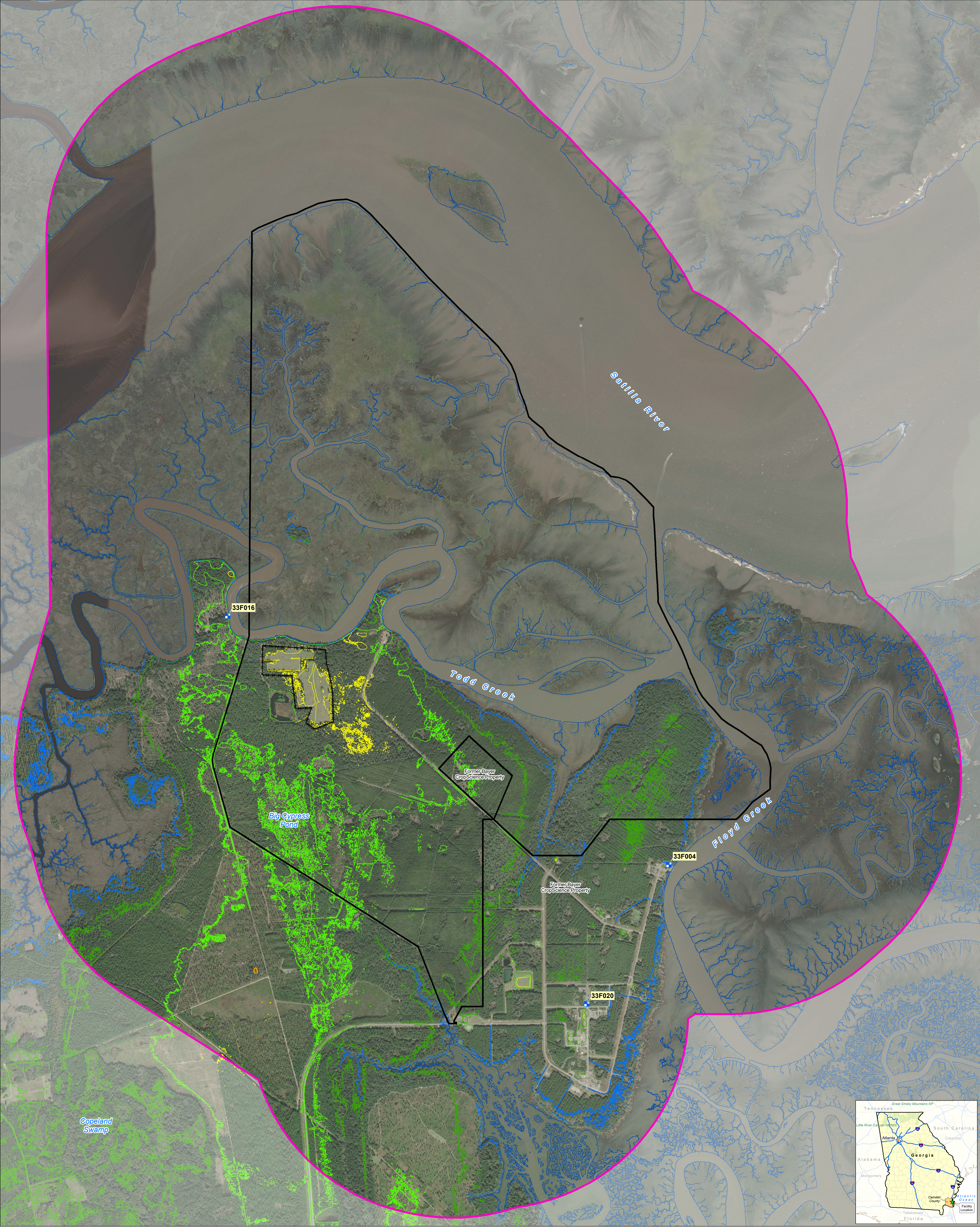


Figures



LEGEND

- Withdrawal Wells
- Closed Landfill Boundary/Fence
- Property Boundary
- One Mile From Property

Topographic Contours (feet NAVD83)

- 0
- 6
- 12
- 18
- 24
- 30
- 36

Notes:

1. ESRI Aerial from ArcGIS Online, Dated 1/21/2020
2. Property boundary based on survey completed September 21, 2017 by Geomatics Corporation.
3. Withdrawal well locations and information obtained from USGS NWIS Mapper and Bayer.
4. Topographic contour data source: 2010 Coastal Georgia Elevation Project Lidar Data

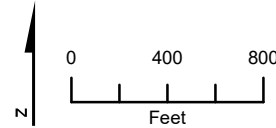
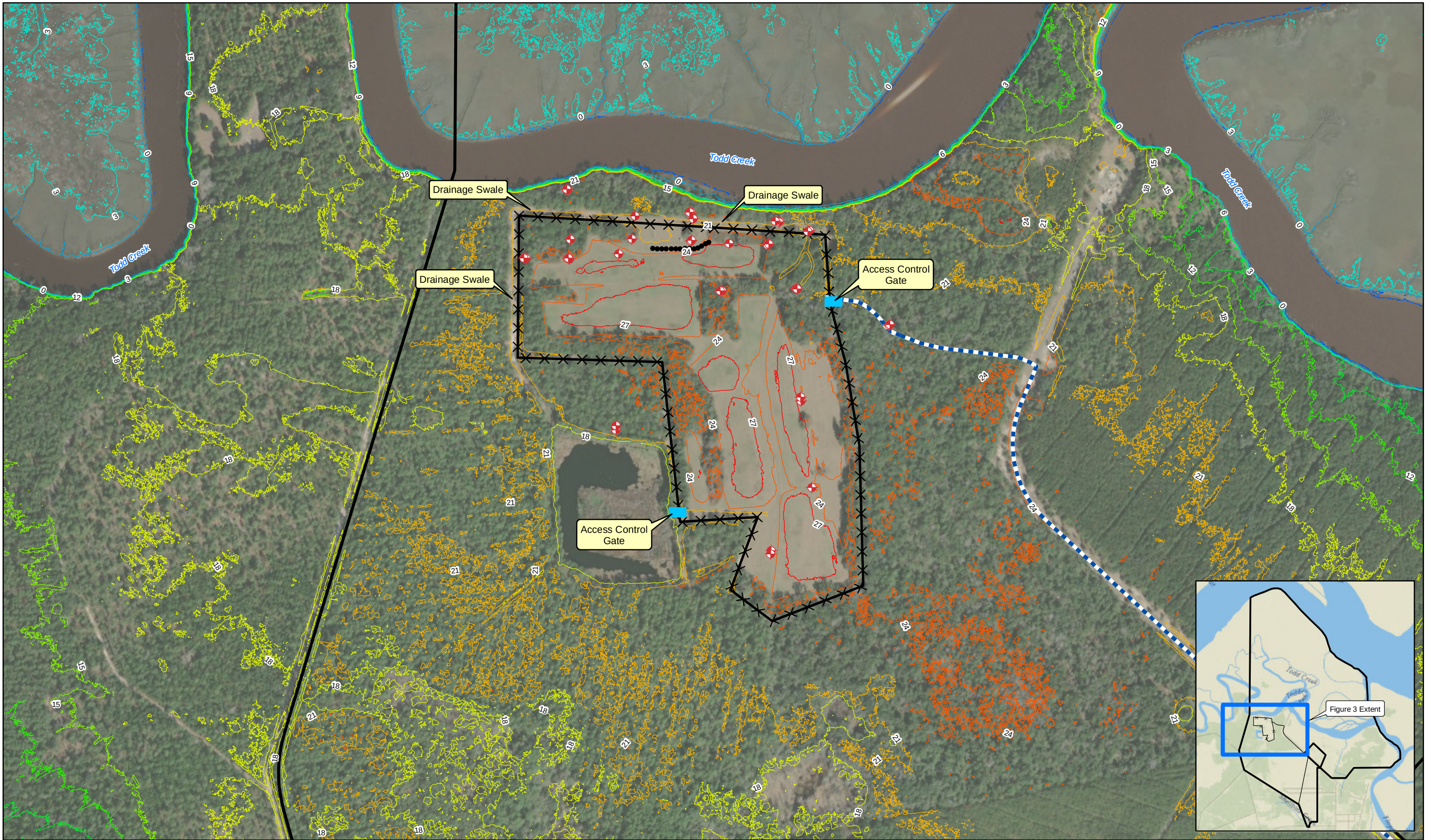


Figure 1. Facility Location Map
Permit Renewal Application
Union Carbide Corporation
UCC Woodbine, Camden County, Georgia



Figure 2. Site Features
Permit Renewal Application
Union Carbide Corporation
UCC Woodbine, Camden County, Georgia



LEGEND

● Oxygen Diffusion Well	✕ Closed Landfill	Topographic Contours (feet NAVD88)	6	18
◆ Monitoring Well	▭ Property Boundary	-3	9	21
■ Landfill Access Route		0	12	24
		3	15	27

Notes:
 1. ESRI Aerial from ArcGIS Online, Dated 1/21/2020
 2. Topographic contour data source: 2010 Coastal Georgia Elevation Project Lidar Data

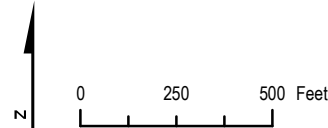
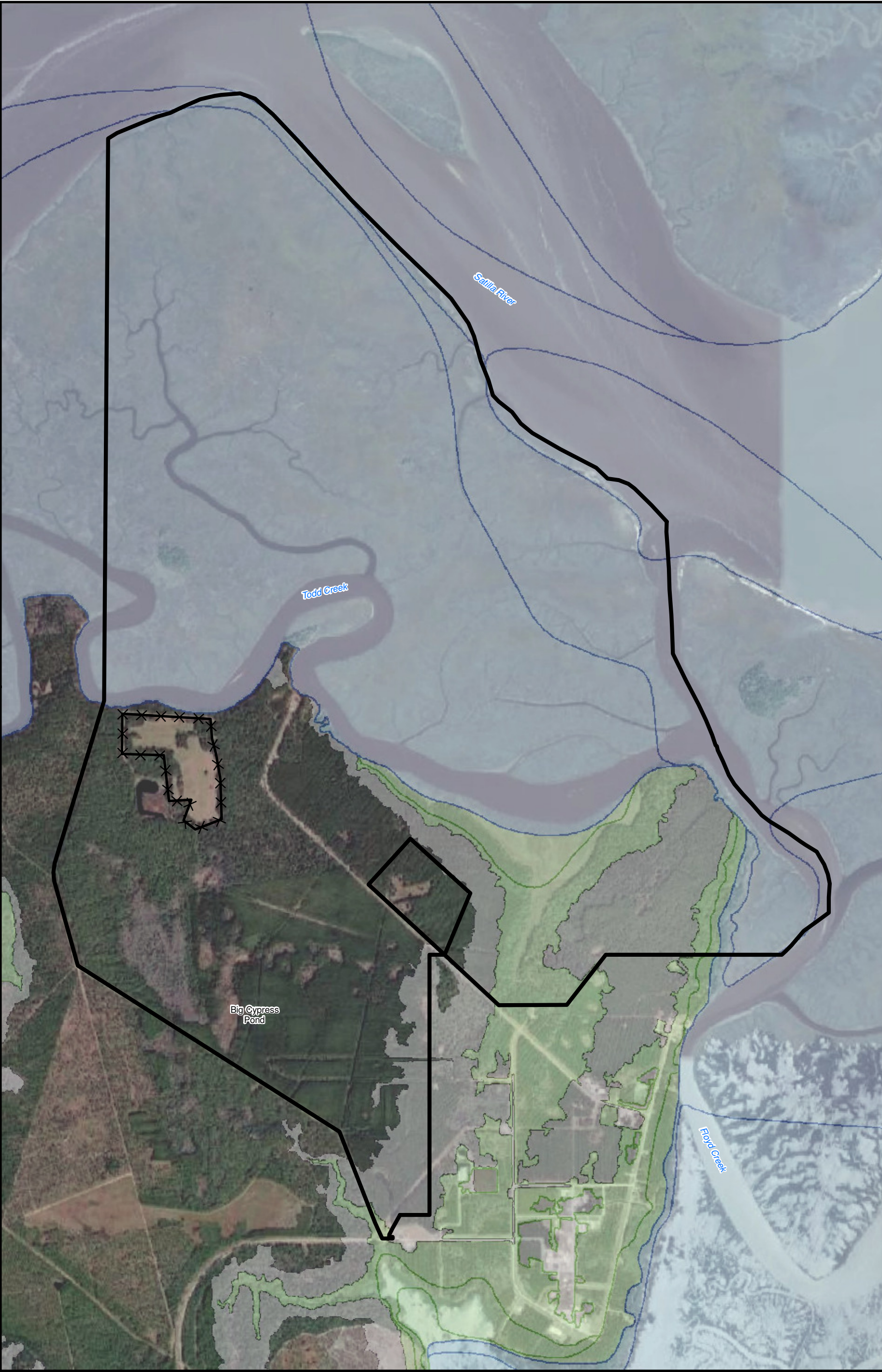


Figure 3. Landfill (SWMU 1) Topographic Map
 Union Carbide Corporation
 UCC Woodbine, Camden County, Georgia



- | | |
|---|--|
|  Zone A / Zone AE: A Special Flood Hazard Area. Areas subject to inundation by the 1-percent-annual-chance flood event. |  Zone X Shaded: 0.2 % Annual Chance |
|  Zone VE: The Special Flood Hazard Area subject to coastal high hazard flooding. Areas subject to inundation by the 1-percent-annual-chance flood event with additional hazards due to storm-induced velocity wave action. |  Zone X Unshaded: Minimal Chance. |
| |  Closed Landfill |
| |  Property Boundary |

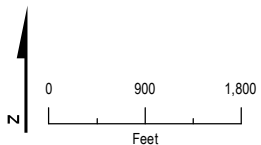
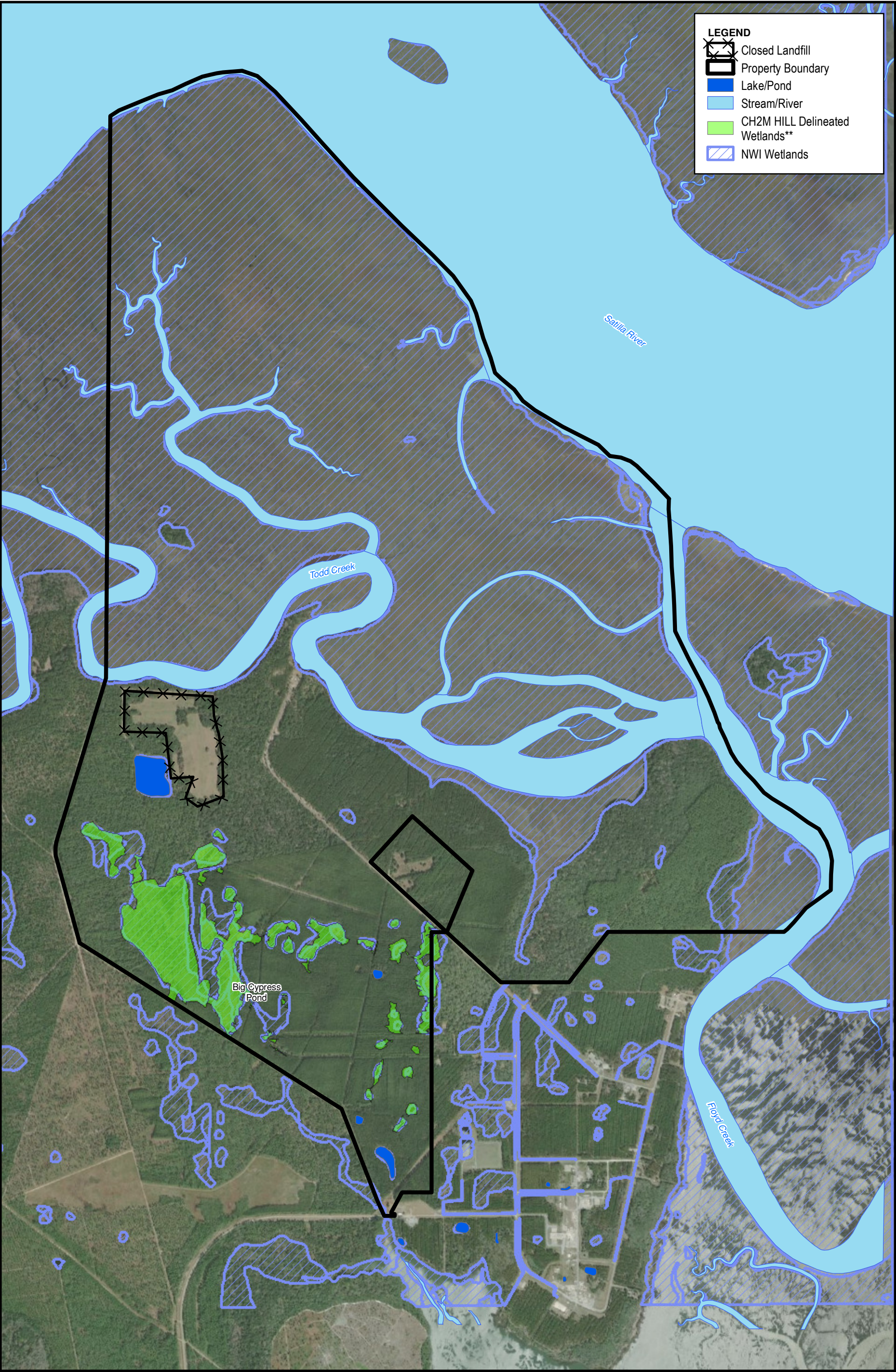
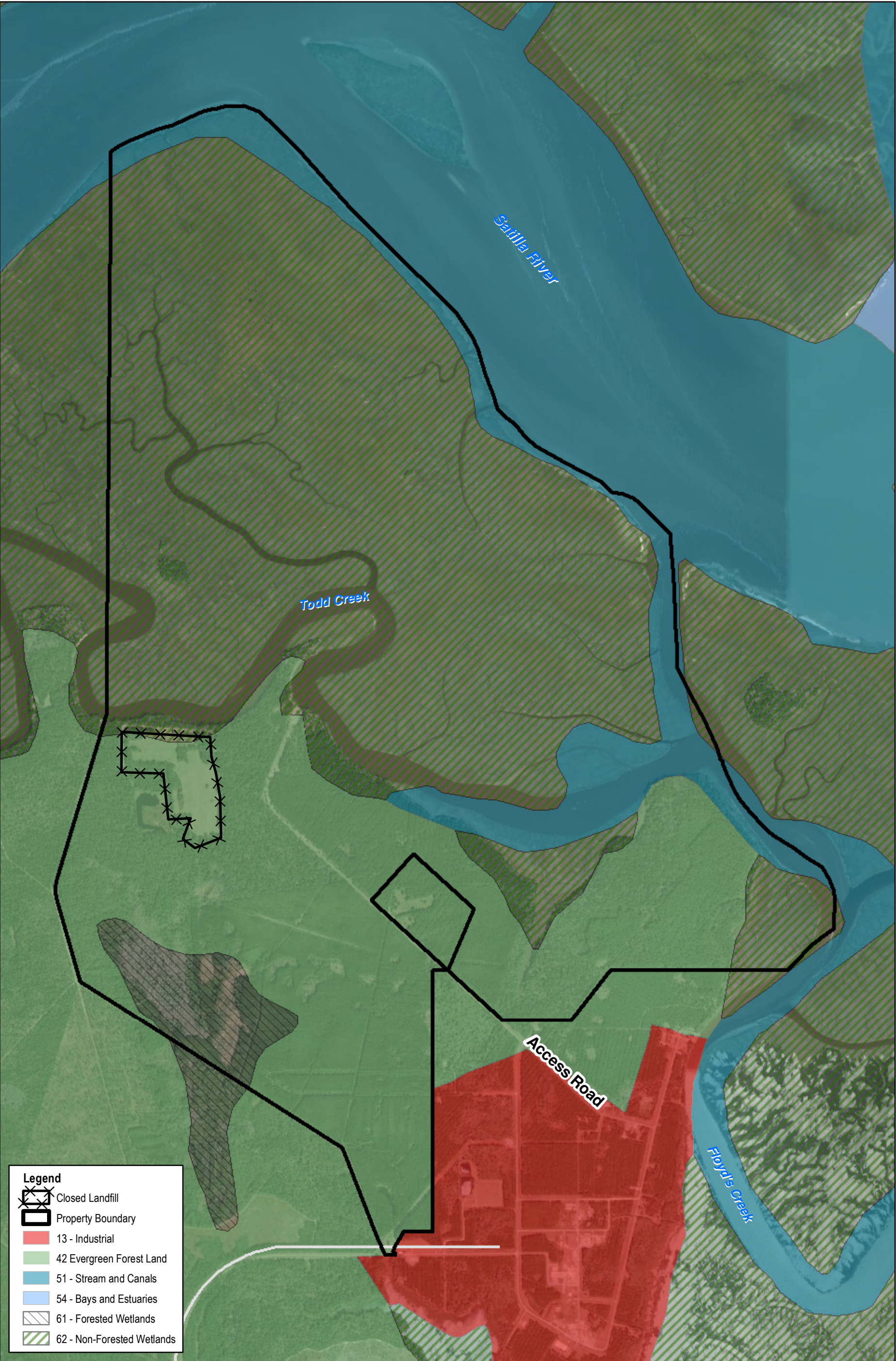


Figure 4. 100 Year Flood Plain
Permit Renewal Application
Union Carbide Coporation
UCC-Woodbine, Camden County, Georgia



Notes:
*Wetlands Source: National Wetlands Inventory
US Fish and Wildlife Service
**CH2M Hill delineated wetlands in August 2011.
ESRI Aerial from ArcGIS Online, Dated 1/21/2020

Figure 5. Surface Waters
Permit Renewal Application
Union Carbide Corporation
UCC-Woodbine, Camden County, Georgia



Notes:
*Land Use and Land Coverage Source: (USGS)
United States Geological Survey,
Available Online at <http://www.webgis.com/lulcdata.html>
Accessed 11/18/2020, modified based on site knowledge.
ESRI Aerial from ArcGIS Online, Dated 1/21/2020

