at Dunbarton Bay). The exposure assumptions for the IOU onsite worker are 20 years, 150 days/year, and 8 hours per day.

In addition, the risk assessment conducted in the DEXOU RFI/RI/BRA calculated a separate risk for each isotope in the decay chain and is now considered an outdated methodology. Therefore, the HH risk will be re-calculated using the most recent USEPA Peak Preliminary Remediation Goals (PRGs) (2024). Peak PRGs are the preferred, default risk-based thresholds. For both the Th232 and U238 decay series, secular equilibrium is assumed, and the risk is calculated using the highest exposure point concentration (EPC) for all the daughter products in the series. Previously identified HH RCOCs Ra228, Th228 and Tl208 are included in the Th232 series PRG, and Ra226 and Bi214 are included in the U238 series PRG. The risk is calculated for the entire series, not individual isotopes. A draft table is shown in Table 4.

#### *Ecological Risk Assessment*

For the ERA, constituents of concern (COCs) identified in the DEXOU RFI/RI/BRA included As, selenium (Se), and vanadium for sediment/soil. No ecological RCOCs were identified, however, the results of the BRA referred to the uncertainty surrounding the final COCs and deferred to continuance of the ecological assessment process for collection of site-specific ecological data to support the remedial decision.

An ecological Sampling and Analysis Plan (SAP) was developed and submitted with the Revision 0 DEXOU RFI/RI/BRA. Comments from SCDES were received and discussed in a follow up scoping meeting. Based on results of the DEXOU RFI/RI/BRA and the development of the draft SAP, the DABW was administratively transferred to the SRFS IOU to allow for additional ecological study. Initial studies were conducted by SREL and the Savannah River National Laboratory including, but not limited to, earthworm toxicity

testing, trace element distribution and speciation, assessment of plant and animal communities, contaminant inventories, and body burdens assessments.

Following on the results of these studies and the ERA approach used for the approved *Focused Corrective Measures Study/Feasibility Study Report for the Wetland Area at Dunbarton Bay*, SREL began a final investigation of the DABW in 2022. The study, *Bioaccumulation and Community Composition of Small Terrestrial Biota Exposed to Coal Combustion Residual Contaminants* (K. Holland, University of Georgia Master's Thesis, 2024), was completed in April 2024.

As expected, the ecological investigation found trace element concentrations were higher in ash-contaminated soils than reference soils. Data comparisons also showed similar concentrations in ash/soil from 2003 to 2022 suggesting no observable natural attenuation. Target biota had elevated levels of As, Se, and strontium (Sr) when compared to reference samples. Evaluation of community-level metrics included species richness and diversity of small vertebrates with collection of environmental parameters to assess variability. Results show that environmental variables varied minimally among contaminated and reference sites. In addition, species of small vertebrates documented were reflective of a typical southeastern floodplain forest. Elevation and ground cover differed between sites, but there was no evidence that any environmental variables affected species richness or diversity. Ground cover density was found to be greater at the ash sampling sites compared to the reference site which may be attributed to the enriched availability of essential trace elements for plants growing within the ash plume area.

Overall, there was little evidence that the presence of ash-associated contaminants in DABW are impacting alpha diversity measures such as species richness and diversity. Findings suggest beta diversity, measured by dissimilarity in species composition, also provided no evidence of negative effects due to the broad overlap in species composition among reference and ash-contaminated sites. DABW has not received contaminant inputs in over five decades.

*ERA Focused CMS/FS Strategy*

The results of the 2022-2024 study demonstrate that elevated levels of trace elements are present in ash/soil and biota, but ecological communities within the DABW were comparable to reference sites. This indicates that the elevated levels present in ash/soil are not eliciting adverse community-level effects within inhabiting communities. Therefore, no ECO RCOCs are identified.

*PTSM/CM Analysis Focused CMS/FS Strategy*

No PTSM RCOCs were identified for the DABW based on the DEXOU RFI/RI/BRA. The DEXOU RFI/RI/BRA concluded that a CM analysis was not warranted because there was no primary source material identified for the DABW and the DABW is a discharge area located within a floodplain that is at, or near, the water table (Figure 4).

Although a CM analysis was not completed for the DABW in the DEXOU RFI/RI/BRA, the impact on groundwater in D Area is considered. Groundwater is addressed under the D-Area Groundwater (DAG) OU. Seven shallow wells exist at the perimeter of the DABW (Figure 4), and empirical groundwater results can be used to evaluate the CM potential from the ash. Arsenic is a COC with a robust data set and is a significant contaminant associated with ash that can be used as an indicator of contamination. The 2Q23 groundwater results showed no exceedances of the arsenic MCL (10 ug/L) in the seven shallow wells (Figure 5). Table 5 provides a summary of groundwater data collected to support the DAG OU monitoring at the seven DABW shallow wells. Arsenic, barium, beryllium, and uranium are constituents related to ash waste units at SRS. As shown in Table 5, the only detections above MCLs in the last 16 years were from samples that also had elevated turbidity values (greater than 140 NTU). Groundwater monitoring supports the conclusions of the DEXOU RFI/RI/BRA that ash located in the DABW floodplain is not a CM concern to groundwater. Therefore, the conclusions of the DEXOU RFI/RI/BRA were carried through, and no further CM analysis was performed.

*Summary of Problems Warranting Action*

There are no ecological, CM, or PTSM RCOCs for the DABW. Arsenic and naturally occurring radionuclides (K40, Th232 series and U238 series) are present in surface ash/soils that pose an unacceptable risk for the IOU onsite worker (i.e., SREL researcher) with a TCR = 1.7E-04. The most likely cleanup levels for As and the naturally occurring radionuclides are based on SRS background concentrations (Table 6). Figures 6 and 7 present sampling results for As, K-40, Th-232, and U-238 which represent the highest reasonable maximum exposure concentrations from the HH RCOC parent and daughter products based on the DEXOU data. The sampling points identify levels that are above 95<sup>th</sup> percentile background concentration representing the likely cleanup level for the constituent shown. A proposed LUC boundary is depicted in Figure 8 based on the ash extent and HH RCOC concentrations above 2x average background represented by As (8.2 mg/kg).

<b>DABW</b>			
<b>Problem(s) Warranting Action</b>	<b>Remedial Action Objectives</b>	<b>Scope of Problem(s)</b>	<b>Likely Response Actions</b>
As and naturally occurring rads (K40, Th232 series and U238 series) are present in the 0-1 ft ash/soil interval that pose an unacceptable risk to the IOU Onsite Worker scenario (TCR = 1.7E-04).	Protect IOU onsite worker from exposure to contaminants in surface ash/soil that exceed $1 \times 10^{-6}$ risk threshold or background levels.	~ 90 ac (36 ha) with an estimated volume of ~739,000 yd <sup>3</sup> (565,006 m <sup>3</sup> ) of soil/ash	<ul style="list-style-type: none"> <li>• No Action</li> <li>• LUCs</li> <li>• Excavation and Disposal</li> </ul>
<b>Uncertainties</b>			
None.			

## 5.0 OU STRATEGY

The project team will develop a Focused CMS/FS for submittal to the regulatory agencies by October 30, 2024. The project team believes that the existing data are sufficient for the development of the Focused CMS/FS. The Focused CMS/FS will evaluate the following three remedial alternatives for the DABW against the nine CERCLA criteria:

- A1: Alternative A-1: No Action
- A2: Alternative A-2: LUCs
- A3: Alternative A-3: Excavation and Disposal

Documents following the Focused CMS/FS will include a SB/PP and ROD. It is expected that the preferred remedial action documented in the SB/PP and selected in the ROD will be Alternative A-2: LUCs with a remedial action start in March 2028.

Core Team agreements are documented in Table 7.

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**Table 1. Waste Unit Comparison of Maximum Arsenic Concentrations and Naturally Occurring Radionuclide Activities**

<i>HH COC</i>	<i>Units</i>	<i>SRS Bkgd</i>	<i>PAB*</i>	<i>RAB*</i>	<i>DCPRB*</i>	<i>WADB*</i>	<i>AAP</i>	<i>ACPRB</i>	<i>HAB</i>	<i>KAB</i>	<i>LAB</i>	<i>FAL</i>	<i>DABW</i>
As	mg/kg	22.9	59.7	28.7	158	33.6	51.6	44.7	76.5	32.3	19.1	36.3	152
K-40	pCi/g	8.53	13.8	16.9	NA	16.4	23.9	NA	11.3	12.5	10.8	na	26.1
Ra-228 (+D)	pCi/g	6.75	4.07	NA	NA	NA	NA	NA	4.15	2.91	2.63	na	3.1
Th-228 (+D)	pCi/g	4.17	3.94	NA	NA	NA	NA	NA	4.27	3.94	3.18	na	3.2
U-238 (+D)	pCi/g	1.9	5.29	8.32	NA	2.51	2.68	NA	3.59	3.7	5.82	na	2.79
Ra-226 (+D)	pCi/g	1.74	5.4	8.08	NA	2.38	3.33	NA	4.04	4.12	8.63	na	2.66
U-235 (+D)	pCi/g	0.17	NA	0.506	NA	NA	NA	NA	ND	ND	0.561	na	NA

\* = Closed basin/unit  
RSL/PRG = USEPA Regional Screening Level / Preliminary Remediation Goal set at risk = 1E-06  
SRS Bkgd = *Background Soils Statistical Summary Report for Savannah River Site*, Appendix B-2 (max detect, all depths)  
PAB = P-Area Ash Basin  
RAB = R-Area Ash Basin  
DCPRB = D-Area Coal Pile Runoff Basin  
WADB = Wetland Area at Dunbarton Bay  
AAP = A-Area Ash Pile  
ACPRB = A-Area Coal Pile Runoff Basin  
HAB = H-Area Ash Basin  
KAB = K-Area Ash Basin  
LAB = L-Area Ash Basin  
FAL = F-Area Ash Landfill  
DABW = D-Area Ash Basin Wetlands  
na = not analyzed  
NA = not applicable  
ND = not detected

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**Table 2. Exposure Groups and Sampling Stations (RFI/RI/BRA DEXOU)**

Exposure Group	Media	Sampling Stations	Notes
488-DAB (Interior)	Soil	DAB-07 through -16, DAB-43 and DAB-44	Includes borings through waste, berm, and 488-D Pooled Basin.
488-DAB (Exterior)	Soil	DAB-17 through -24	
DRP	Soil	DRP-01 through -51	
Background	Soil	BGFA-01, BGFA-02	Background dataset for all soil exposure groups.
Background	Soil	BGCH-01, BGCH-02	For information only (See Section 4.3).
Background	Soil	BGUO-01, BGUO-02	For information only (See Section 4.3).
488-D Pooled Basin	SW	DAB-43 and DAB-44	Data group for surface water only. DAB-43 and DAB-44 sediment samples are evaluated as soil under 488-DAB (Interior).
488-D Drainage	SW/SED	DAB-39, -40, -45, -46	
Dead and Stressed Vegetation Area	SW/SED	DAB-27, -28, -41, -41R, -42	DAB-41: Sediment only.
488-D Wetland	SW/SED	DAB-31, DAB-33 through -38; DAB-50 through -62; and DAB-74, -75, and -76 and BGSM-01 and BGSM-02.	
DRP Stream Boundary	SW/SED	DRP-S2, -S3, and -S4; DAB-32	
DRP Stream Boundary Background	SW/SED	DRP-S1	For information only (See Section 4.3).
Background	SW/SED	SSBG-01, SSBG-02, SSBG-03	For use as background for all SW/SED exposure groups, including DRP.

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**Table 3. Data Summary Table for the DABW Human Health Refined Constituents of Concern (0-1 ft)**

HH RCOC	Units	Samples	ND	Det	J- Qual	Dist	UCL Method	Mean	95%UCL	Max	Min	RME	Max Loc
Arsenic	mg/kg	25	1	24	9	2	95%UCL-N	28.4	40.7	152	0.321	40.7	DAB-60
Potassium-40	pCi/g	25	0	25	2	2	95%UCL-N	14.8	17.5	26.1	2.73	17.5	DAB-52
<i>Thorium-232</i>	pCi/g	25	0	25	5	3	95%UCL-N	1.48	1.7	2.58	0.567	1.7	DAB-38
Radium-228	pCi/g	25	3	22	5	1	95%UCL-T	1.65	2.03	3.1	0.9	2.03	DAB-38
Thorium-228	pCi/g	25	0	25	4	1	95%UCL-T	1.66	2.09	3.17	0.56	2.09	DAB-52
Thallium-208	pCi/g	16	0	16	0	2	95%UCL-N	0.586	0.678	0.836	0.281	0.678	DAB-75
<i>Uranium-238</i>	pCi/g	25	6	19	2	2	95%UCL-N	1.39	1.74	2.79	0.53	1.74	DAB-60
Radium-226	pCi/g	25	0	25	1	2	95%UCL-N	1.64	1.9	2.66	0.54	1.9	DAB-54
Bismuth-214	pCi/g	16	0	16	0	2	95%UCL-N	1.95	2.27	2.66	0.797	2.27	DAB-54

HH RCOCs = As, K40, Ra228, Th228, Tl208, Ra226, Bi214. Th232 and U238 (in italics) shown for Th and U series data comparison.