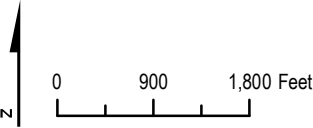
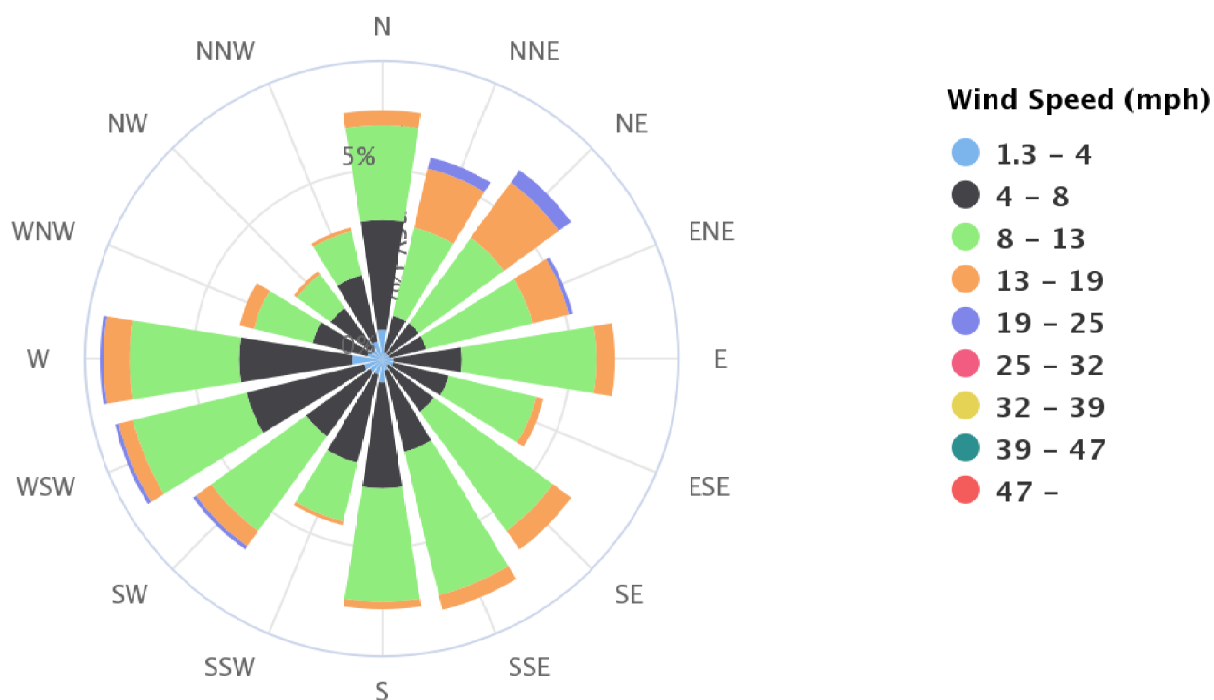


Figure 6. Surrounding Land Use
Permit Renewal Application
Union Carbide Corporation
UCC-Woodbine, Camden County, Georgia

BRUNSWICK MALCOLM MCKINNON AP (GA) Wind Rose

Oct. 20, 2010 – Oct. 20, 2020
Sub-Interval: Jan. 1 – Dec. 31, 0 – 23



Average Wind Speeds per Sector			
Latitude	31.1522	Longitude	-81.3908
Elevation	16 ft.	Element	Mean Wind Speed
	mph		mph
N	7.7	S	7.6
NNE	11.5	SSW	7.2
NE	11.7	SW	8.6
ENE	10.3	WSW	7.9
E	8.9	W	8.1
ESE	8.5	WNW	8.1
SE	9.3	NW	7.2
SSE	8.5	NNW	6.9
OVERALL AVG			7.8
10 Years of Records		85,152 Observations	

Notes:

Location: Brunswick Malcolm McKinnon Airport, Georgia
Reference: National Oceanic and Atmospheric Administration;
Wind Energy Resource Information

Figure 7. Wind Rose
Union Carbide Corporation, Woodbine, GA

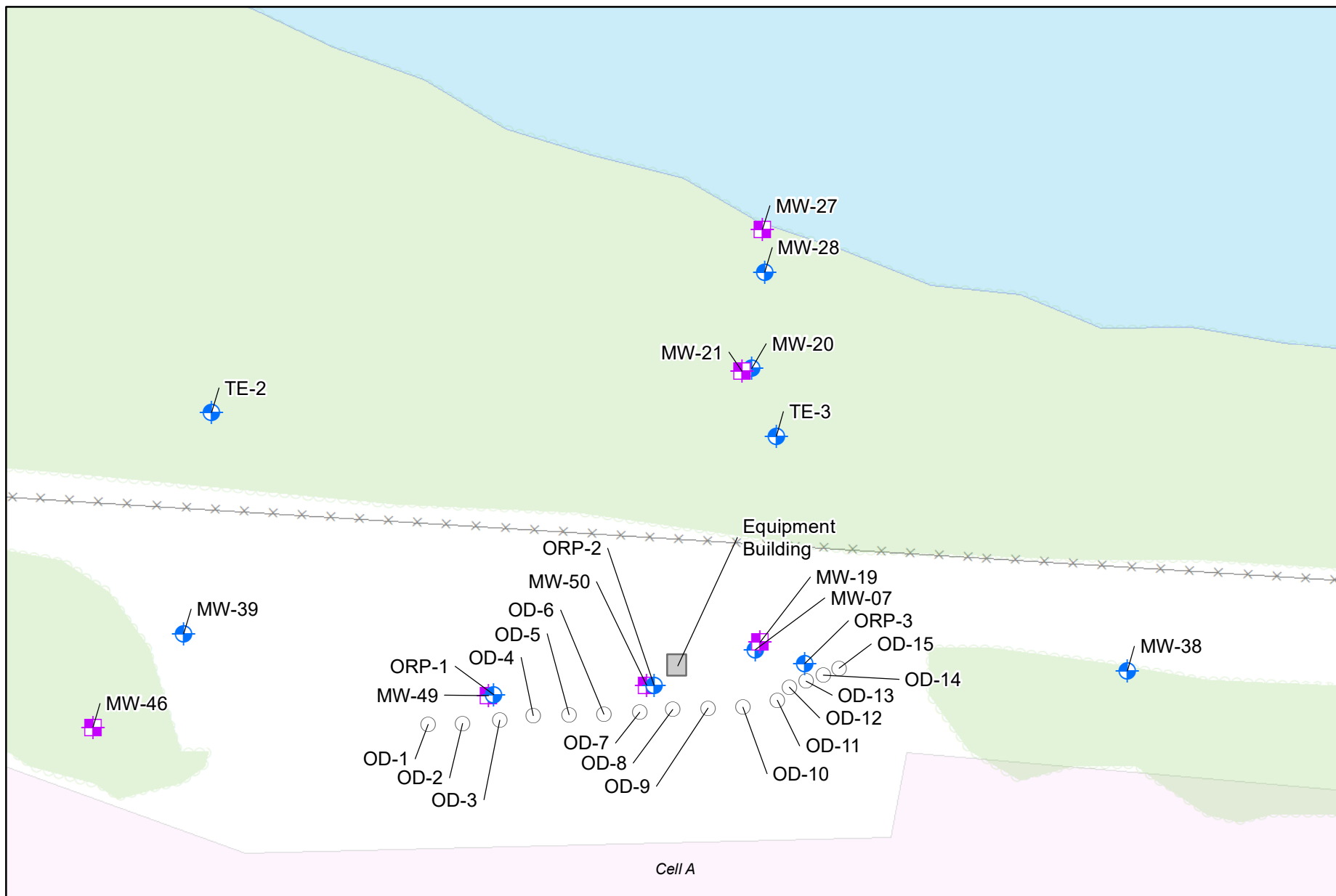
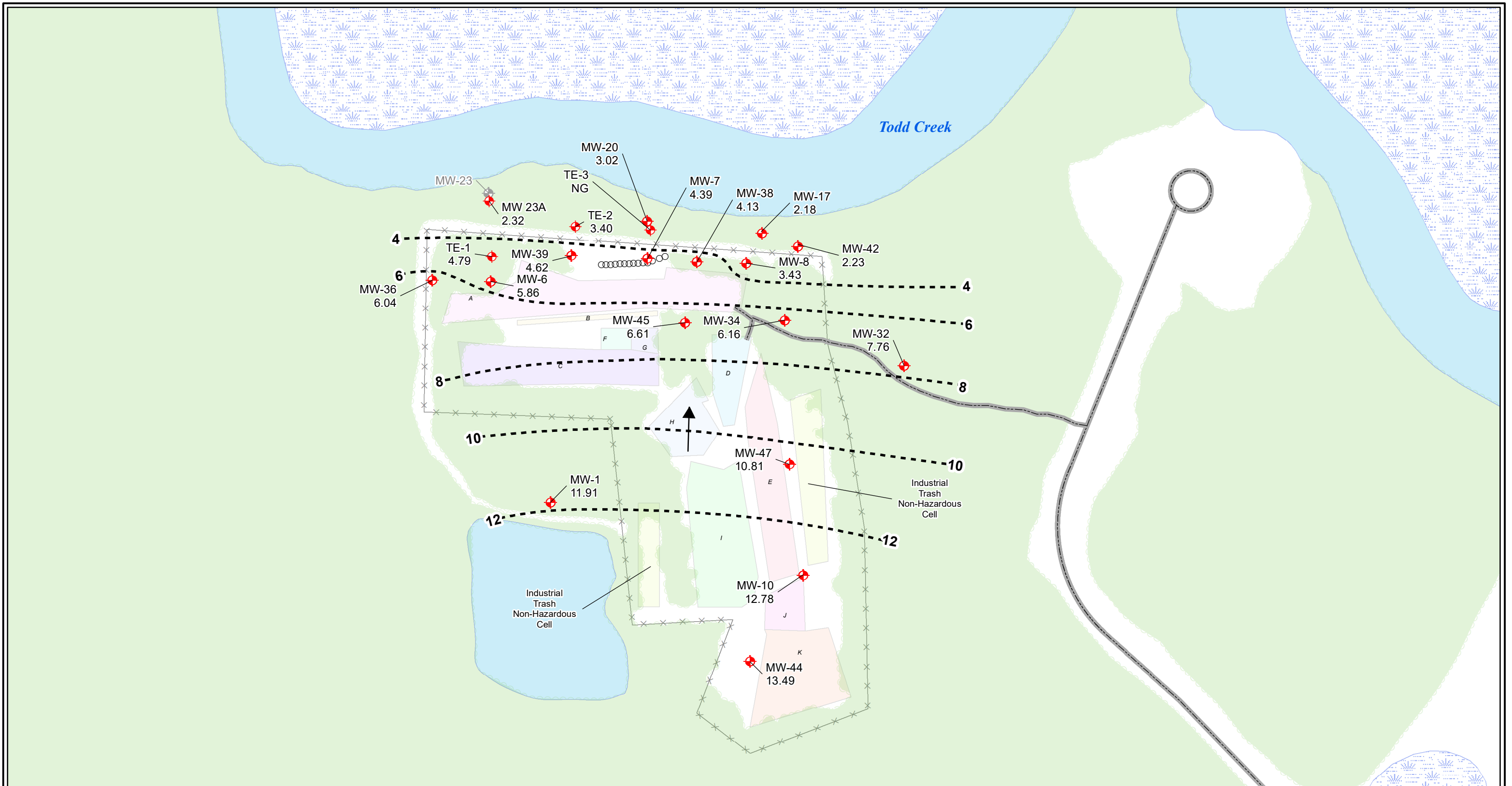


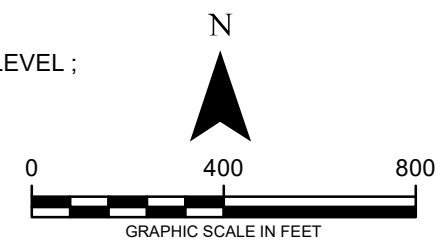
Figure 8. iSOC System Layout
 Union Carbide Corporation
 UCC Woodbine, Camden County, Georgia



Legend

- Shallow Monitoring Well
- Abandoned Monitoring Well
- Oxygen Diffusion Well
- Groundwater Surface Contour
- Apparent Groundwater Flow Direction
- Fence
- Road
- Water
- Swamp/Marsh
- Treeline
- Cell A
- Cell B
- Cell C
- Cell D
- Cell E
- Cell F
- Cell G
- Cell H
- Cell I
- Cell J
- Cell K
- Industrial Trash Non-Hazardous Cell

NOTES:
 1. GROUNDWATER ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL ;
 MEASURED SEPTEMBER 26, 2022
 2. NG = NOT GAUGED



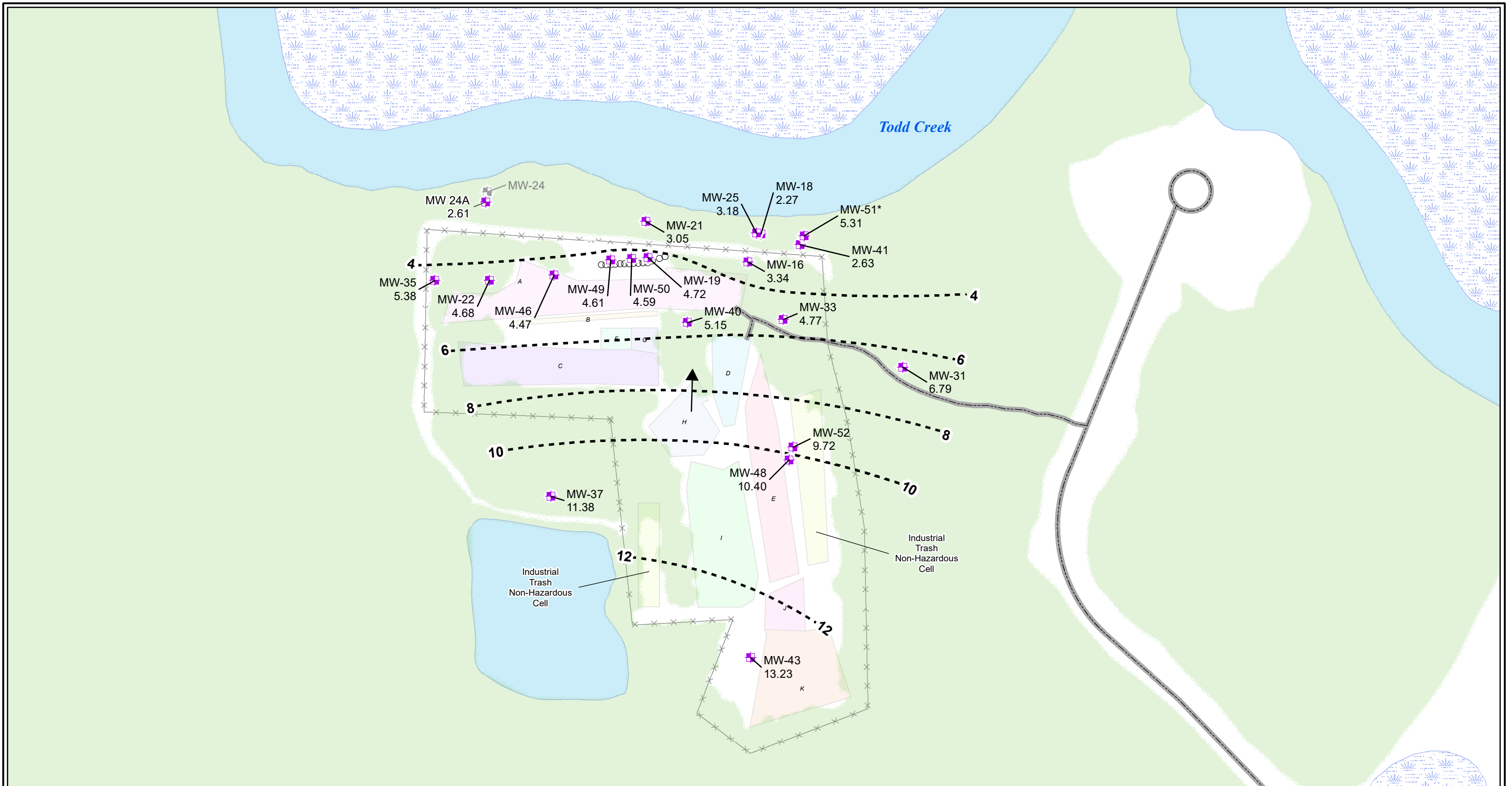
Union Carbide Corporation
Woodbine, Georgia

POTENTIOMETRIC SURFACE MAP SHALLOW MONITORING WELLS SEPTEMBER 26, 2022



FIGURE

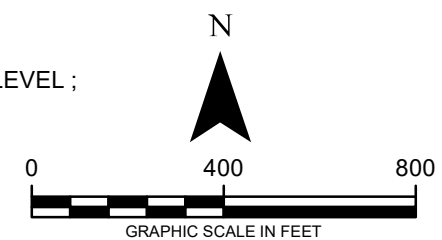
9



Legend

- | | | |
|--|---|---|
| <ul style="list-style-type: none"> Deep Monitoring Well Abandoned Monitoring Well Oxygen Diffusion Well Groundwater Surface Contour Apparent Groundwater Flow Direction | <ul style="list-style-type: none"> Fence Road Water Swamp/Marsh Treeline | <ul style="list-style-type: none"> Cell A Cell B Cell C Cell D Cell E Cell F Cell G Cell H Cell I Cell J Cell K Industrial Trash Non-Hazardous Cell |
|--|---|---|

NOTES :
 1. * = WELLS NOT USED FOR CONTOURING.
 2. GROUNDWATER ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL ;
 MEASURED SEPTEMBER 26, 2022.



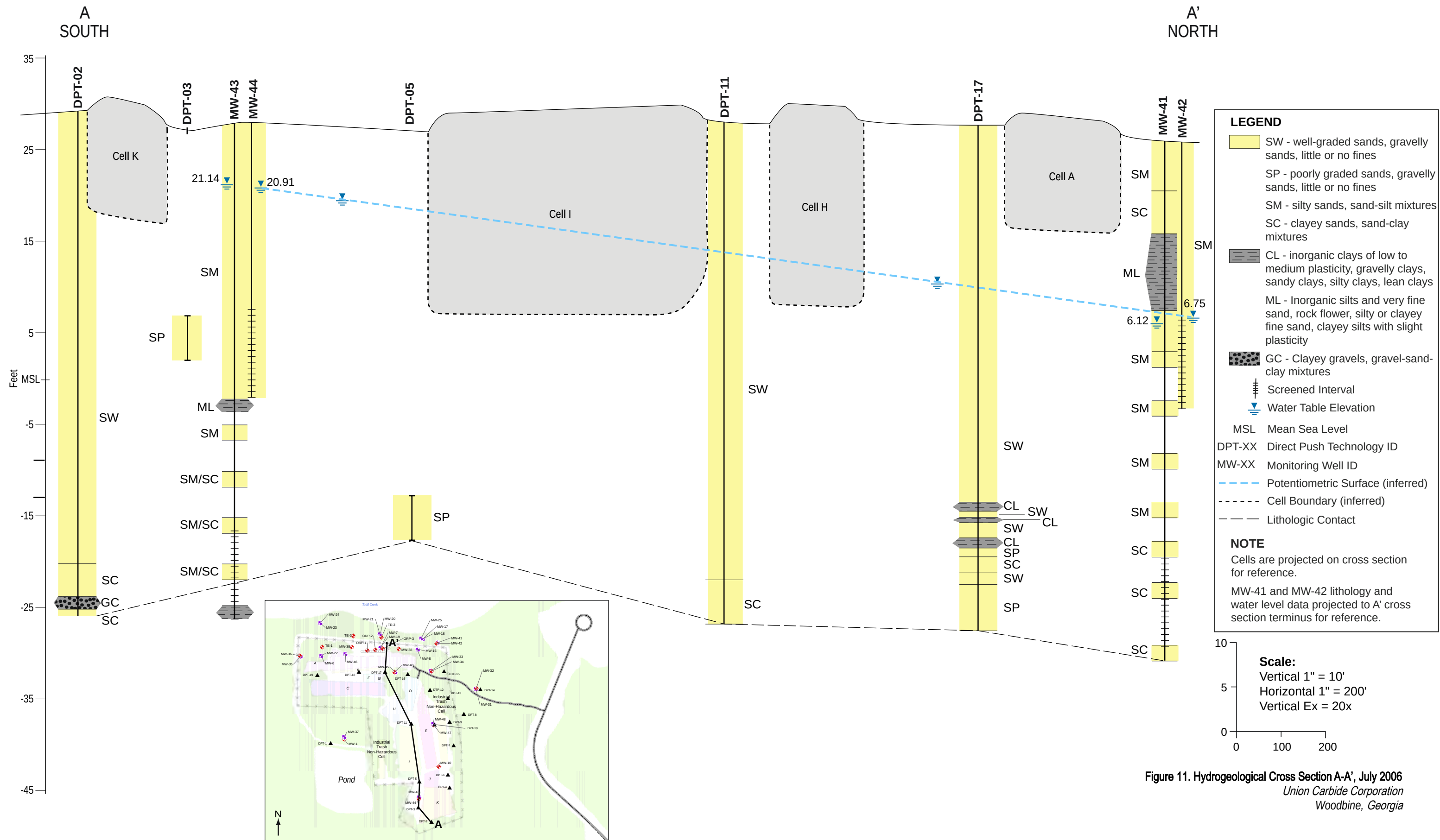
Union Carbide Corporation
 Woodbine, Georgia