Data Summary Table populated from RFI/RI/BRA for the DEXOU, Table 4.2-12, p. 4-242 and Table 5.1-11, p. 5-38

1 - Log-normal distribution per Shapiro-Wilkes W test.

2 - The distribution was indeterminant per the Shapiro-Wilkes W test. It was assumed as normal for determination of EPC.

3 - Normal distribution per the Shapiro-Wilkes W test.

ND = non-detect, DET = Detected, J-Qual = "J-Qualified (estimated), UCL = Upper Confidence Limit, Qual. of Max = Qualifier of Maximum

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**Table 4. Human Health Risk Recalculation Using Current RSLs/PRGs**

HH RCOC <sup>1</sup>	EPC <sup>2</sup> (mg/kg or pCi/g)	Resident RSL/PRG <sup>3</sup>	Industrial RSL/PRG <sup>3</sup>	IOU Onsite Worker RSL/PRG <sup>3</sup>	Residential Risk Estimate <sup>4</sup>	Industrial Risk Estimate <sup>4</sup>	IOU Onsite Worker Risk Estimate <sup>4</sup>
As	4.07E+01	6.80E-01	3.00E+00	6.24E+00	5.99E-05	1.36E-05	6.52E-06
K40	1.75E+01	1.44E-01	2.19E-01	4.56E-01	1.22E-04	7.99E-05	3.84E-05
Th232 (Th228)	2.09E+00	9.85E-03	1.53E-02	3.18E-02	2.12E-04	1.37E-04	6.57E-05
U238 (Bi214)	2.27E+00	1.25E-02	2.00E-02	4.16E-02	1.82E-04	1.14E-04	5.46E-05
Total Cumulative Risk =					5.75E-04	3.44E-04	1.65E-04

1 - HH RCOCs = As, K40, Ra228, Th228, Tl208, Ra226, Bi214. For radionuclides within a decay chain (i.e., thorium-232 and uranium-238) the most conservative EPC (highest activity) within each series is used to estimate the risk. Risk is calculated using the parent PRG for the entire series. For the thorium-232 series, the thorium-228 EPC was used; for the uranium-238 series, the bismuth-214 EPC was used.

2 - EPC = reasonable maximum exposure (RME) exposure point concentration (EPC) from Table 3.

3 - RSLs for nonradiological constituents obtained from the USEPA Regional Screening Levels website (November 2023). PRGs for radiological constituents obtained from the Preliminary Remedial Goals website (February 2024).

4 - Risk estimate =  $(EPC/[RSL \text{ or } PRG]) \times 1E-06$

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**Table 5. Summary of Ash Related Constituents in Shallow D-Area Groundwater Operable Unit Wells**

Sampling Event	Arsenic			Barium			Beryllium			Uranium		
	Detects/Samples	Max	# Above MCL <sup>A</sup>	Detects/Samples	Max	# Above MCL <sup>A</sup>	# of Samples	Max	# Above MCL <sup>A</sup>	# of Samples	Max	# Above MCL <sup>A</sup>
2023	5/8	58 <sup>B</sup>	1	8/8	103	0	7/8	10 <sup>B</sup>	1	-	-	-
2022	2/7	7.77	0	7/7	125	0	4/7	2.07	0	-	-	-
2021	5/10	27.9 <sup>B</sup>	1	10/10	127	0	2/10	1.11	0	-	-	-
2020	4/7	6.77	0	7/7	81.2	0	5/7	0.714	0	-	-	-
2019	4/6	6.47	0	6/6	47.4	0	6/6	0.946	0	0/6	-	-
2018	5/6	7.5	0	6/6	109	0	5/6	3.04	0	2/6	0.185	0
2017	4/5	5.97	0	5/5	142	0	5/5	1.54	0	-	-	-
2016	6/8	7.92	0	8/8	185	0	5/8	2.75	0	1/8	2.92	0
2015	4/7	5.97	0	7/7	68	0	5/7	0.944	0	0/7	-	-
2014	3/6	3.9	0	6/6	140	0	5/6	0.68	0	-	-	-
2013	2/5	6.2	0	5/5	82.8	0	5/5	0.896	0	-	-	-
2012	4/4	7.63	0	4/4	156	0	4/4	1.29	0	0/3	-	-
2011	2/6	6.4	0	6/6	92.8	0	4/6	0.66	0	-	-	-
2010	3/7	9.3	0	7/7	118	0	2/7	0.45	0	-	-	-
2009	3/7	5.8	0	7/7	90	0	7/7	1.6	0	1/7	0.327	0
2008	0/6	-	-	6/6	135	0	2/6	1.87	0	0/6	-	-
2007	2/7	16.2	1	7/7	131	0	6/7	2	0	-	-	-
2006	3/7	10.1	1	7/7	195	0	7/7	1	0	-	-	-
2005	2/5	10.7	1	5/5	81.9	0	3/5	2.1	0	0/5	-	-
2004	3/5	13.9	1	5/5	87.9	0	2/5	5	1	-	-	-
2003	2/6	7.29	0	6/6	67	0	12/12	3.48	0	-	-	-

Red shaded results exceed the MCL

A - November 2023 USEPA MCLs; Arsenic - 10 ug/L, Barium - 2,000 ug/L, Beryllium - 4 ug/L, Uranium - 30 ug/L

B - Sample had high turbidity (>140 NTU)

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**Table 6. Most Likely Cleanup Levels for DABW**

Unit (media)	RCOC	Units	ARAR	CM	HH Residential <sup>1</sup>	HH Industrial <sup>1</sup>	HH IOU Worker <sup>1</sup>	ERA	PTSM	Most Restrictive Cleanup Level	SRS Background Maximum <sup>2</sup>	SRS Background 95 <sup>th</sup> Percentile	Most Likely Cleanup Level <sup>3</sup>
DABW (ash)	Arsenic	mg/kg	---	---	0.68	3.0	6.24	---	---	0.68	22.9	8.2	8.2
	Potassium-40	pCi/g	---	---	0.144	0.219	0.446	---	---	0.144	8.53	3.3	3.3
	Thorium-232	pCi/g	---	---	0.00985	0.0153	0.0318	---	---	0.00985	2.79	1.94	1.94
	Uranium-238	pCi/g	---	---	0.0125	0.020	0.0416	---	---	0.0125	1.9	1.22	1.22

<sup>1</sup> Resident, Industrial Worker and IOU Onsite Worker 1E-06 RSL or PRG from Appendix D, Table D.1.

<sup>2</sup> SRS Background concentrations from the *Background Soils Statistical Summary Report for the Savannah River Site* (ERD-EN-2005-0223) (WSRC 2006).

<sup>3</sup> Most likely cleanup level is the lesser of the risk-based levels and SRS 95<sup>th</sup> percentile background concentration. Source of the most likely cleanup level is identified in italics.

**Table 7. Record of Core Team Agreements**

<b>Record of Key Agreements<sup>2</sup></b>	
<b>Date</b>	<b>Description of Agreement</b>
4/19/2022	The Core Team agreed on a preferred remedial strategy for remaining coal/ash operable units including the D-Area Ash Basin Wetlands, and an administrative strategy.
7/8/2024	The Core Team is in agreement with the problems warranting action and the strategy to verify the conclusions of the DEXOU RI/BRA for the DABW through implementation of the most current technical protocols.
7/8/2024	The Core Team is in agreement to evaluate No Action, LUCs, and Excavation and Disposal in the Focused CMS/FS.

<sup>2</sup> Core team agreements will be documented at each scoping phase and should be retained for each successive phase to maintain a comprehensive list for the life of the project.

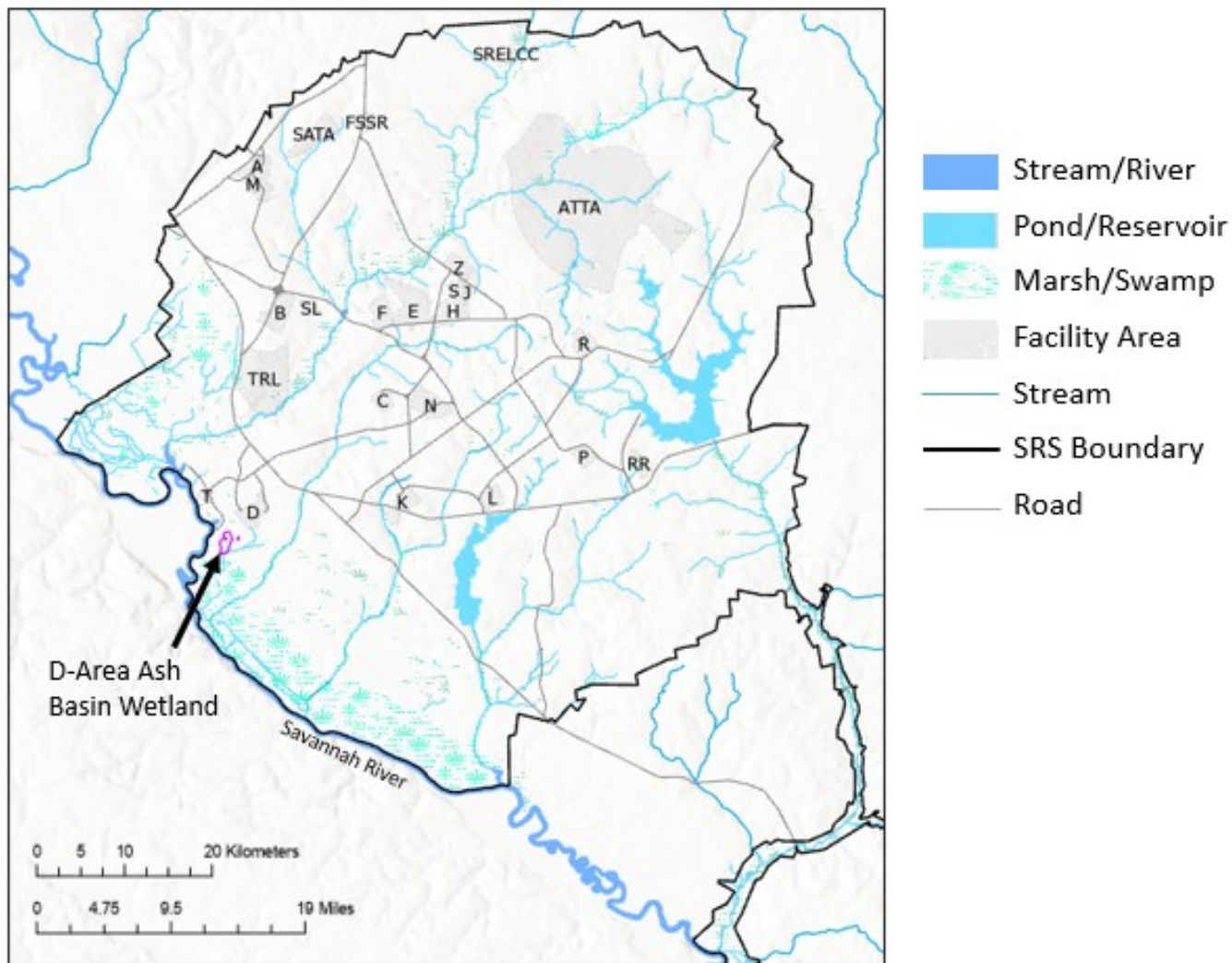


Figure 1. Location of the D-Area Ash Basin Wetlands

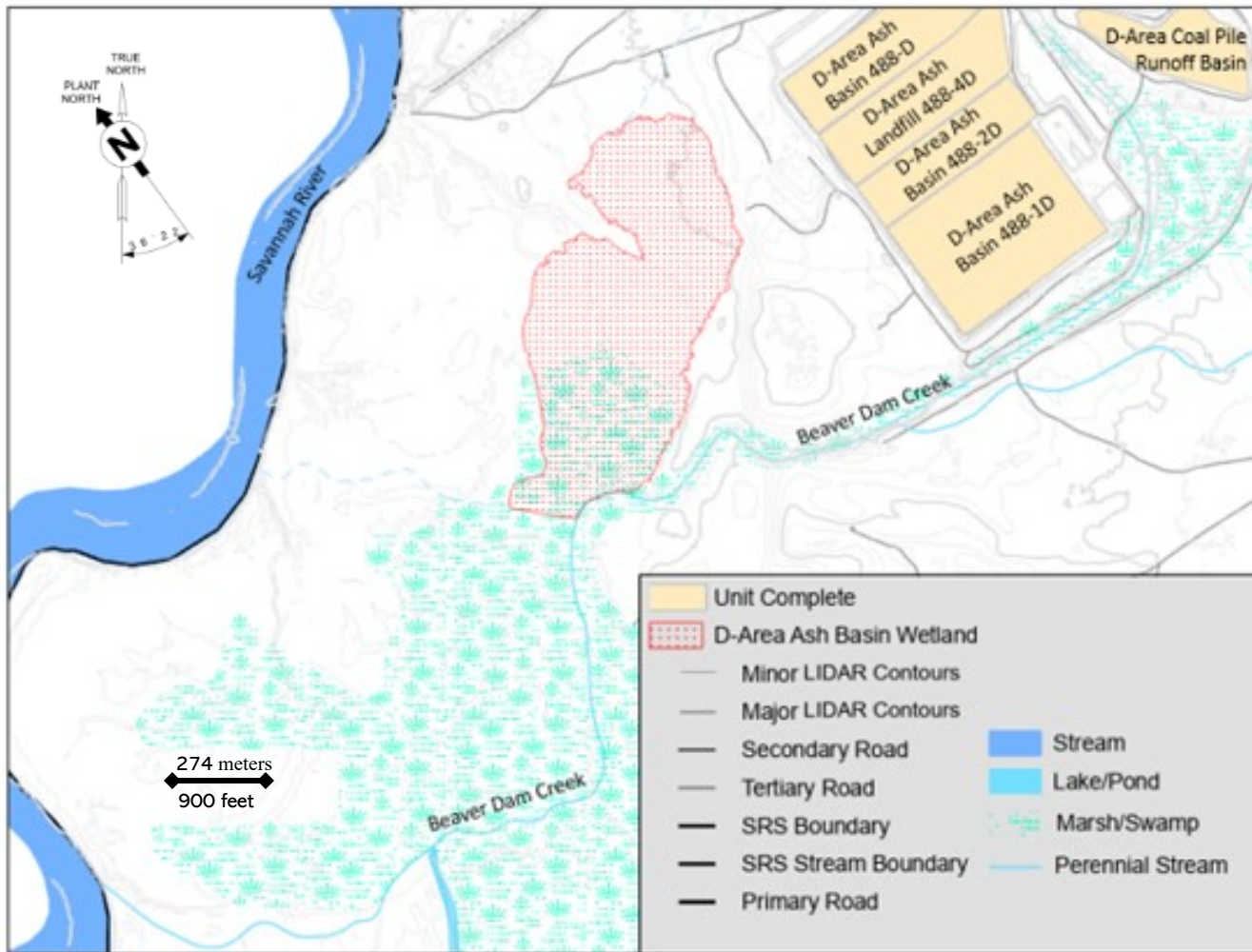


Figure 2. D-Area Ash Basin Wetlands