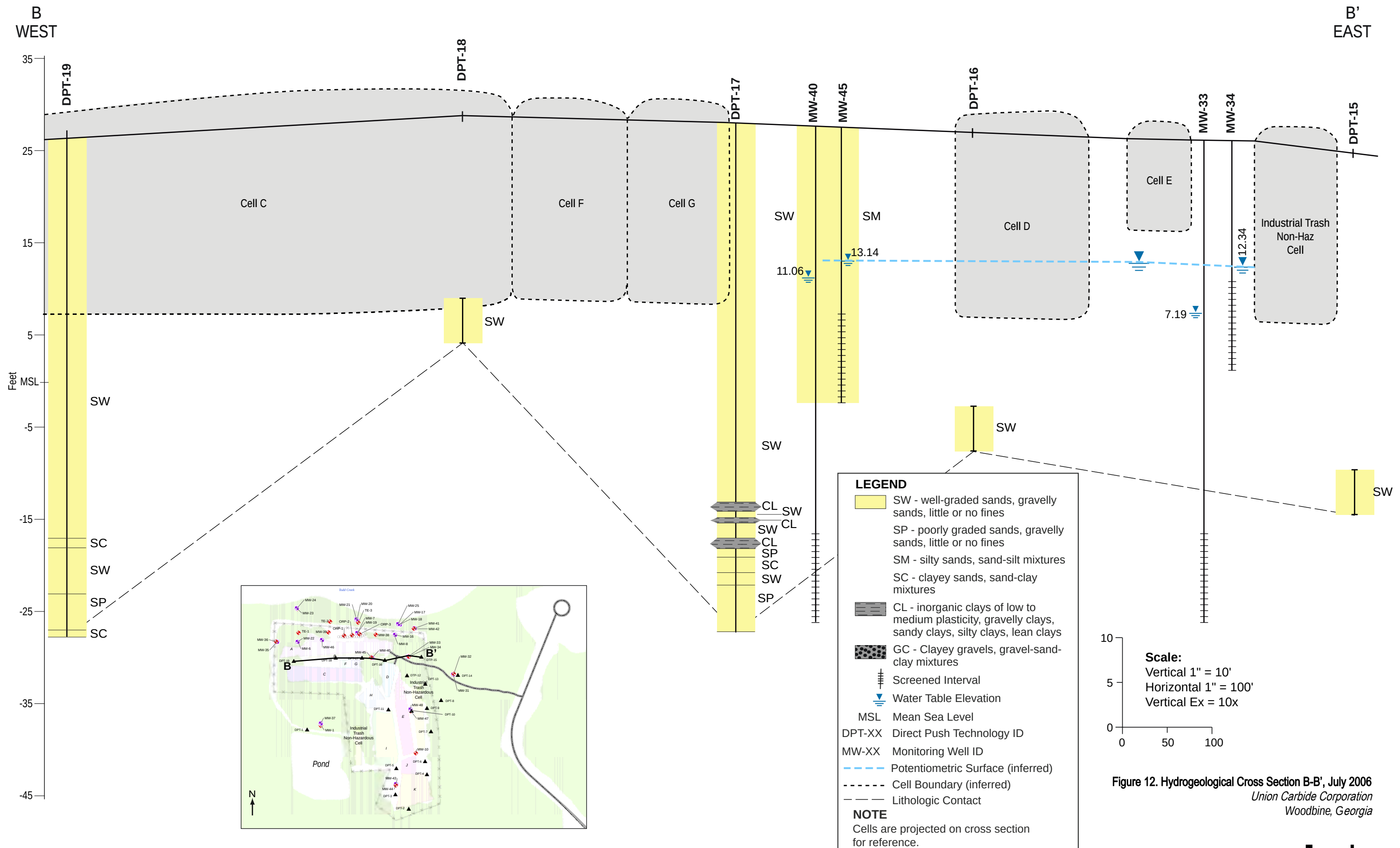
**POTENTIOMETRIC SURFACE MAP
 DEEP MONITORING WELLS
 SEPTEMBER 26, 2022**

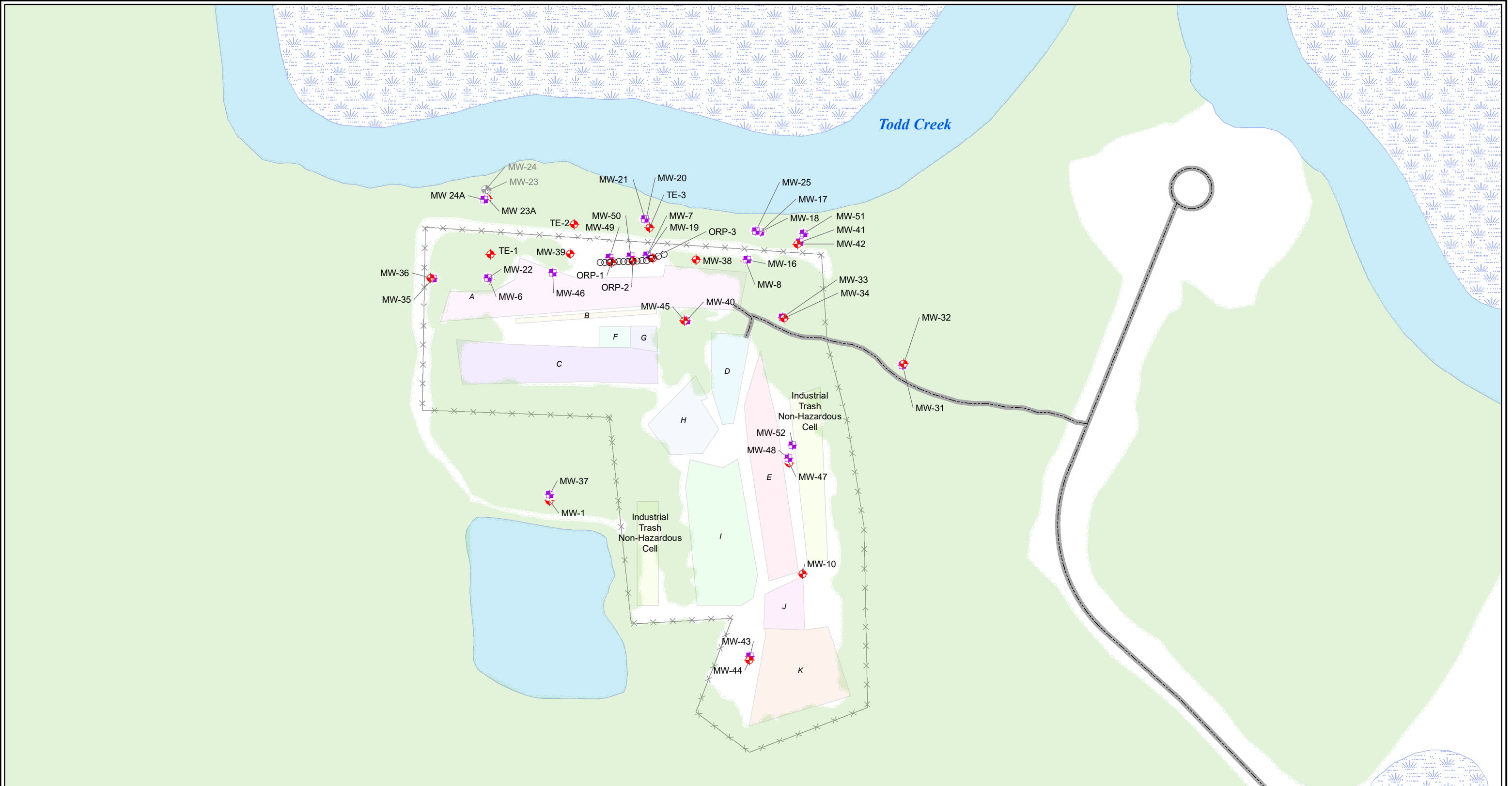
ARCADIS

FIGURE

10







Legend

Shallow Monitoring Well	Cell A	Cell G
Deep Monitoring Well	Cell B	Cell H
Oxygen Diffusion Well	Cell C	Cell I
Abandoned Monitoring Well	Cell D	Cell J
Road	Cell E	Cell K
Treeline	Cell F	Industrial Trash Non-Hazardous Cell
Water		
Swamp/Marsh		
Fence		

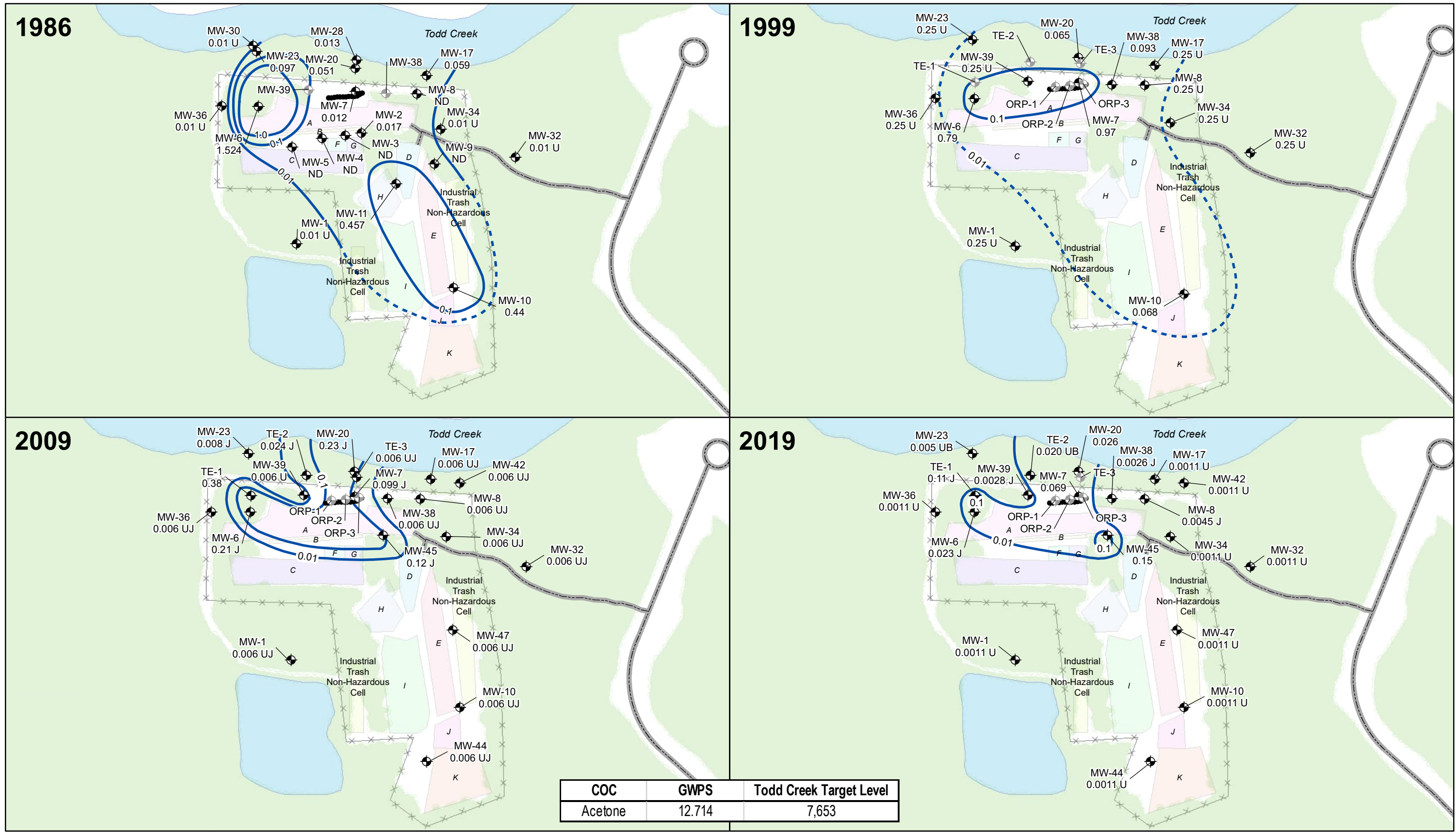
Note:
RCRA = Resource Conservation and Recovery Act

Union Carbide Corporation
Woodbine, Georgia

WELL LOCATION MAP RCRA LANDFILL

ARCADIS

FIGURE
13



Legend:

- Monitoring Well Sampled
- Monitoring Well Not Sampled
- Oxygen Diffusion Well
- Plume Concentration Contours (Dashed where inferred)
- Road
- Treeline
- Fence
- Cell A
- Cell B
- Cell C
- Cell D
- Cell E
- Cell F
- Cell G
- Cell H
- Cell I
- Cell J
- Cell K
- Industrial Trash
- Non-Hazardous Cell
- Water

Acronyms:

- B = sample blank contamination
- GWPS = Groundwater Protection Standards
- J = estimated concentration
- ND = non-detect
- U = non-detect
- UJ = non-detect, estimated detection limit

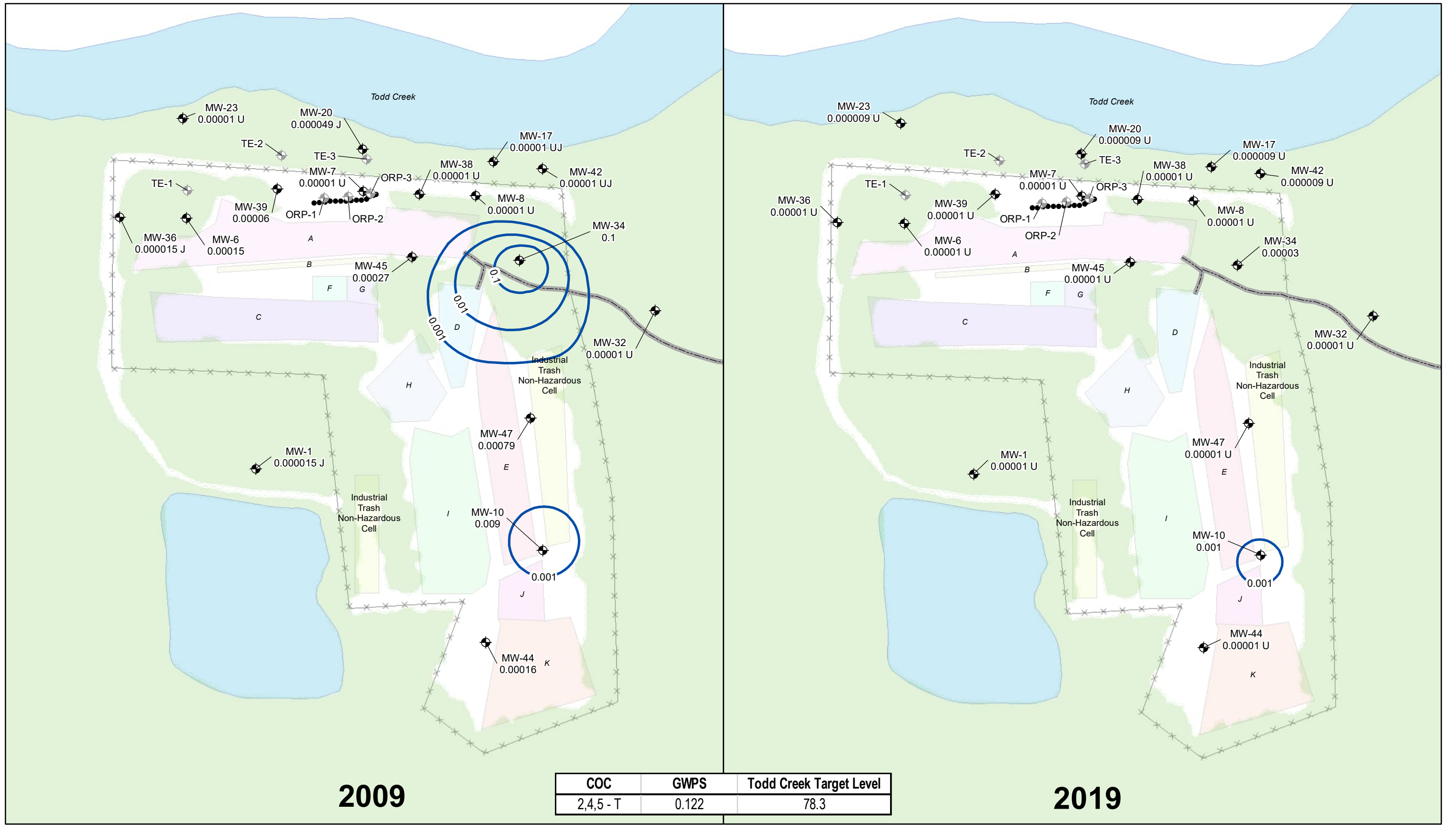
Notes:

- Groundwater concentrations are shown in milligrams per liter (mg/L).
- Groundwater sampling was conducted in April-August of 1986, November of 1999, and September of 2009 and 2019.
- The detection limit was used in lieu of "BRL" (below reporting limit) for the 1999 data set.
- Due to the elevated detection limit in 1999, the 0.01 contour was inferred based on the 1986 plume.
- The detection limit for 1986 results reported as ND were not found.
- All features shown currently exist but did not exist in each timeframe.
- Contours shown are 1.0, 0.1, and 0.01 mg/L acetone in groundwater.

Figure 14. 1986, 1999, 2009, and 2019 Acetone in Shallow Aquifer Monitoring Wells
 Union Carbide Corporation
 UCC Woodbine, Camden County, Georgia

0 300 600 Feet

Jacobs



- Monitoring Well Sampled
- Monitoring Well not Sampled
- Oxygen Diffusion Well
- Plume Concentration Contours (Dashed where inferred)
- Road
- Treeline
- Fence
- Cell A
- Cell B
- Cell C
- Cell D
- Cell E
- Cell F
- Cell G
- Cell H
- Cell I
- Cell J
- Cell K
- Industrial Trash
- Non-Hazardous Cell
- Water

Acronyms:
 GWPS = Groundwater Protection Standards
 J = estimated concentration
 U = non-detect
 UJ = non-detect, estimated detection limit

Notes:
 1. Groundwater concentrations are shown in milligrams per liter (mg/L).
 2. Sampling was conducted in September of 2009 and 2019.
 3. All features shown currently exist but did not exist in each timeframe.
 4. Contours shown are 0.1, 0.01, and 0.001 mg/L 2,4,5 -T in groundwater

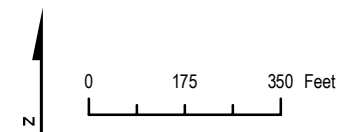
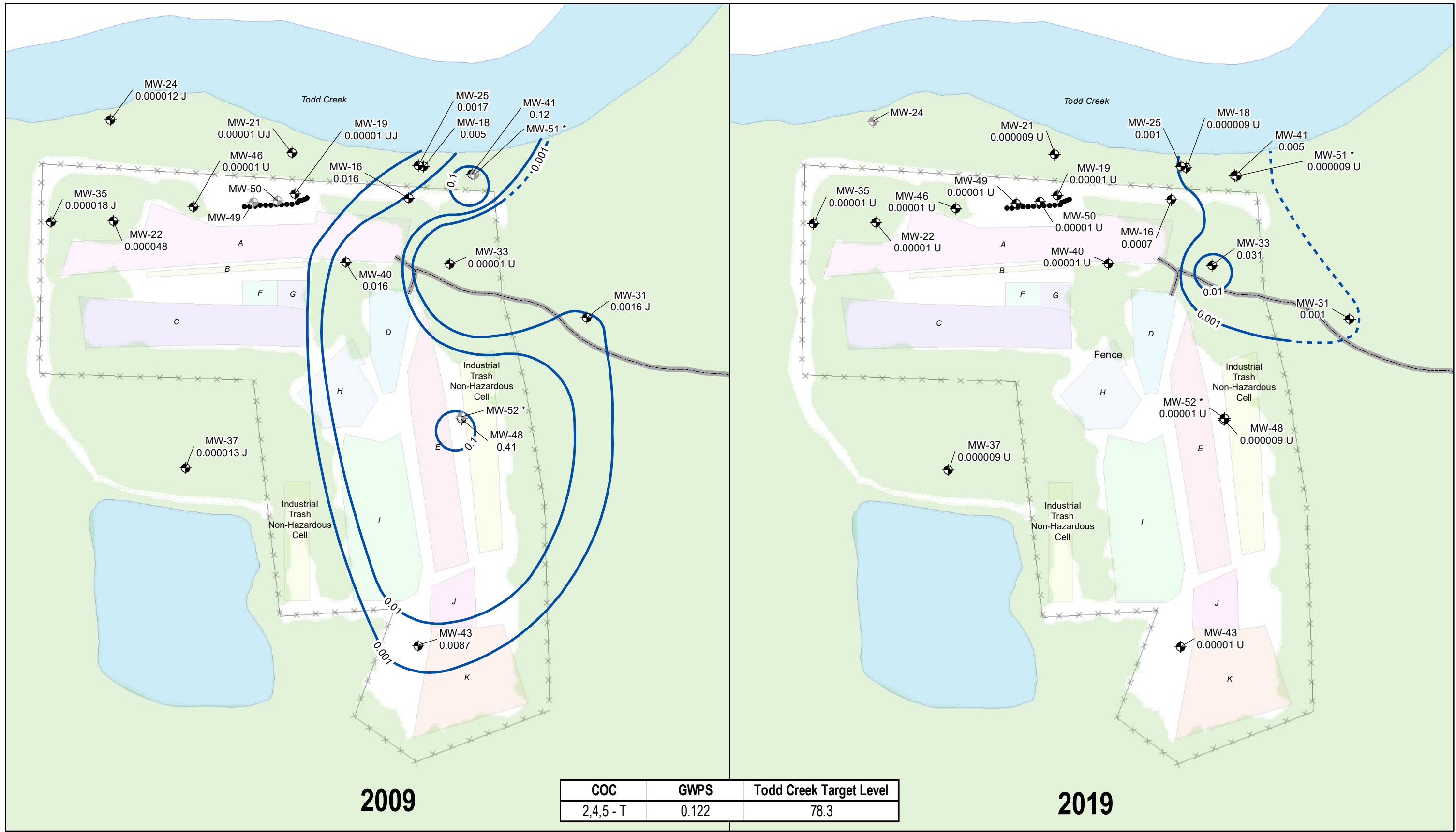


Figure 15. 2009 and 2019 2,4,5 - T in Shallow Aquifer Monitoring Wells
 Union Carbide Corporation
 UCC Woodbine, Camden County, Georgia



- Monitoring Well Symbols:**
- Monitoring Well Sampled
 - Monitoring Well not Sampled
 - Oxygen Diffusion Well
- Plume Concentration Contours:**
- (Dashed where inferred)
- Other Features:**
- Treeline
 - Fence
 - Industrial Trash Non-Hazardous Cell
 - Road
- Acronyms:**
- GWPS = Groundwater Protection Standards
 - J = estimated concentration
 - U = non-detect
 - UJ = non-detect, estimated detection limit
- Cell Legend:**
- Cell A
 - Cell B
 - Cell C
 - Cell D
 - Cell E
 - Cell F
 - Cell G
 - Cell H
 - Cell I
 - Cell J
 - Cell K
 - Non-Hazardous Cell
 - Water