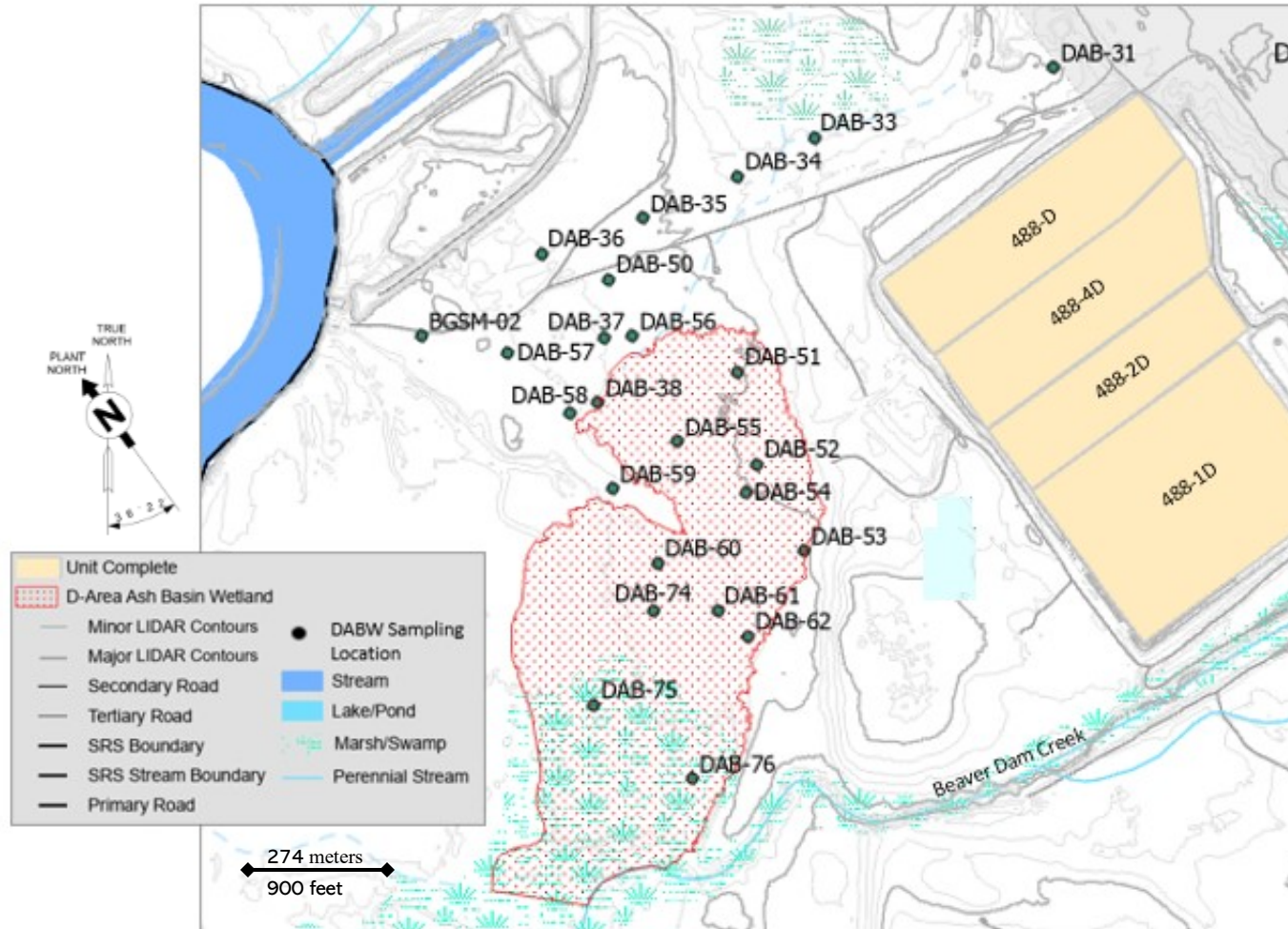


Figure 3. D-Area Ash Basin Wetlands Sampling Locations

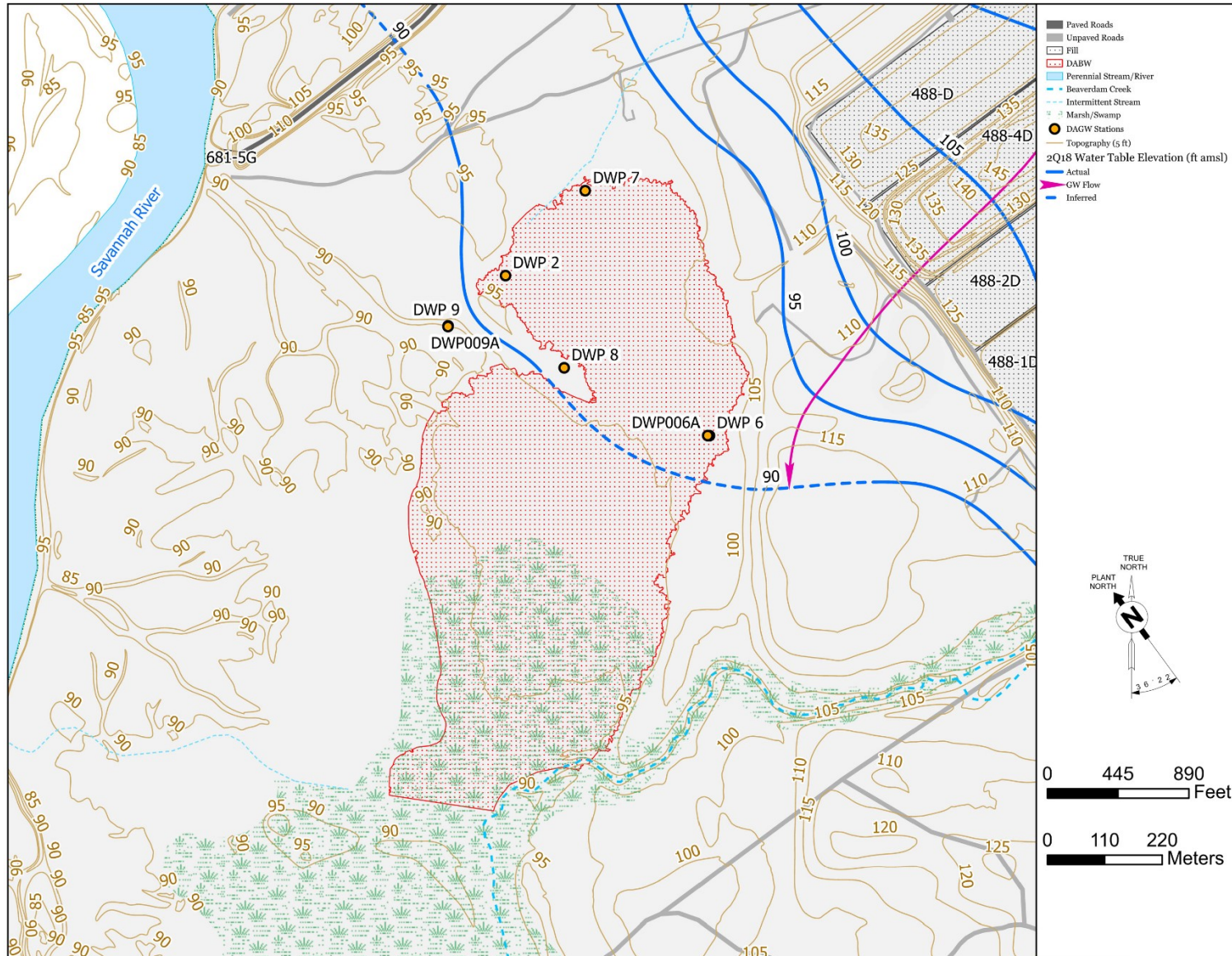


Figure 4. D-Area Ash Basin Wetlands Topography and Water Table Contours

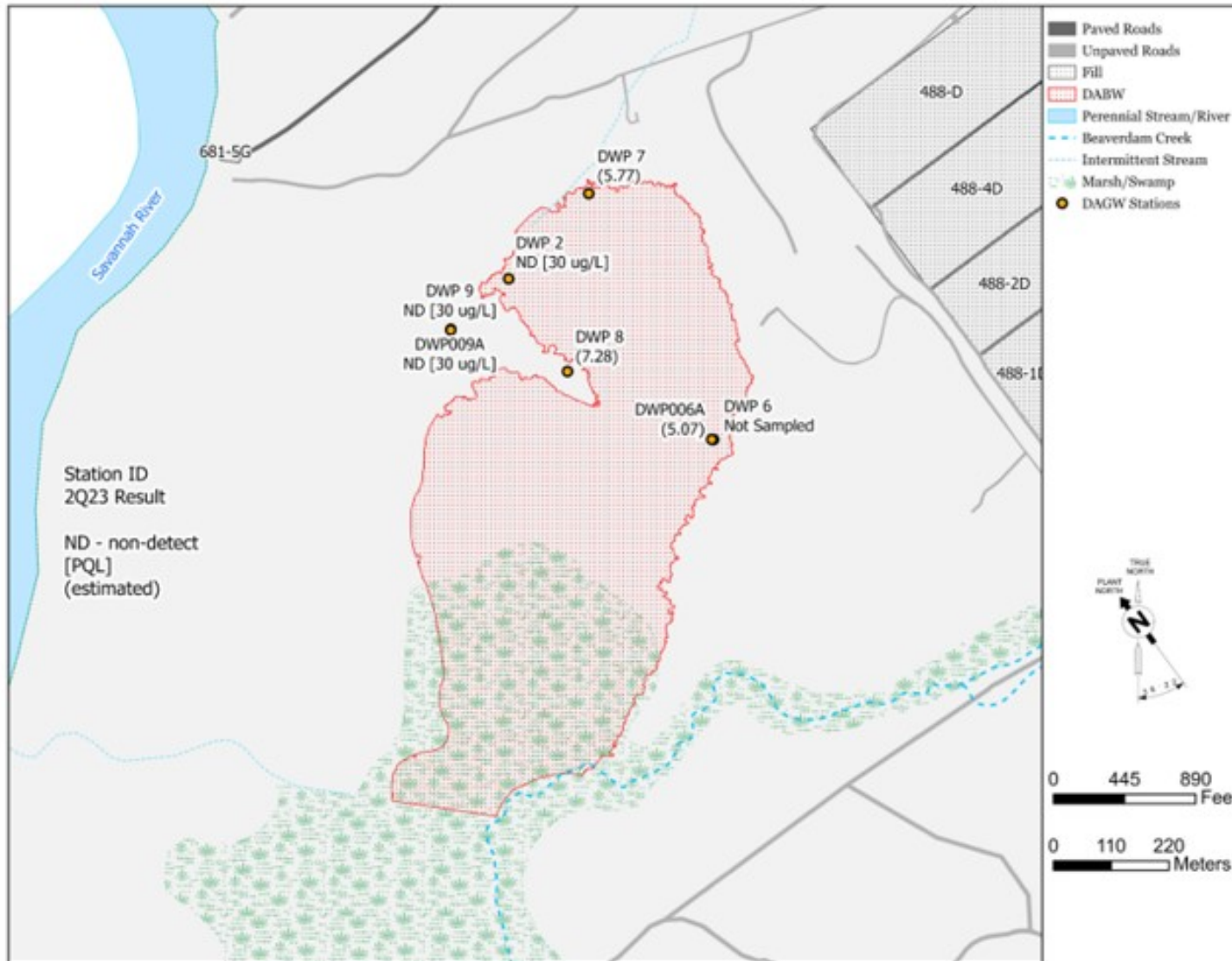


Figure 5. D-Area Ash Basin Wetlands Arsenic Results for Groundwater (2Q23)

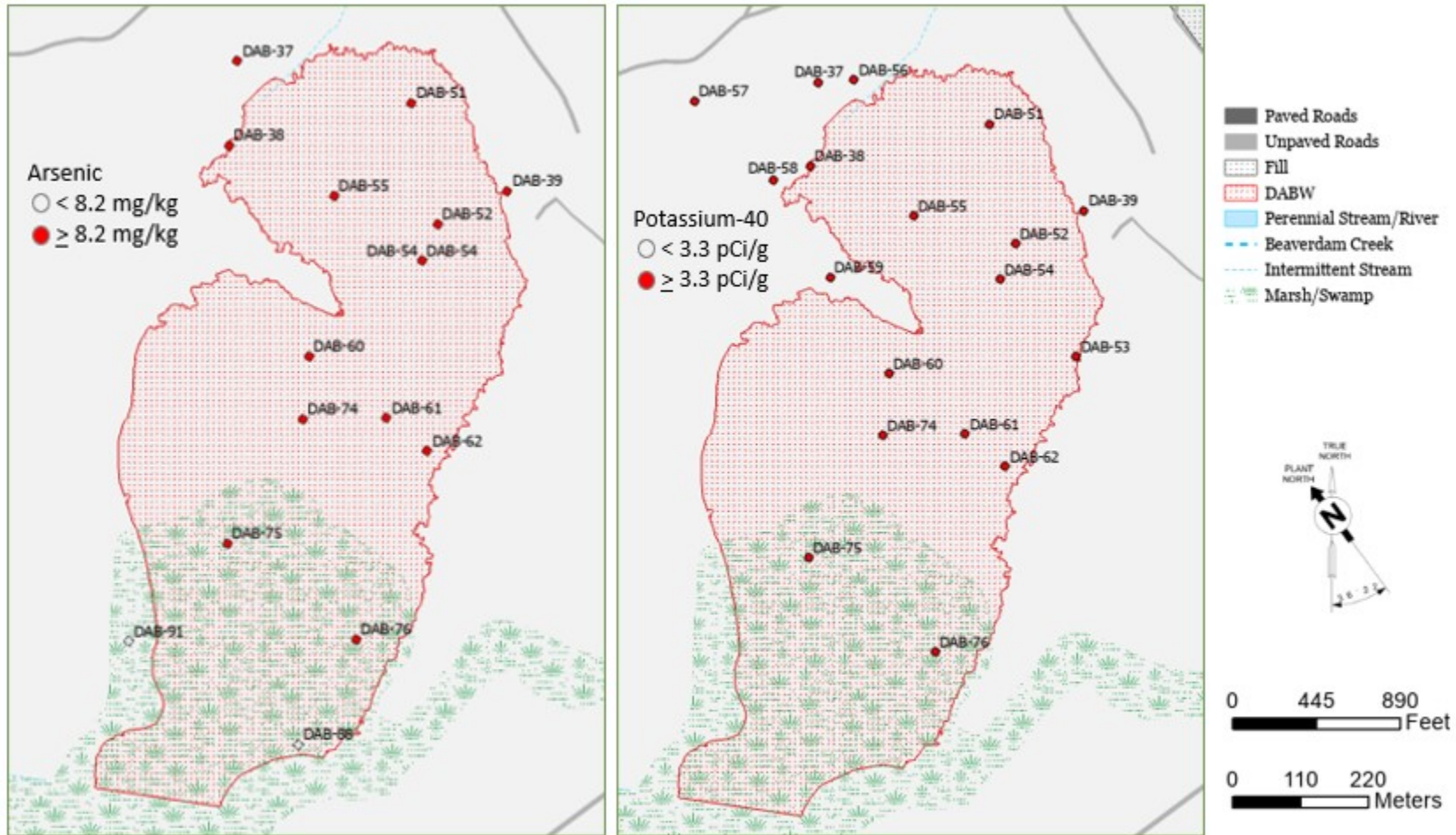


Figure 6. Arsenic and Potassium-40 Levels in Sediment/Soil within the 0-1' and 0-4' Depth Interval

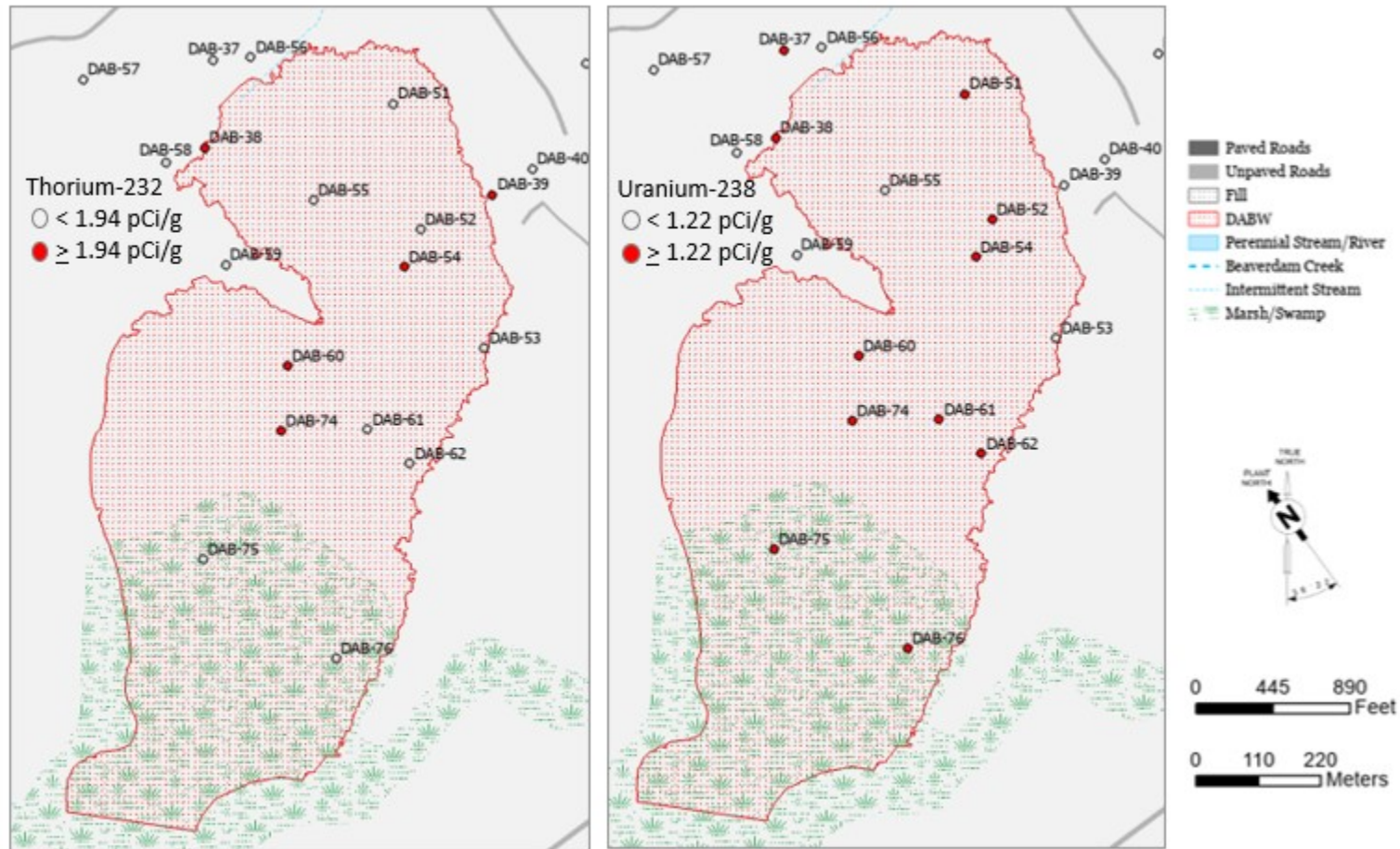
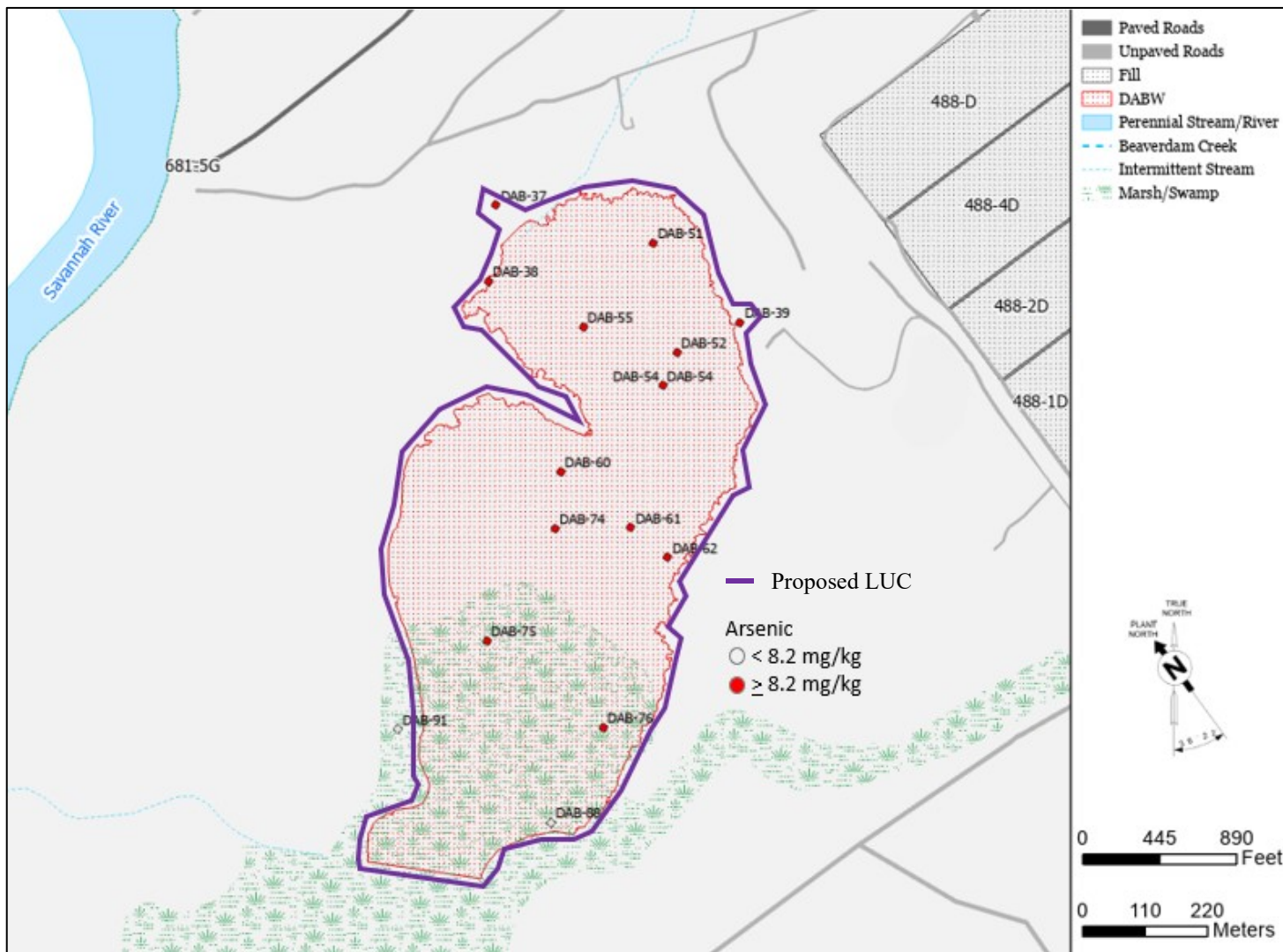


Figure 7. Thorium-232 and Uranium-238 Levels in Sediment/Soil within the 0-1' and 0-4' Depth Interval



**Figure 8. Proposed LUC Boundary Based on Ash Extent (represented by As and background cleanup level of 8.2 mg/kg)**

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