- Notes:**
- Groundwater concentrations are shown in milligrams per liter (mg/L).
 - Groundwater sampling was conducted in September of 2009 and 2019.
 - * For MW-51 and MW-52, the screen interval at these locations are greater than 80 ft bgs; therefore, the results were not used for contour interpretation.
 - No exceedances of 2,4,5 - T in 2019
 - All features shown currently exist but did not exist in each timeframe.
 - Contours shown are 0.1, 0.01, and 0.001 mg/L 2,4,5 - T in groundwater

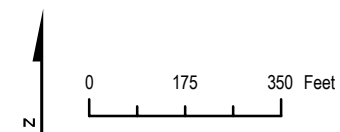
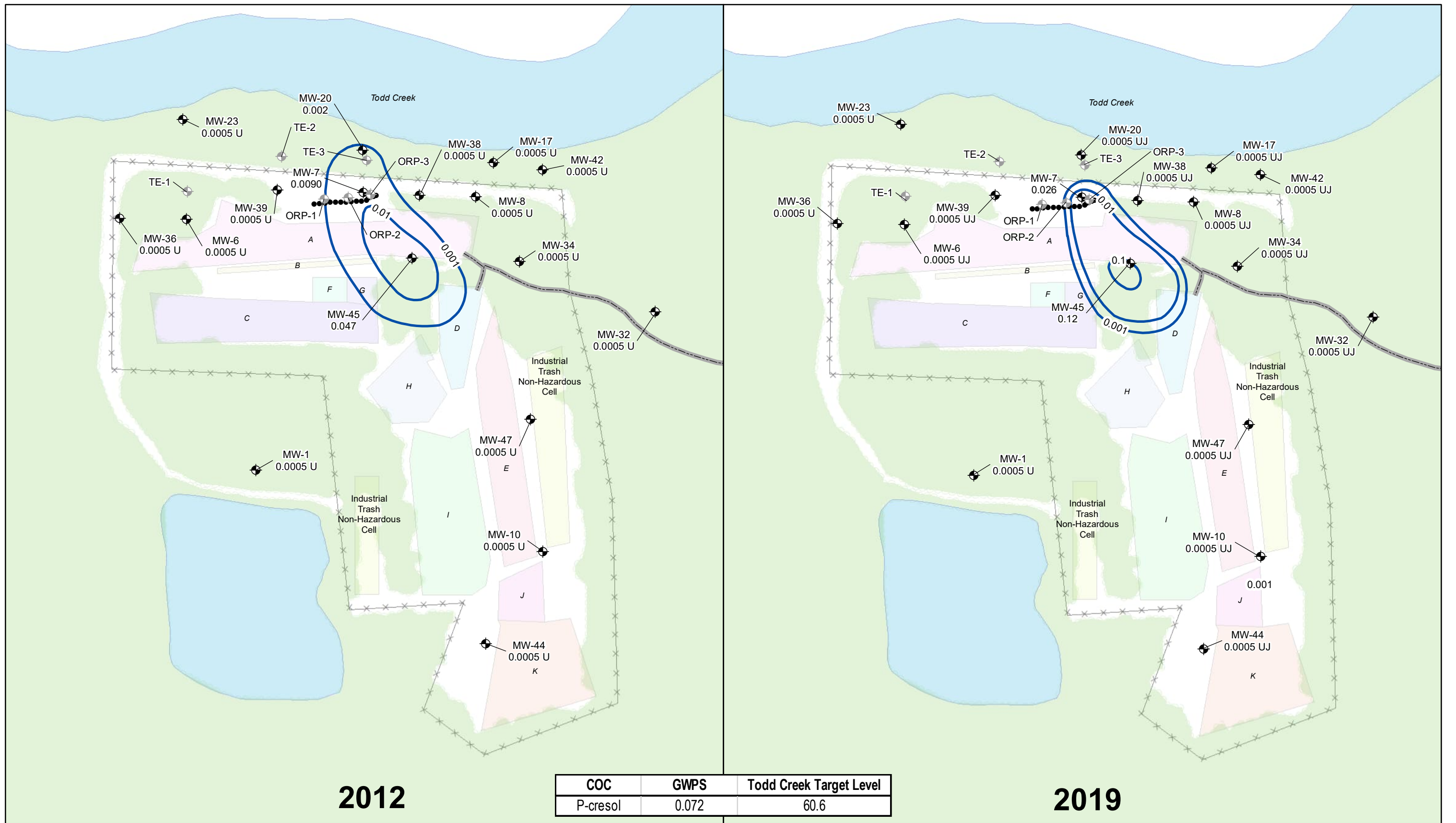


Figure 16. 2009 and 2019 2,4,5-T in Deep Aquifer Monitoring Wells Union Carbide Corporation UCC Woodbine, Camden County, Georgia



- Monitoring Well Sampled
- Monitoring Well not Sampled
- Oxygen Diffusion Well
- Plume Concentration Contours
- Road
- Treeline
- Fence
- Cell A
- Cell B
- Cell C
- Cell D
- Cell E
- Cell F
- Cell G
- Cell H
- Cell I
- Cell J
- Cell K
- Industrial Trash
- Non-Hazardous Cell
- Water

Acronyms:
 GWPS = Groundwater Protection Standards
 J = estimated concentration
 U = non-detect
 UJ = non-detect, estimated detection limit

- Notes:**
1. Groundwater concentrations are shown in milligrams per liter (mg/L).
 2. Groundwater sampling was conducted in September 2012 and 2019.
 3. Prior to 2012 m- and p-cresol were not analyzed separately
 4. All features shown currently exist but did not exist in each timeframe.
 5. Contours shown are 0.1, 0.01, and 0.001 mg/L P-cresol in groundwater

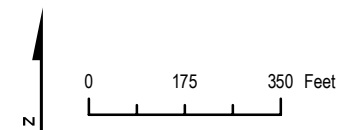
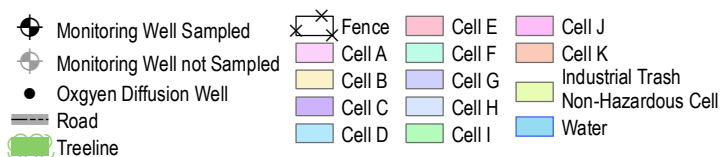
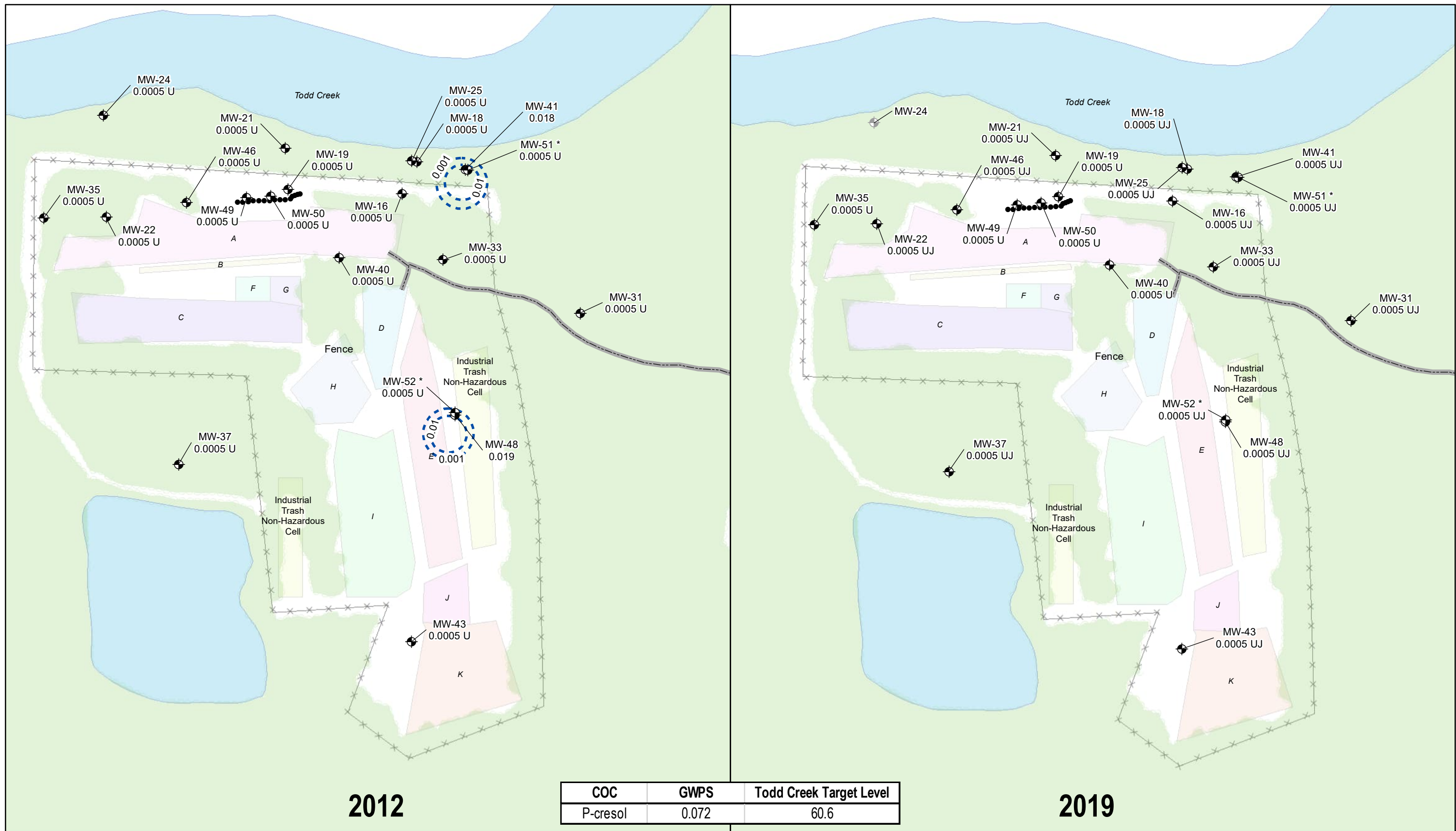


Figure 17. 2012 and 2019 P-cresol in Shallow Aquifer Monitoring Wells
 Union Carbide Corporation
 UCC Woodbine, Camden County, Georgia



Notes:

1. Groundwater concentrations are shown in milligrams per liter (mg/L).
2. Groundwater sampling was conducted in September 2012 and 2019.
3. * For MW-51 and MW-52, the screen interval at these locations are greater than 80 ft bgs; therefore, the results were not used for contour interpretation.
4. P-cresol was not detected in any deep monitoring wells in 2019.
5. Prior to 2012 m- and p-cresol were not analyzed separately.
6. All features shown currently exist but did not exist in each timeframe.

7. Contours shown are 0.01 and 0.001 mg/L P-cresol in groundwater.

Acronyms:

GWPS = Groundwater Protection Standards
 J = estimated concentration
 U = non-detect
 UJ = non-detect, estimated detection limit

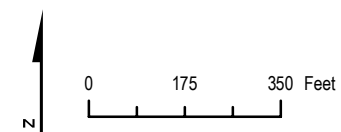
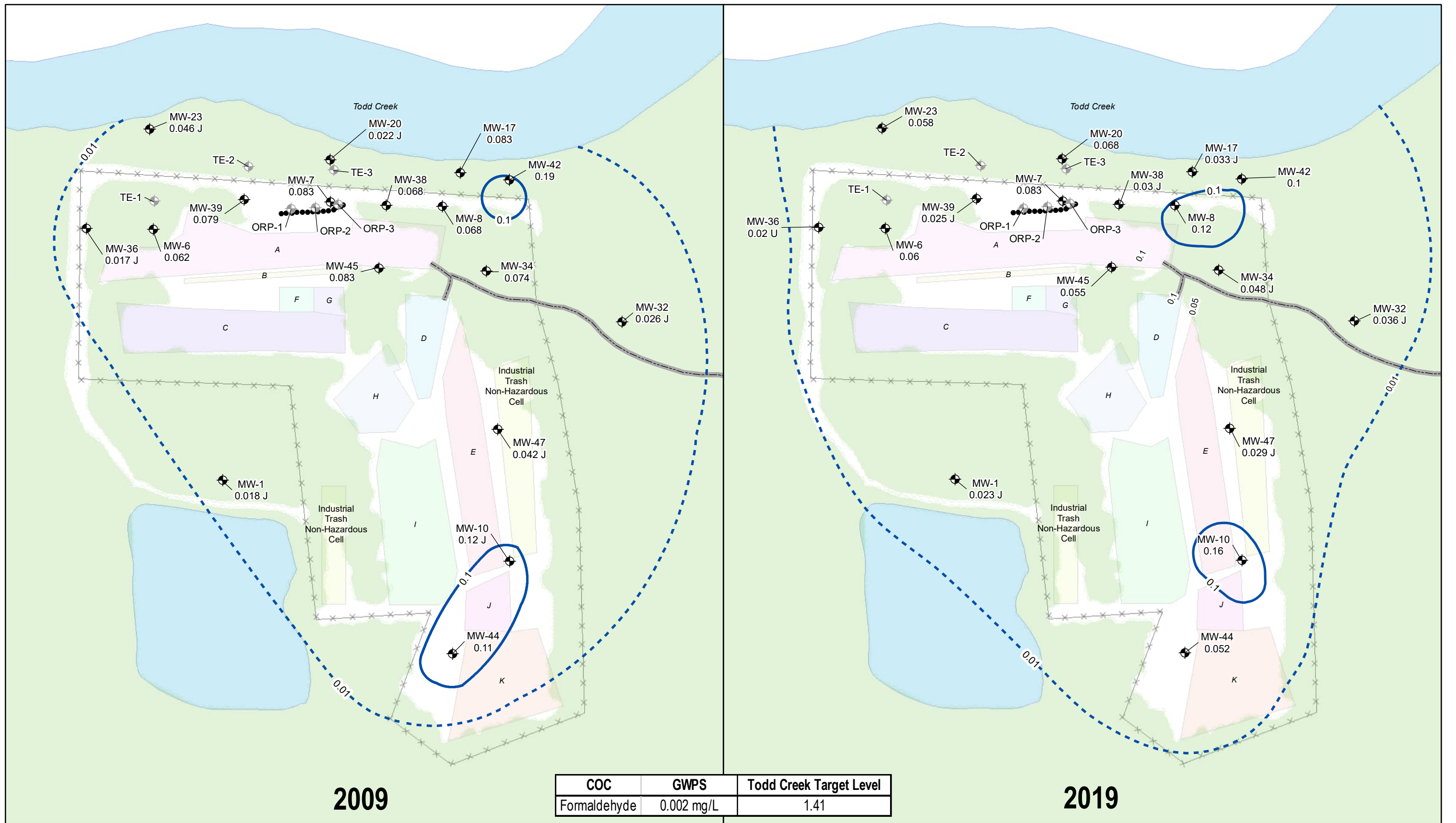


Figure 18. 2012 and 2019 P-cresol in Deep Aquifer Monitoring Wells
 Union Carbide Corporation
 UCC Woodbine, Camden County, Georgia



- Monitoring Well Sampled
- Monitoring Well not Sampled
- Oxygen Diffusion Well
- Plume Concentration Contours
- Roads
- Treeline
- Fence
- Cell A
- Cell B
- Cell C
- Cell D
- Cell E
- Cell F
- Cell G
- Cell H
- Cell I
- Cell J
- Cell K
- Industrial Trash
- Non-Hazardous Cell
- Water

Acronyms:
 GWPS = Groundwater Protection Standards
 J = estimated concentration
 U = non-detect

- Notes:**
- Groundwater concentrations are shown in milligrams per liter (mg/L).
 - Sampling was conducted in September of 2009 and 2019.
 - All features shown currently exist but did not exist in each timeframe.
 - Contours shown are 0.1 and 0.01 mg/L formaldehyde in groundwater

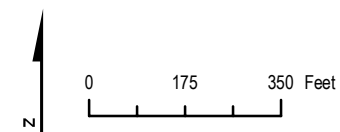
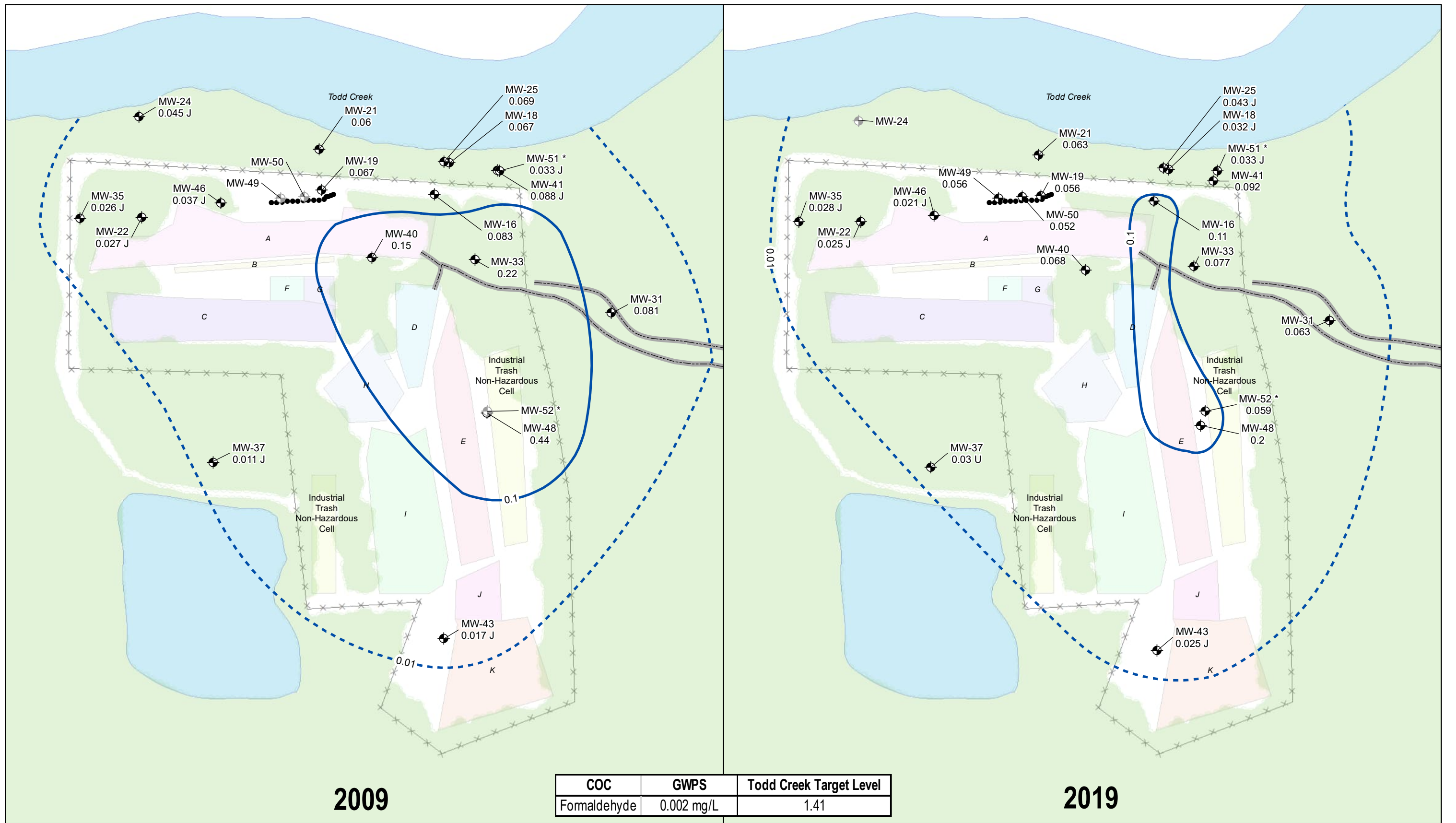


Figure 19. 2009 and 2019 Formaldehyde in Shallow Aquifer Monitoring Wells
 Union Carbide Corporation
 UCC Woodbine, Camden County, Georgia



- Monitoring Wells Sampled
- Monitoring Wells not Sampled
- Oxygen Diffusion Well
- Plume Concentration Contour (Dashed where inferred)
- Road
- Treeline
- Fence
- Cell A
- Cell B
- Cell C
- Cell D
- Cell E
- Cell F
- Cell G
- Cell H
- Cell I
- Cell J
- Cell K
- Industrial Trash
- Non-Hazardous Cell
- Water

Acronyms:
 GWPS = Groundwater Protection Standards
 J = estimated concentration
 U = non-detect

- Notes:**
- Groundwater concentrations are shown in milligrams per liter (mg/L).
 - Groundwater sampling was conducted in September of 2009 and 2019.
 - * For MW-51 and MW-52, the screen interval at these locations are greater than 80 ft bgs; therefore, the results were not used for contour interpretation.
 - Formaldehyde was analyzed in deep aquifer groundwater wells beginning in 2006.
 - All features shown currently exist but did not exist in each timeframe.
 - Contours shown are 0.1 and 0.01 mg/L formaldehyde in groundwater

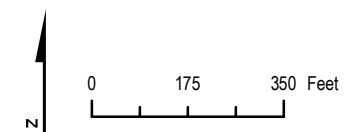


Figure 20. 2009 and 2019 Formaldehyde in Deep Aquifer Monitoring Wells
 Union Carbide Corporation
 UCC Woodbine, Camden County, Georgia

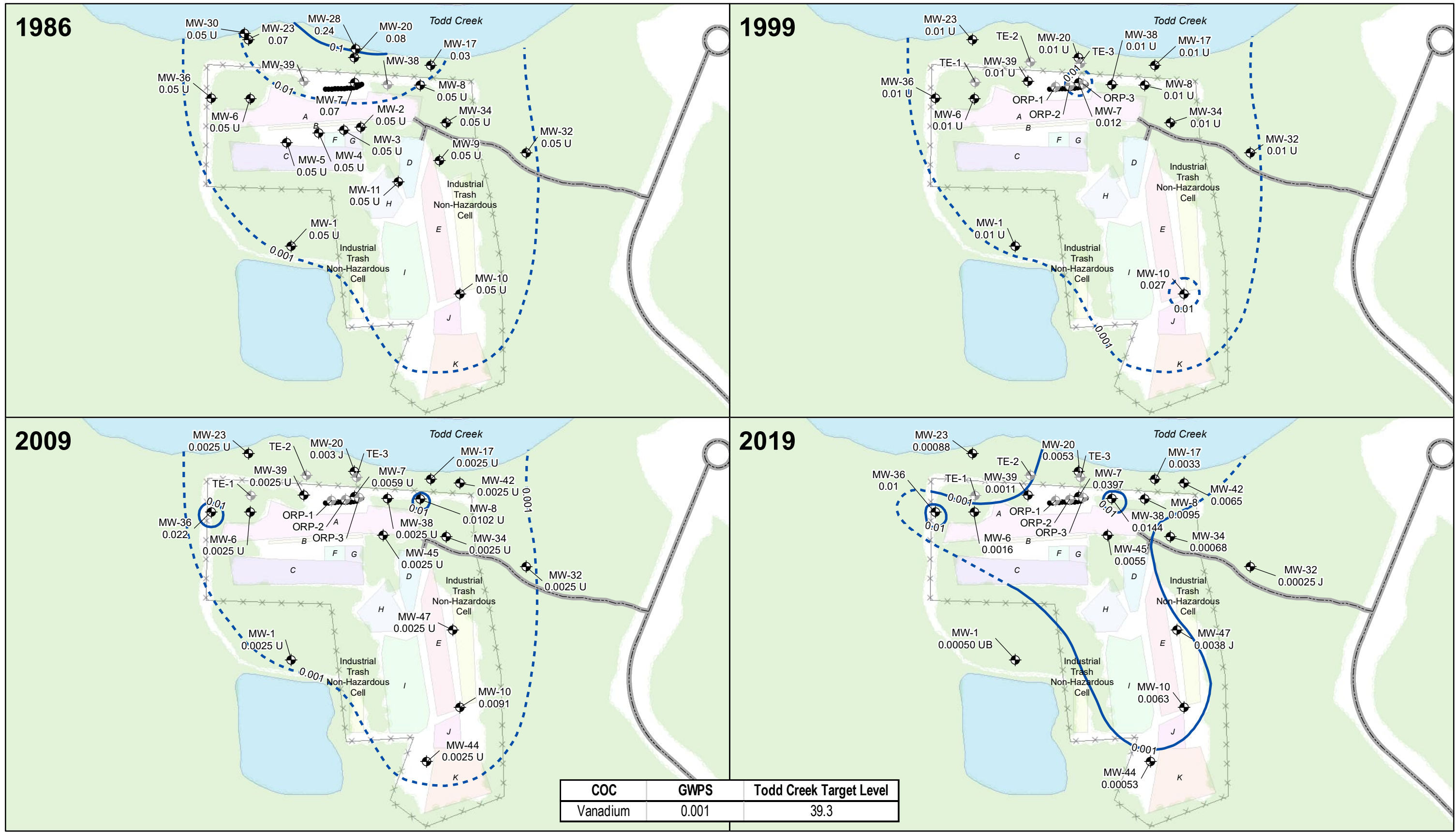


Figure 21. 1986, 1999, 2009, and 2019 Vanadium in Shallow Aquifer Monitoring Wells
 Union Carbide Corporation
 UCC Woodbine, Camden County, Georgia

Notes:
 1. Groundwater concentrations are shown in milligrams per liter (mg/L).
 2. Groundwater sampling was conducted in April-August of 1986, November of 1999, and September of 2009 and 2019.
 3. The laboratory reporting limit was above the GWPS for vanadium in 1986, 1999, and 2009.
 4. The detection limit was used in lieu of "BRL" (below reporting limit) for the 1999 data set.
 5. All features shown currently exist but did not exist in each timeframe.
 6. Contours shown are 0.1, 0.01, and 0.001 mg/L vanadium in groundwater.

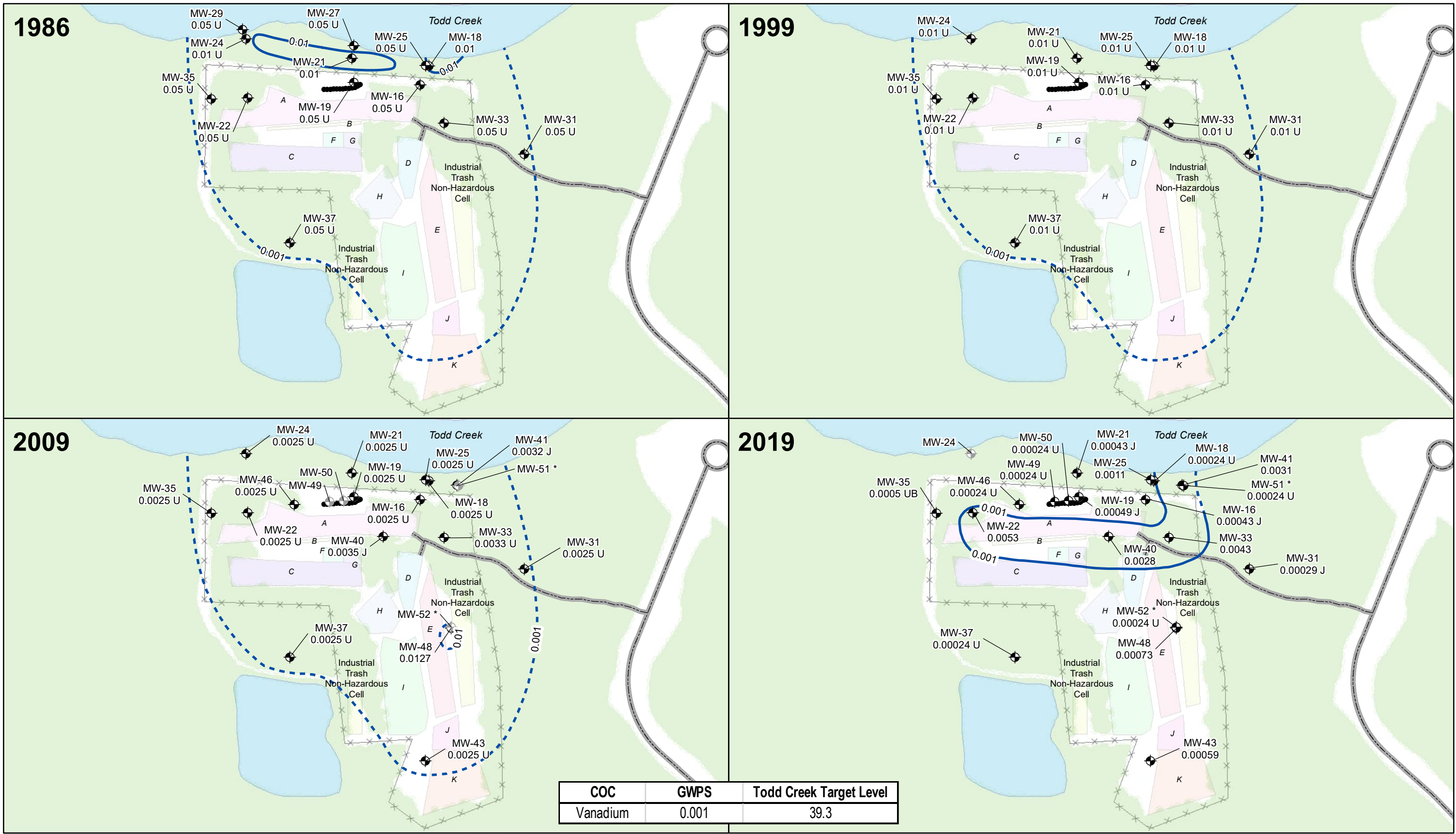
Acronyms
 B = sample blank contamination
 GWPS = Groundwater Protection Standards
 J = estimated concentration
 U = non-detect

Legend:
 Monitoring Well Sampled
 Monitoring Well not Sampled
 Oxygen Diffusion Well
 Plume Concentration Contours (Dashed where inferred)
 Road
 Treeline
 Fence
 Cell A
 Cell B
 Cell C
 Cell D
 Cell E
 Cell F
 Cell G
 Cell H
 Cell I
 Cell J
 Cell K
 Industrial Trash
 Non-Hazardous Cell
 Water

Scale: 0 300 600 Feet

File Path: MKE - \dc1vs01\GISProj\Woodbine\MapFiles\2023\Permit_Renewal_Application_2023\Figure 21_PRA_1986-1999-2009-2019_VanadiuminShallowAquifer.mxd User Name: STOLZRC Date: 11/29/2023 Time: 9:50:47 AM

Jacobs



Monitoring Well Sampled
 Monitoring Well not Sampled
 Oxygen Diffusion Well
 Plume Concentration Contours (Dashed where inferred)
 Road

Treeline
 Fence
 Cell A
 Cell B
 Cell C
 Cell D
 Cell E
 Cell F
 Cell G
 Cell H
 Cell I
 Cell J
 Cell K
 Industrial Trash Non-Hazardous Cell
 Water

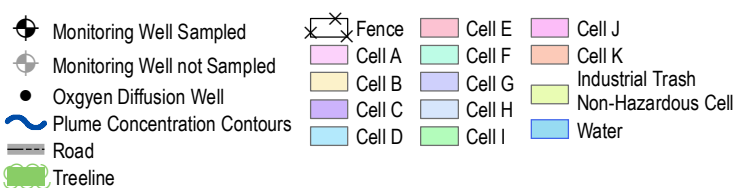
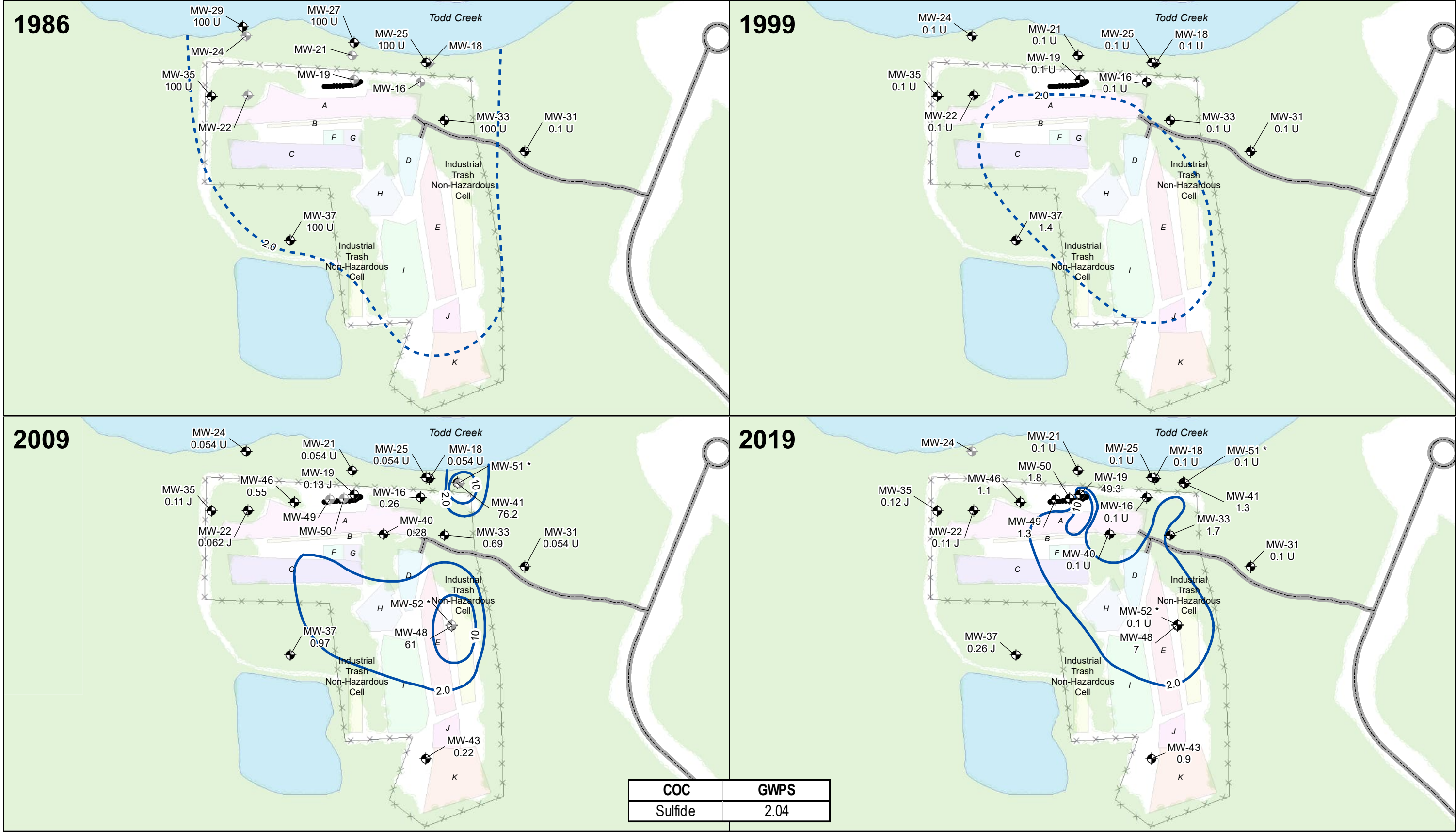
Acronyms:
B = sample blank contamination
GWPS = Groundwater Protection Standards
J = estimated concentration
U = non-detect

Notes:
1. Groundwater concentrations are shown in milligrams per liter (mg/L).
2. Groundwater sampling was conducted in April-August of 1986, November of 1999, and September of 2009 and 2019.
3. * For MW-51 and MW-52, the screen interval at these locations are greater than 80 ft bgs; therefore, the results were not used for contour interpretation.
4. The laboratory reporting limit was above the GWPS for vanadium in 1986, 1999, and 2009.
5. The detection limit was used in lieu of "BRL" (below reporting limit) for the 1999 data set.
6. All features shown currently exist but did not exist in each timeframe.
7. Contours shown are 0.01 and 0.001 mg/L vanadium in groundwater

Figure 22. 1986, 1999, 2009, and 2019 Vanadium in Deep Aquifer Monitoring Wells
Union Carbide Corporation
UCC Woodbine, Camden County, Georgia

Jacobs

MKE - \\dc1vs01\\GISProj\\D\\DowChemicals\\Woodbine\\MapFiles\\2023\\Permit_Renewal_Application_2023\\Figure 22_PRA_1986-1999-2009-2019_VanadiuminDeepAquifer.mxd User Name: STOLZRC Date: 11/29/2023 Time: 9:55:26 AM



Notes:

1. Groundwater concentrations are shown in milligrams per liter (mg/L).
2. Groundwater sampling was conducted in April-August of 1986, November of 1999, and September of 2009 and 2019.
3. * For MW-51 and MW-52, the screen interval at these locations are greater than 80 ft bgs; therefore, the results were not used for contour interpretation.
4. The detection limit was used in lieu of "BRL" (below reporting limit) for the 1999 data set.
5. There is insufficient data available to infer a 10 milligram per liter contour for 1986 and 1999.
6. All features shown currently exist but did not exist in each timeframe.
7. Contours shown are 2.0 and 10 mg/L sulfide in groundwater

Acronyms:

GWPS = Groundwater Protection Standards
 J = estimated concentration
 U = non-detect

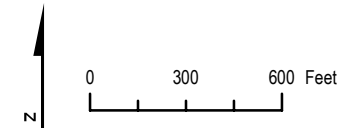
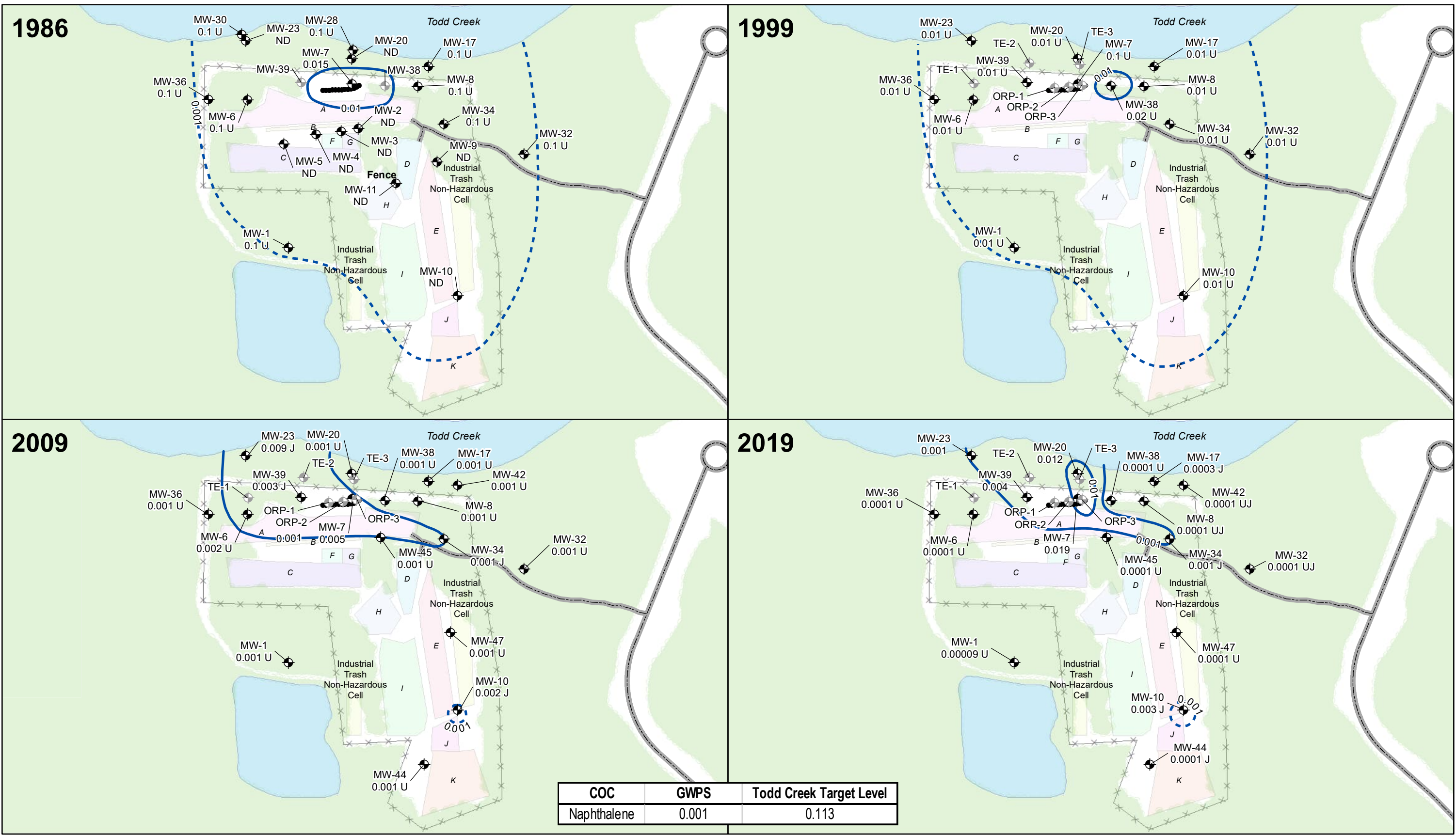


Figure 24. 1986, 1999, 2009, and 2019 Sulfide in Deep Aquifer Monitoring Wells
 Union Carbide Corporation
 UCC Woodbine, Camden County, Georgia



Legend:

- Monitoring Well Sampled
- Monitoring Well not Sampled
- Oxygen Diffusion Well
- Plume Concentration Contours (Dashed where inferred)
- Road
- Treeline
- Fence
- Cell A
- Cell B
- Cell C
- Cell D
- Cell E
- Cell F
- Cell G
- Cell H
- Cell I
- Cell J
- Cell K
- Industrial Trash
- Non-Hazardous Cell
- Water

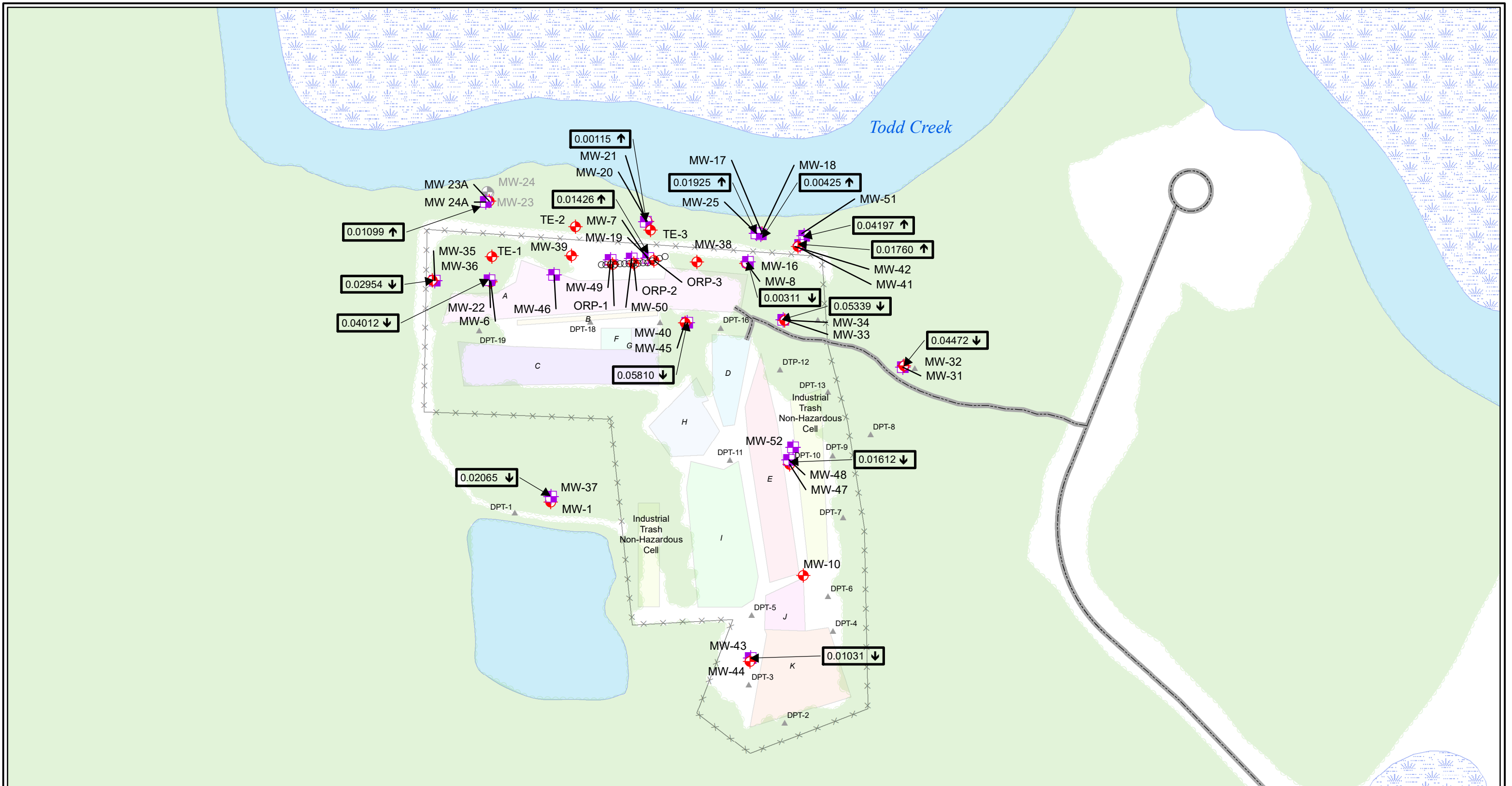
Acronyms

GWPS = Groundwater Protection Standards
 J = estimated concentration
 ND = non-detect
 U = non-detect
 UJ = non-detect, estimated detection limit

Notes:

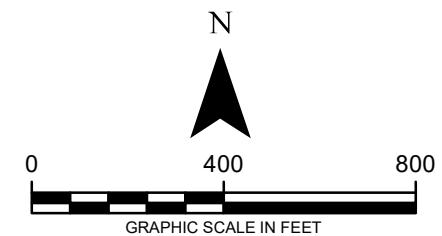
- Groundwater concentrations are shown in milligrams per liter (mg/L).
- Groundwater sampling was conducted in April-August of 1986, November of 1999, and September of 2009 and 2019.
- The detection limit was used in lieu of "BRL" (below reporting limit) for the 1999 data set.
- The laboratory detection limit is above the GWPS for naphthalene in 1986 and 1999.
- The detection limit for 1986 results reported as ND were not found.
- All features shown currently exist but did not exist in each timeframe.
- Contours shown are 0.01 and 0.001 mg/L naphthalene in groundwater

Figure 25. 1986, 1999, 2009, and 2019 Naphthalene in Shallow Aquifer Monitoring Wells
 Union Carbide Corporation
 UCC Woodbine, Camden County, Georgia



Legend

- | | | | |
|---|---|---|---|
| <ul style="list-style-type: none"> Shallow Monitoring Well Deep Monitoring Well Abandoned Monitoring Well Oxygen Diffusion Well Road | <ul style="list-style-type: none"> Fence Water Swamp/Marsh Treeline | <ul style="list-style-type: none"> Cell A Cell B Cell C Cell D Cell E Cell F Cell G Cell H Cell I Cell J Cell K Industrial Trash Non-Hazardous Cell | <p>Vertical Gradient, foot/feet</p> <p>0.01031 ↑ Upward Gradient</p> <p>0.01031 ↓ Downward Gradient</p> |
|---|---|---|---|



Union Carbide Corporation
Woodbine, Georgia

VERTICAL HYDRAULIC GRADIENT SEPTEMBER 26, 2022



FIGURE

26

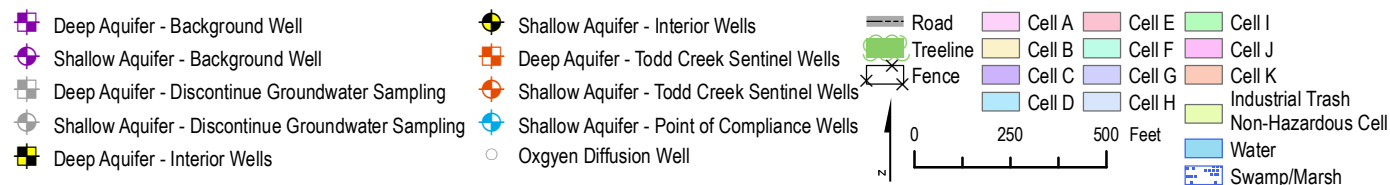
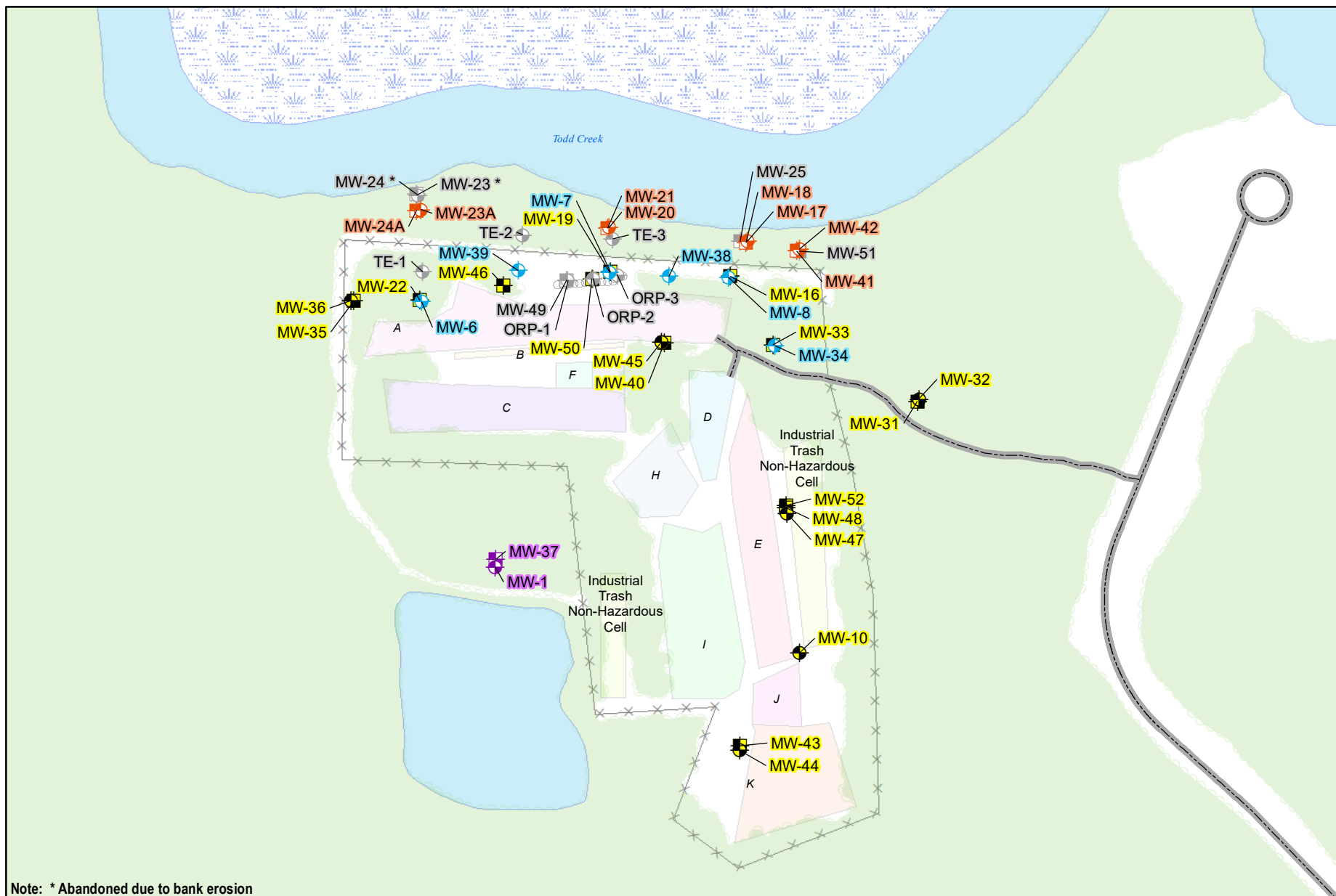
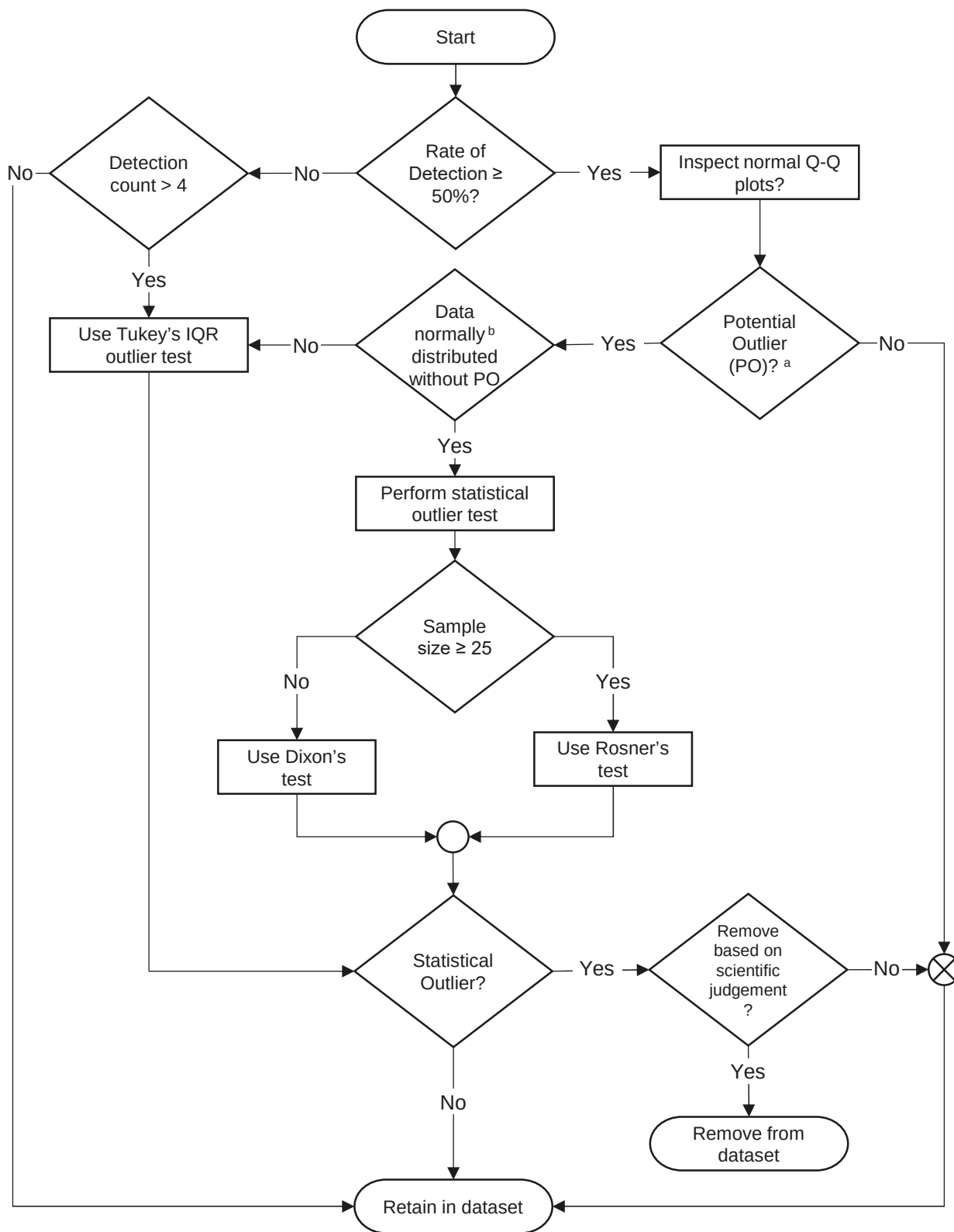


Figure 27. Proposed Groundwater Sampling Locations
 Union Carbide Corporation
 UCC Woodbine, Camden County, Georgia



NOTES:

^a Potential outliers are indicated by large concentration differences between data points and/or deviation from the predominant concentration trend.

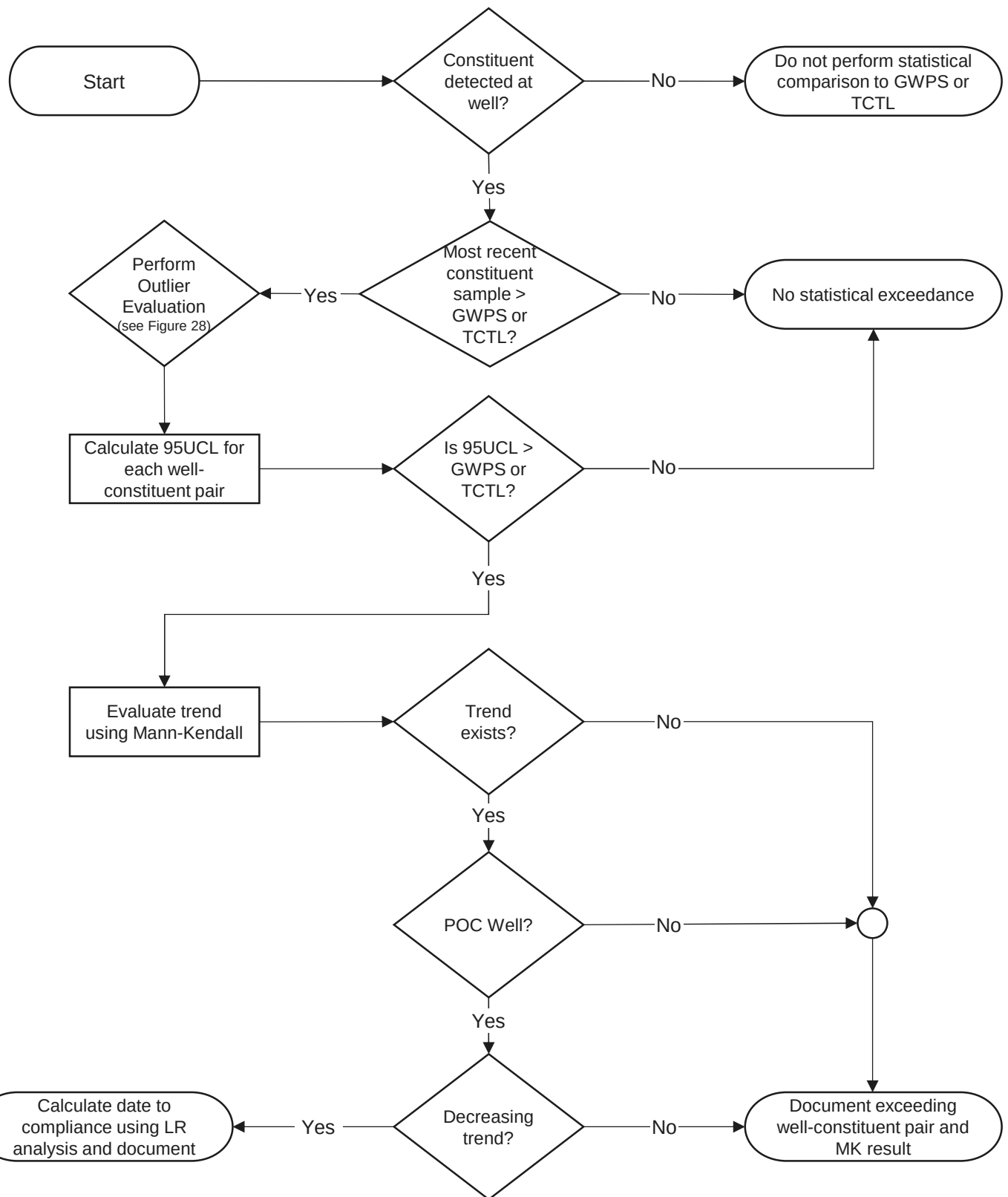
^b Or normalized by transformation.

IQR: interquartile range
>: greater than

Q-Q: quantile-quantile
≥: greater than or equal to

UNION CARBIDE CORPORATION
WOODBINE, GEORGIA

OUTLIER EVALUATION DECISION TREE

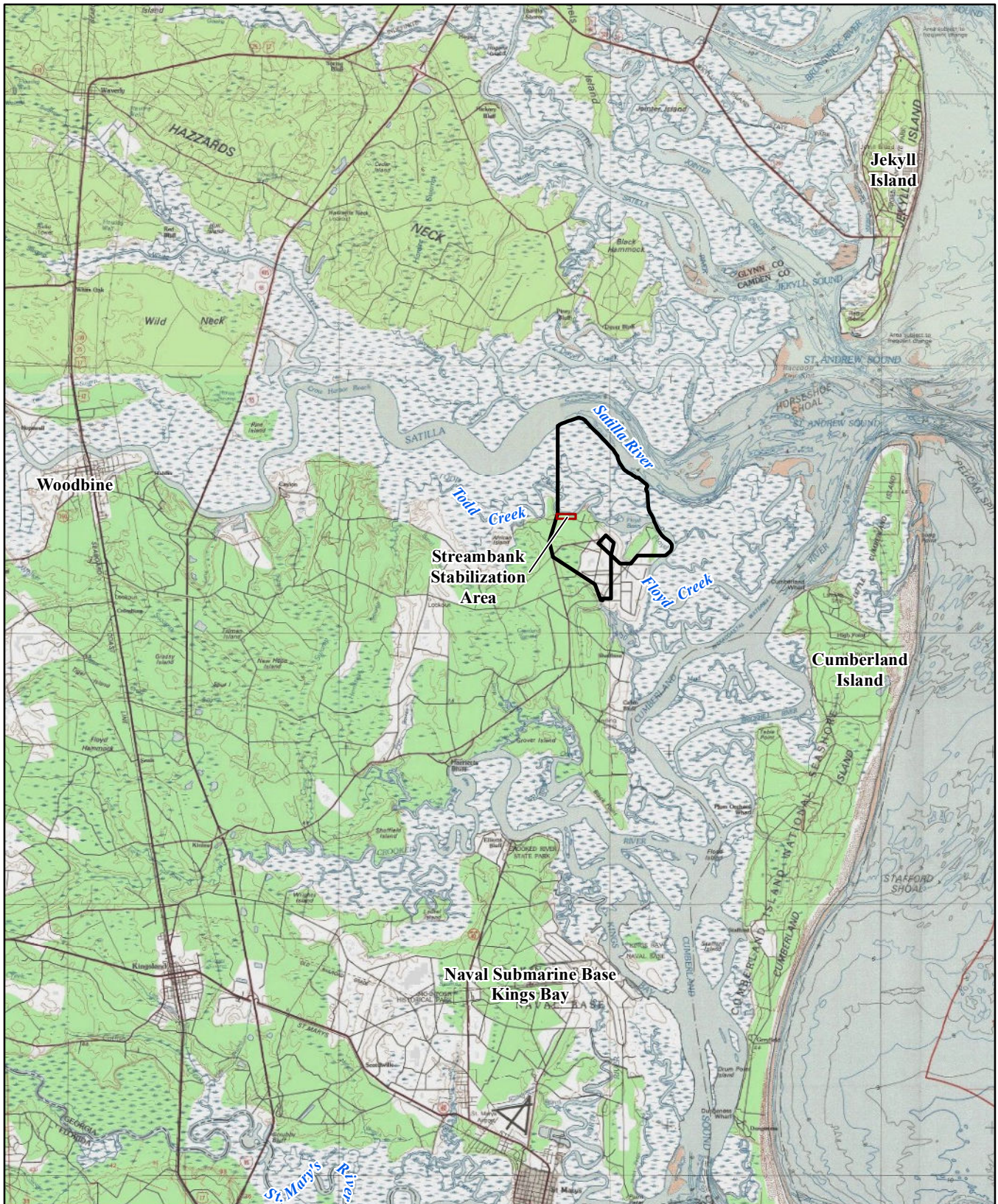


NOTES:

95UCL: 95 percent (%) upper confidence limit
 GWPS: groundwater protection standard
 LR : Linear Regression
 MK: Mann-Kendall
 POC: point of compliance
 TCTL : Todd Creek Trigger Level
 >: greater than

UNION CARBIDE CORPORATION
 WOODBINE, GEORGIA

**STATISTICAL COMPARISON DECISION
 TREE**



LEGEND

- Project Extent
- Property Boundary

Background: USGS 7.5-Minute Series Maps (Topographic)
 Kingsland NE, Georgia
 Cumberland Island, Georgia

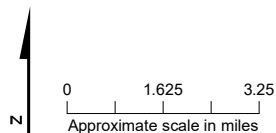


Figure 30. USGS Quad
Union Carbide Corporation
Woodbine, Georgia

Jacobs



LEGEND

- | | | |
|--|--------------------------------|-----------------------|
| ● Erosion Control Measurement (ECM) or Data Collection (DC) Line | ● Monitoring Well | --- Landfill Boundary |
| ○ Design Initiation Trigger Pin | ×---× Fence | |
| ● Primary Contingency Pin | --- Reference Line | |
| ● Secondary Contingency Pin | Streambank Stabilization Areas | |
| | Transitional Grading Areas | |

Notes:
Aerial Imagery: November 2023

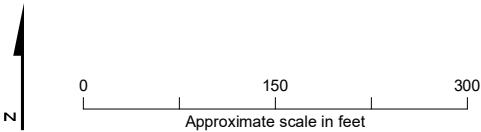


Figure 31. Streambank Monitoring Area and Features
Permit Renewal Application
Union Carbide Corporation
UCC Woodbine, Camden County, Georgia

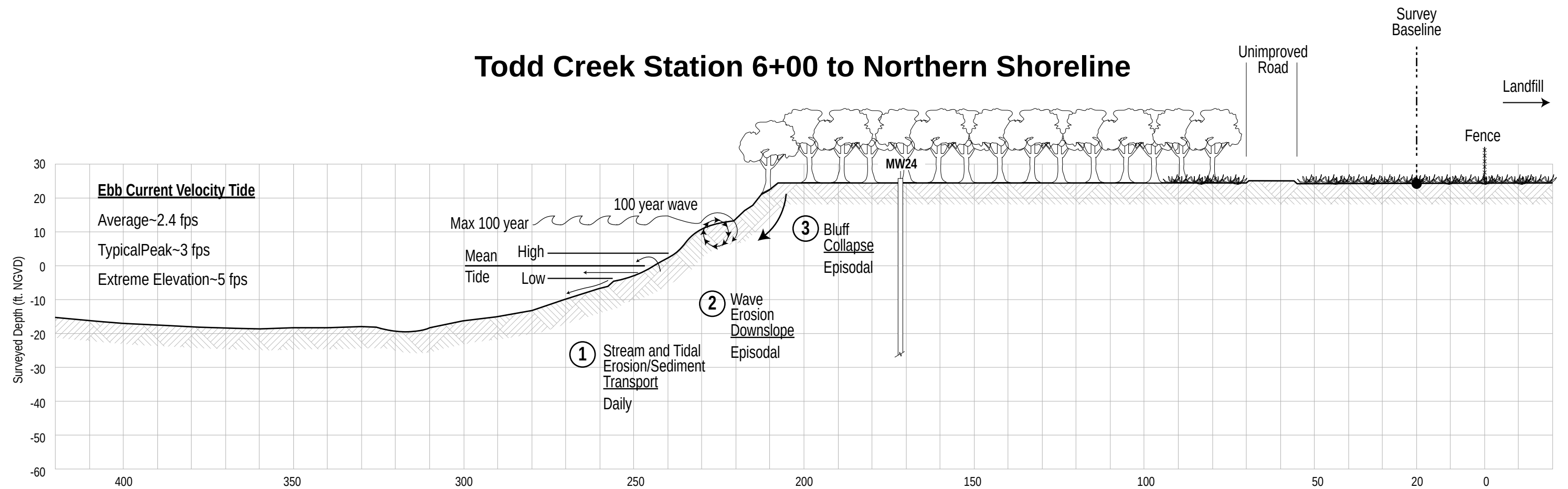
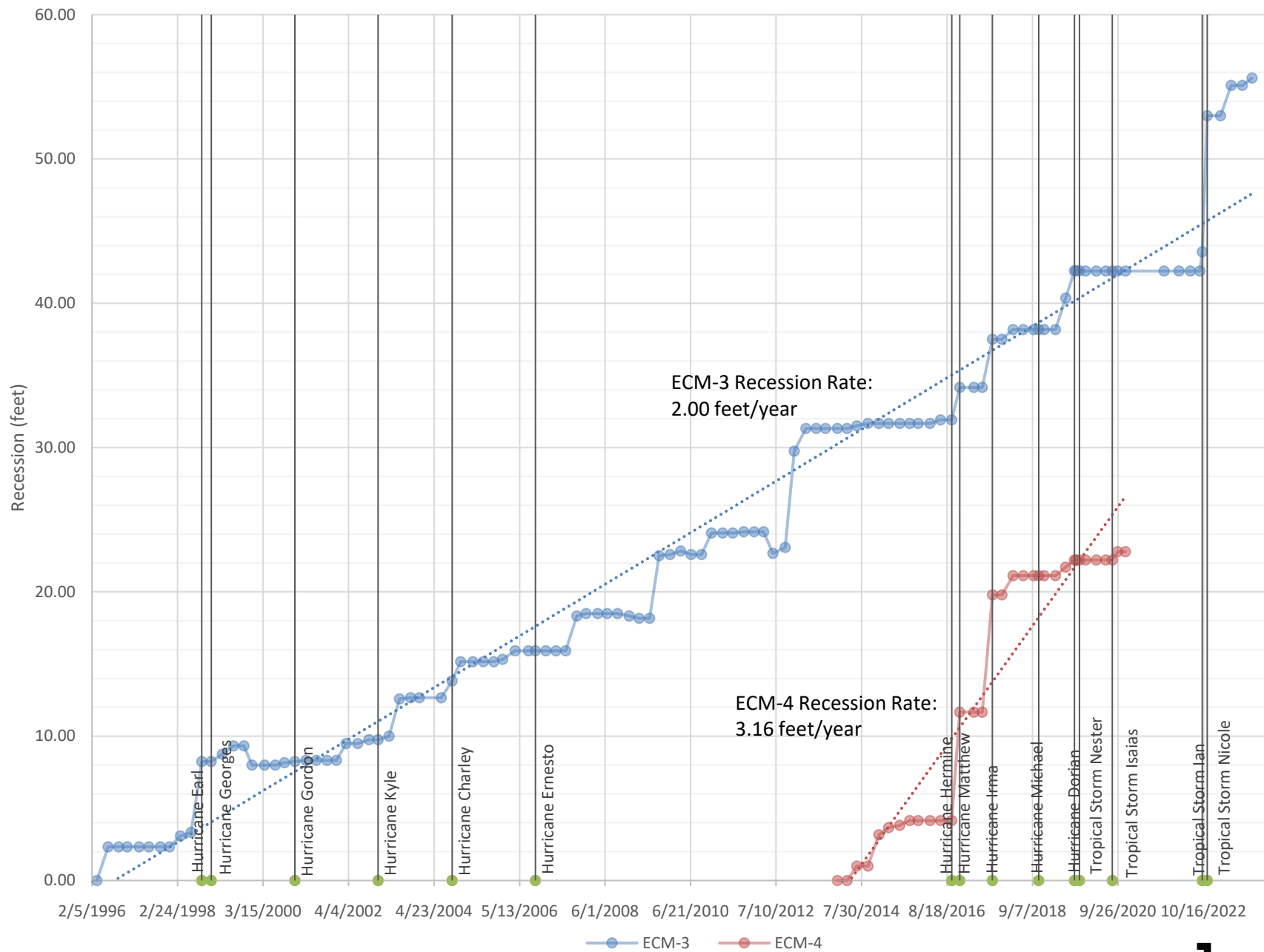
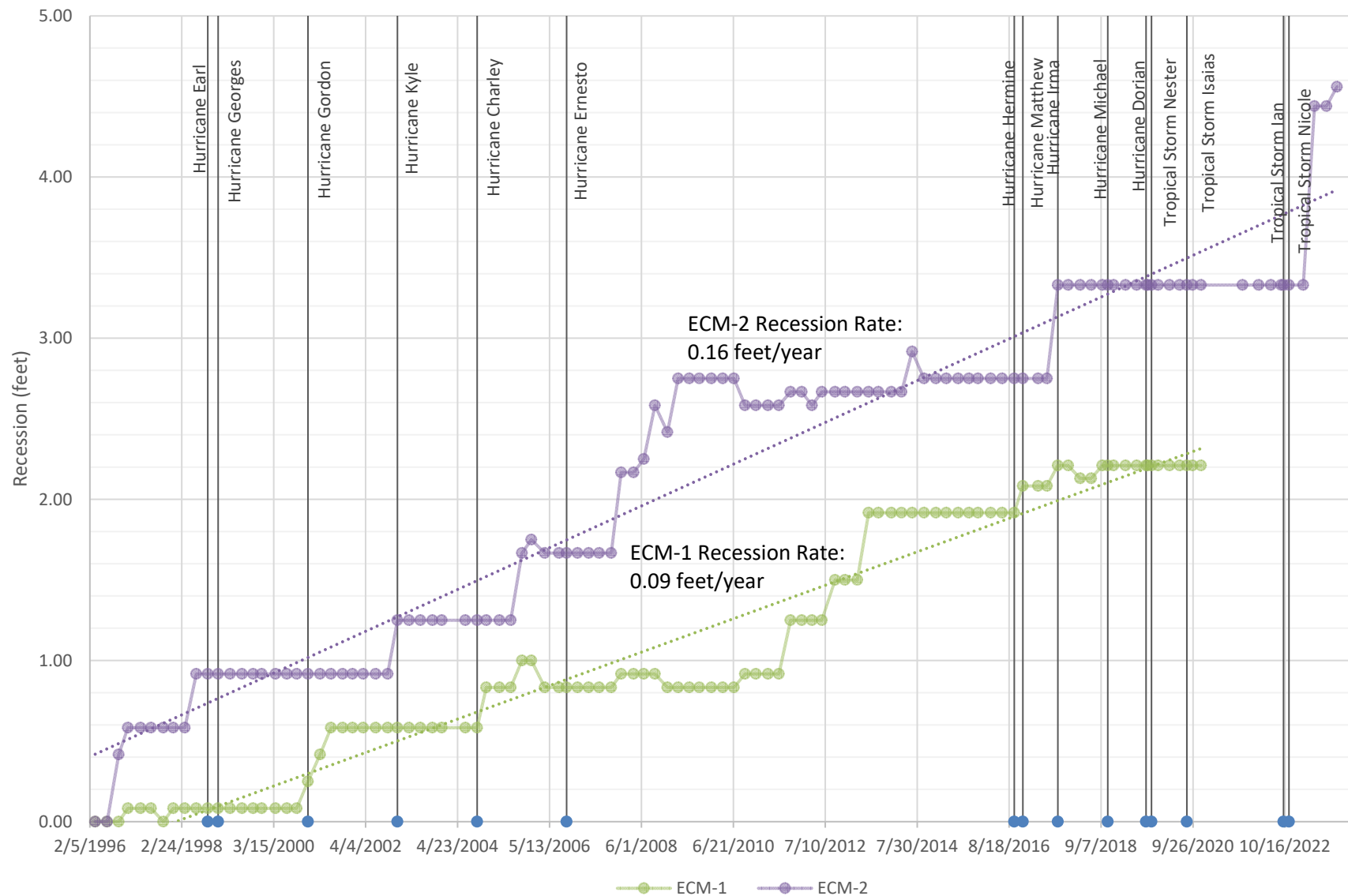


Figure 32. Conceptual Site Model
 Union Carbide Corporation
 Woodbine, Georgia



Jacobs

Figure 33. Recession Rates at ECM-3 and ECM-4
 Permit Renewal Application
 Union Carbide Corporation
 UCC Woodbine, Camden County, Georgia



Jacobs

Figure 34. Recession Rates at ECM-1 and ECM-2
 Permit Renewal Application
 Union Carbide Corporation
 UCC Woodbine, Camden County, Georgia

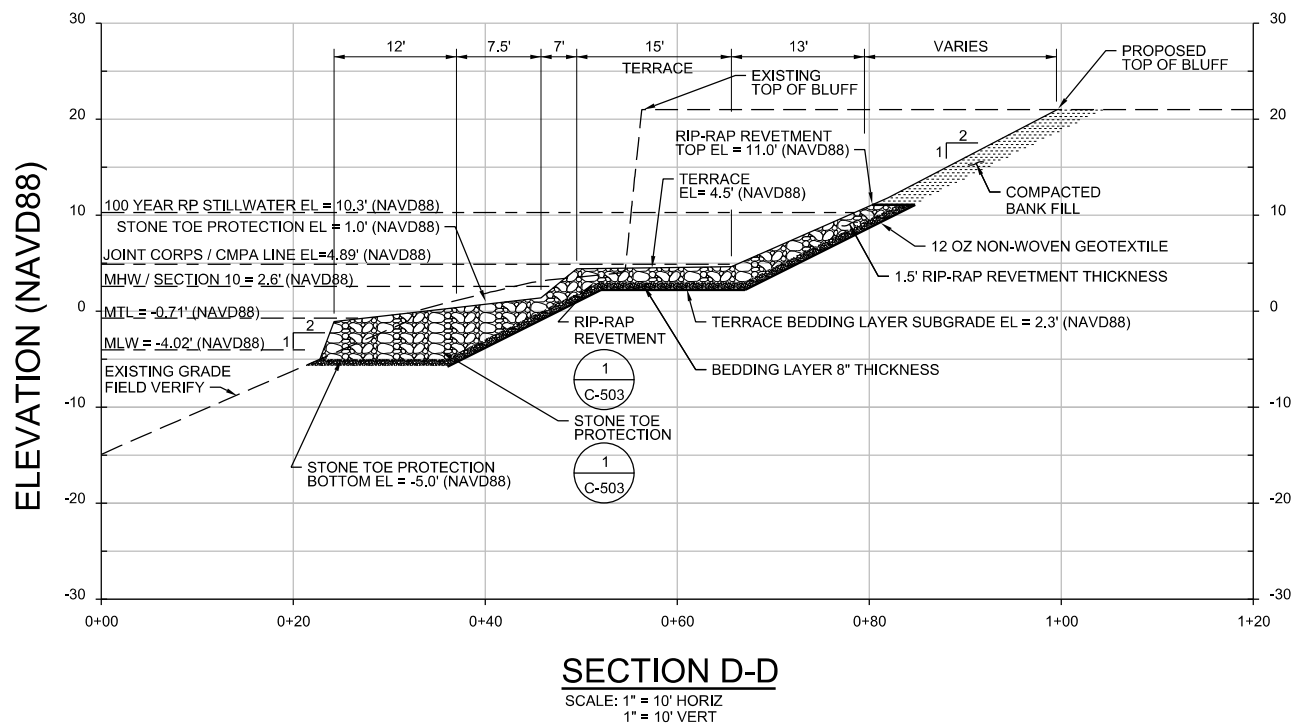
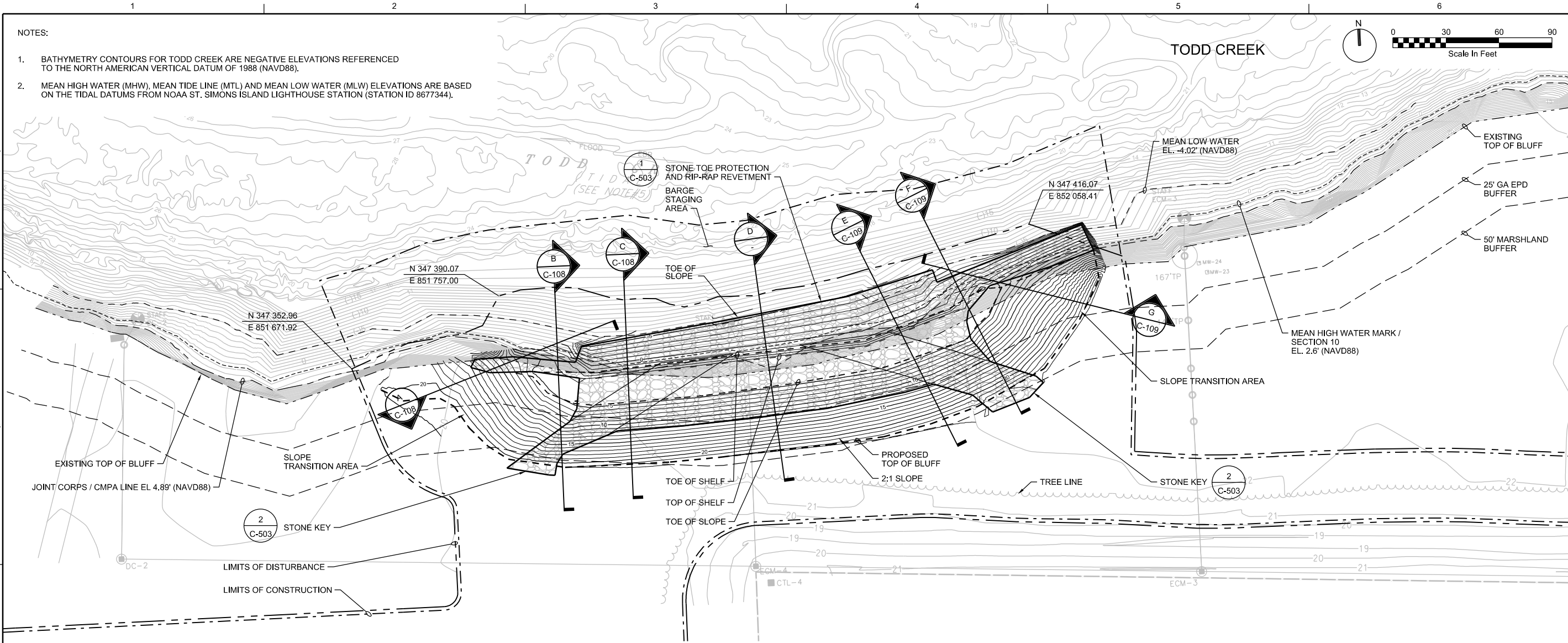


Figure 36. ECM-4 Final Stabilization Plan and Section
Union Carbide Corporation, Woodbine, Georgia

RECORD DRAWINGS

Revisions Drawn By	C. CHILDRRESS	Date	DECEMBER 2021
THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED BY OTHERS. THEY ARE NOT INTENDED TO REPRESENT IN DETAIL THE EXACT LOCATION, TYPE OF COMPONENT NOR MANNER OF CONSTRUCTION. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THE RECORD DRAWINGS.			
DSGN	A. KINSEY	CHK	C. CHILDRRESS
DR	A. KINSEY	APVD	A. SKWARSKI
			C. HAMBLEN

CHRISTOPHER S. HAMBLEN, P.E. 038034
TODD CREEK STREAM BANK
STABILIZATION DESIGN
UNION CARBIDE CORPORATION - WOODBINE
WOODBINE, GEORGIA

JACOBS
CIVIL
ECM-4 STREAM BANK
FINAL STABILIZATION PLAN
AND SECTION

VERIFY SCALE	
BAR IS ONE INCH ON ORIGINAL DRAWING, 1" = 10'	
DATE	NOVEMBER 2019
PROJ	688590
DWG	C-107
SHEET	13 of 24



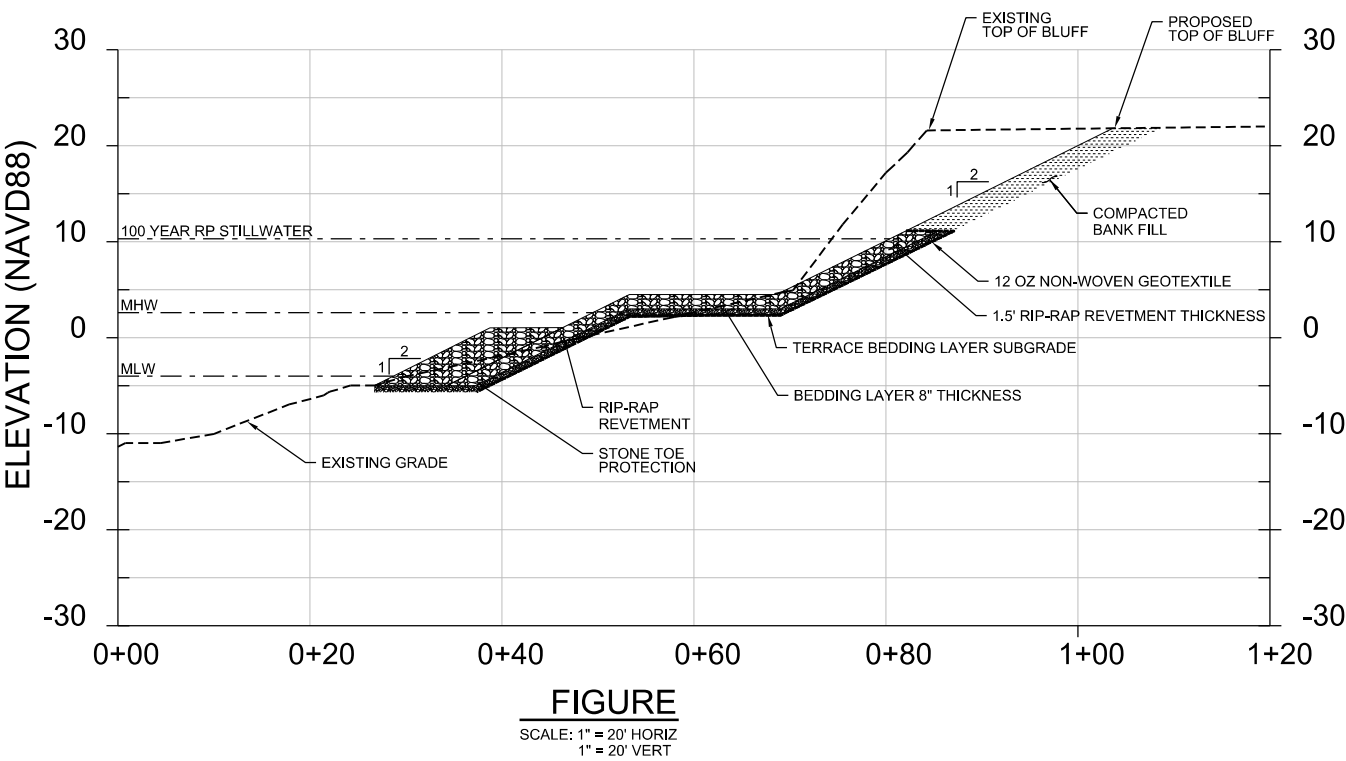
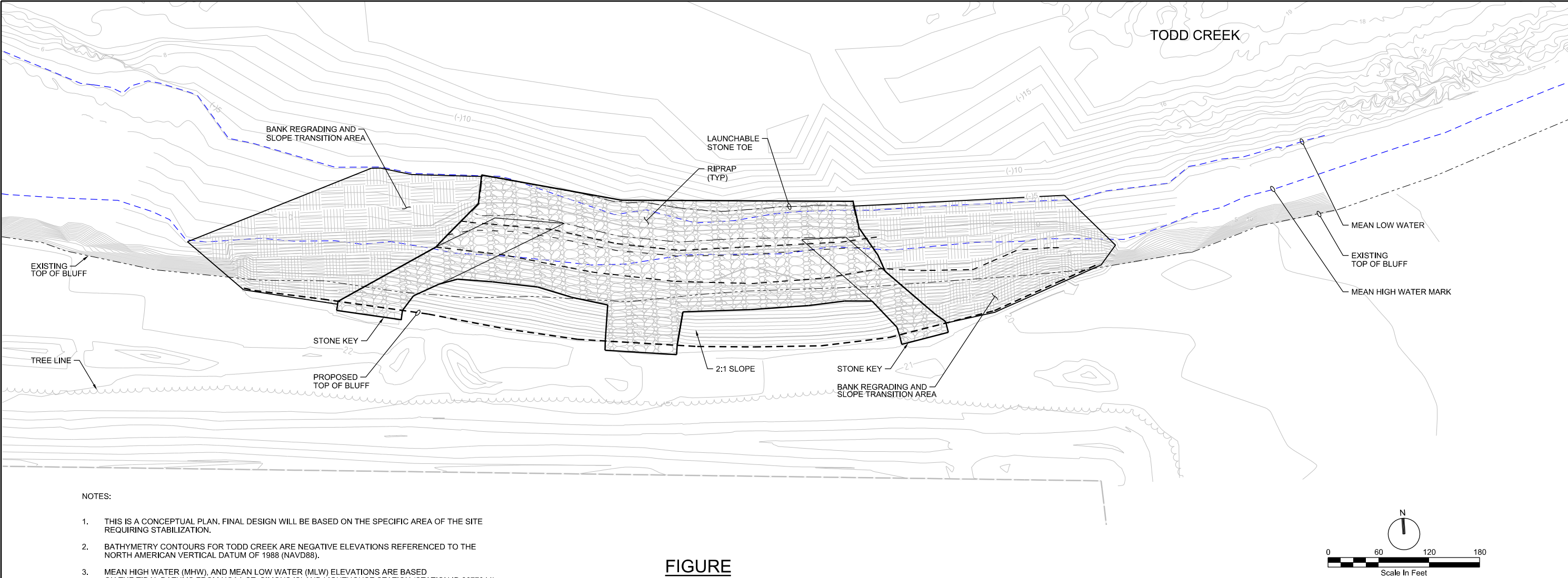
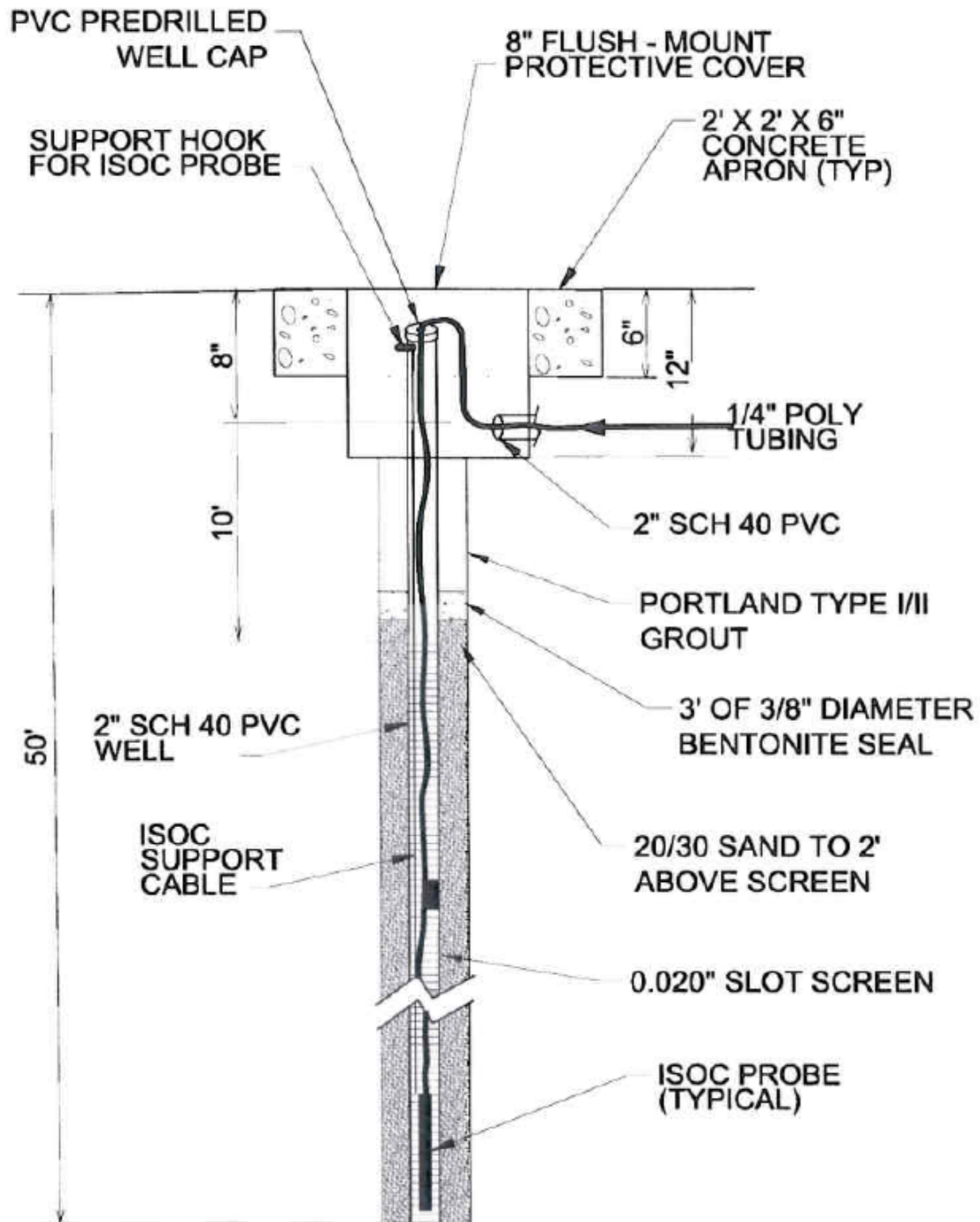


FIGURE 37. CONCEPTUAL PLAN VIEW AND CROSS SECTION OF STREAMBANK STABILIZATION PRIMARY CONTINGENCY UNION CARBIDE CORPORATION UCC WOODBINE, CAMDEN COUNTY, GEORGIA

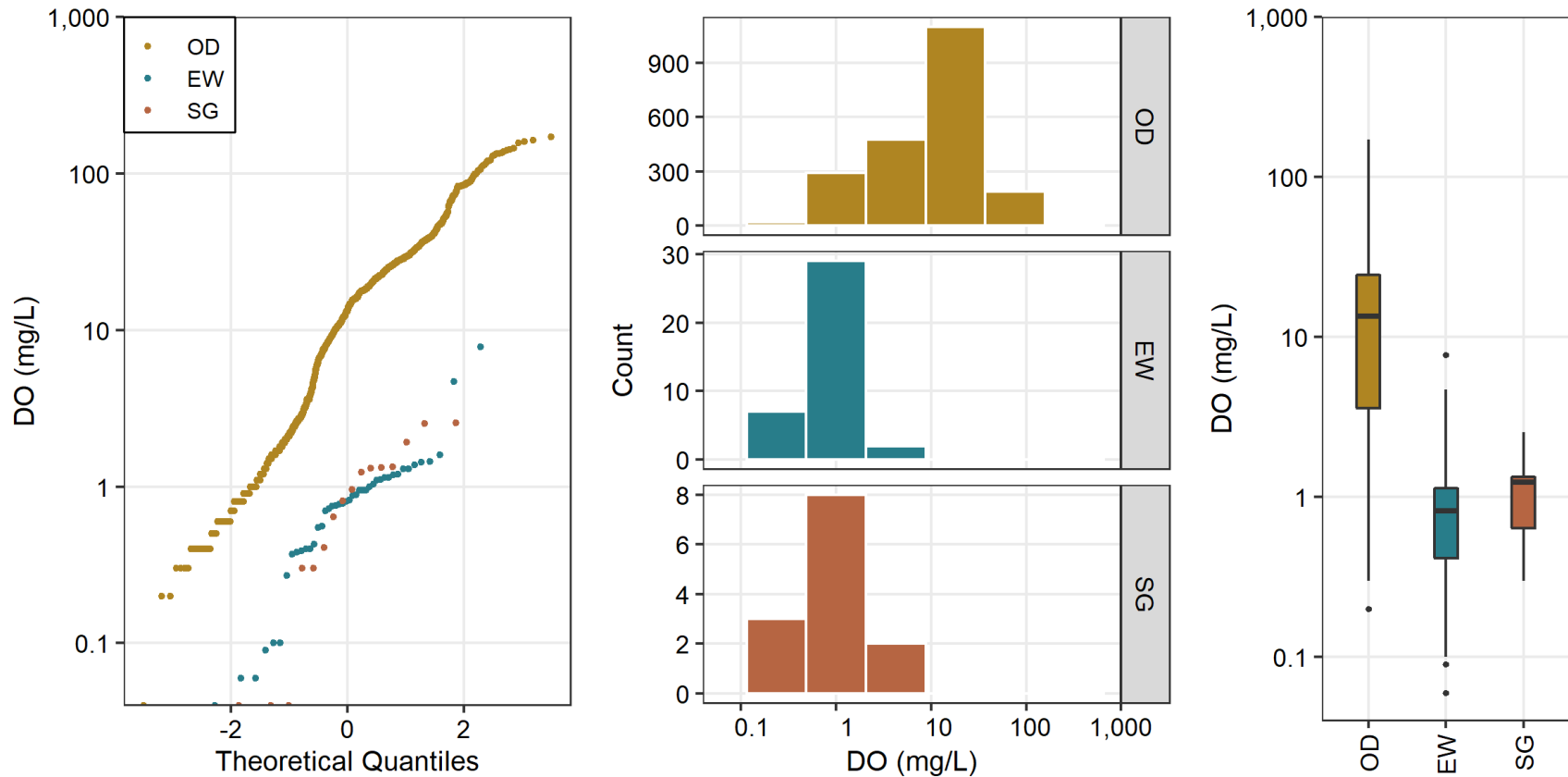




ISOC PROBE
(TYPICAL OF OD-1 THROUGH OD-15)
 NOT TO SCALE

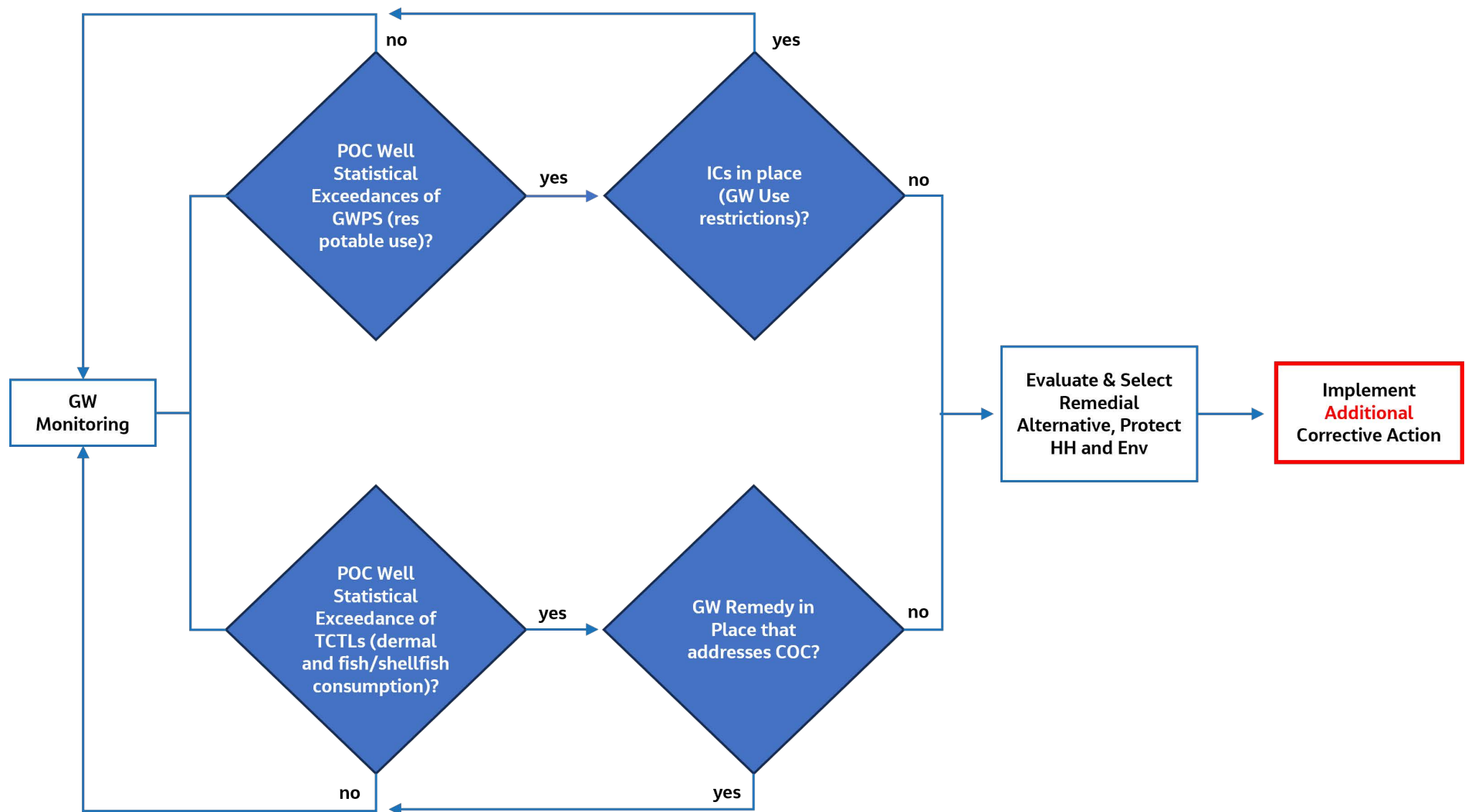
Figure 38. iSOC Well
 Construction Union Carbide
 Corporation Woodbine, Georgia

Dissolved Oxygen Comparison (2017 - 2019) Union Carbide Corporation, Woodbine, Georgia



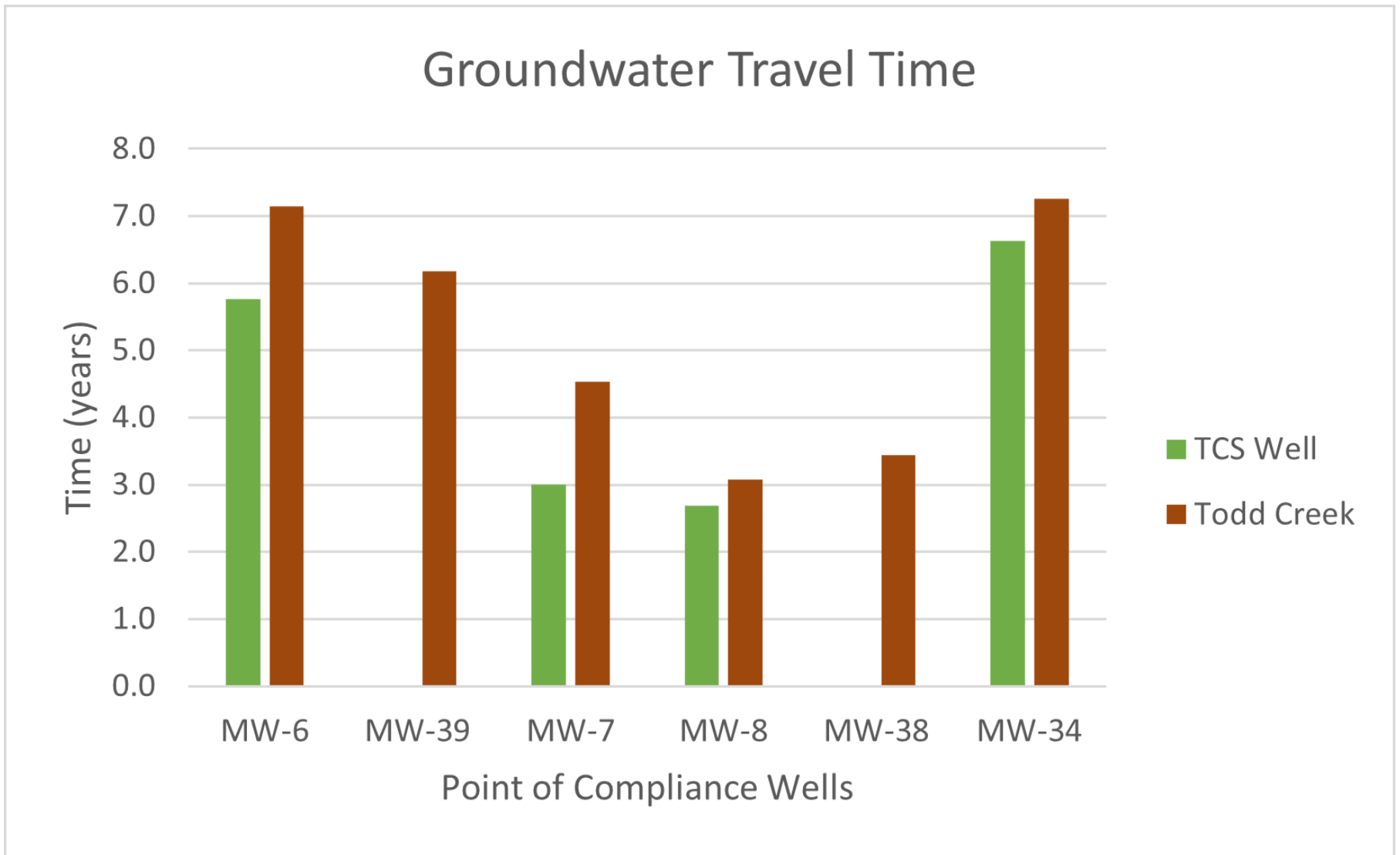
DO – dissolved oxygen
 mg/L – milligrams per liter
 OD – oxygen diffusion wells (OD-1 through OD-15)
 EW – effectiveness wells (MW-7, MW-19, MW-49, MW-50)
 SG – side gradient wells (MW-6, MW-8, MW-38, MW-39)

Figure 39. iSOC Dissolved Oxygen Comparisons
Union Carbide Corporation
Woodbine, Georgia



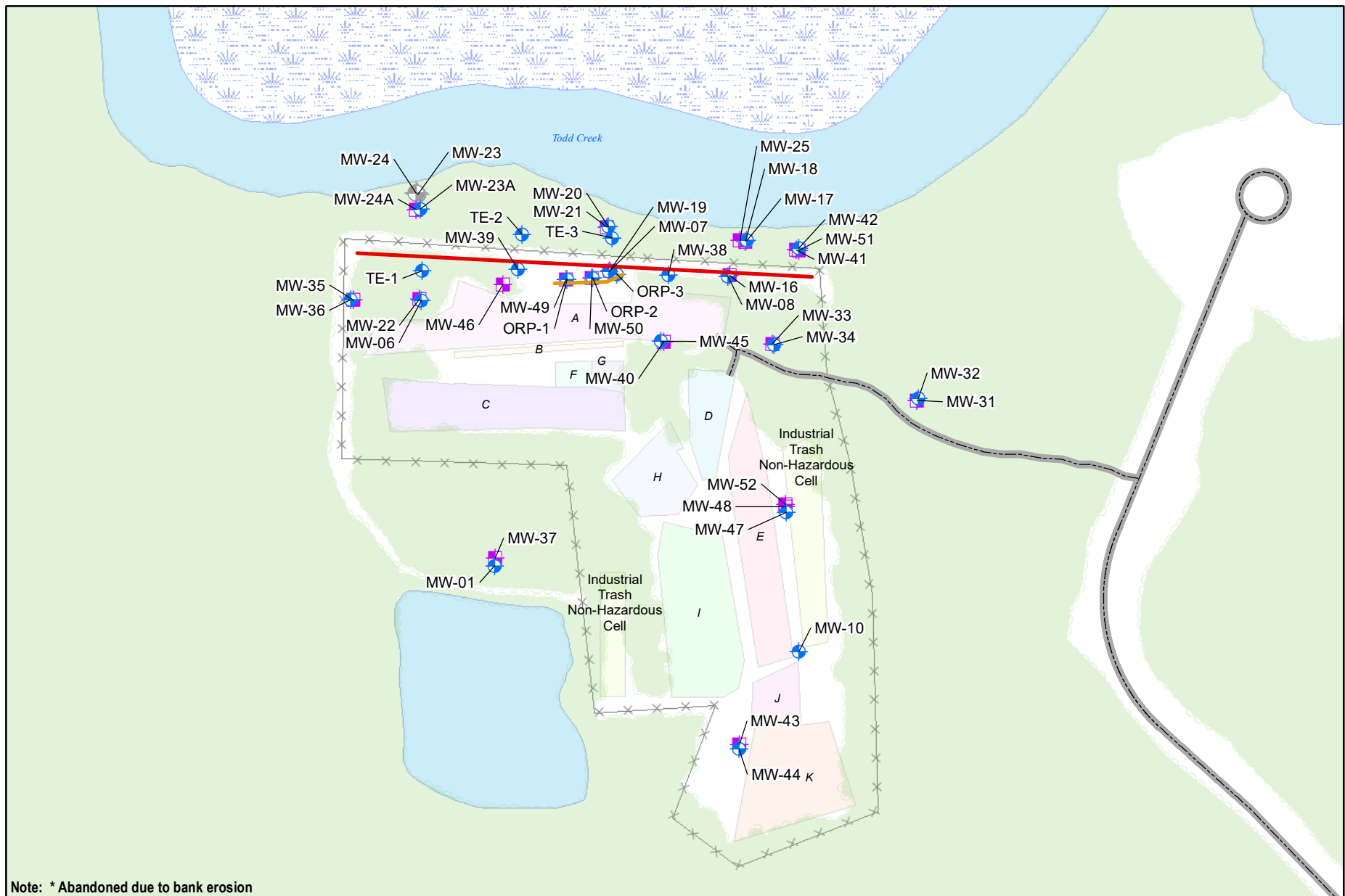
Notes:
 COC = constituent of concern
 Env = environment
 GW = groundwater
 GWPS = Groundwater Protection Standard
 HH = human health
 POC = point of compliance
 res = residential
 TCTL = Todd Creek Trigger Level

Figure 40. Process for Triggering Corrective Action for Groundwater
 Permit Renewal Application
 Union Carbide Corporation
 UCC Woodbine, Camden County, Georgia



Note: Travel time is in years from the Point of Compliance (POC) Well to the nearby Todd Creek Sentinel (TCS) Well or Todd Creek.

Figure 41. Groundwater Travel Time from POC Wells to TCS Wells and Todd Creek
Union Carbide Corporation
Woodbine, Georgia



- | | | | |
|-------------------------------|--------|-------------------------------------|-------------|
| Shallow Monitoring Well | Cell A | Cell G | Water |
| Deep Monitoring Well | Cell B | Cell H | Swamp/Marsh |
| Approximate Air Sparging Area | Cell C | Cell I | |
| Existing iSOC System | Cell D | Cell J | |
| Road | Cell E | Cell K | |
| Treeline | Cell F | Industrial Trash Non-Hazardous Cell | |
| Fence | | | |

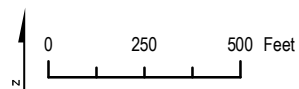
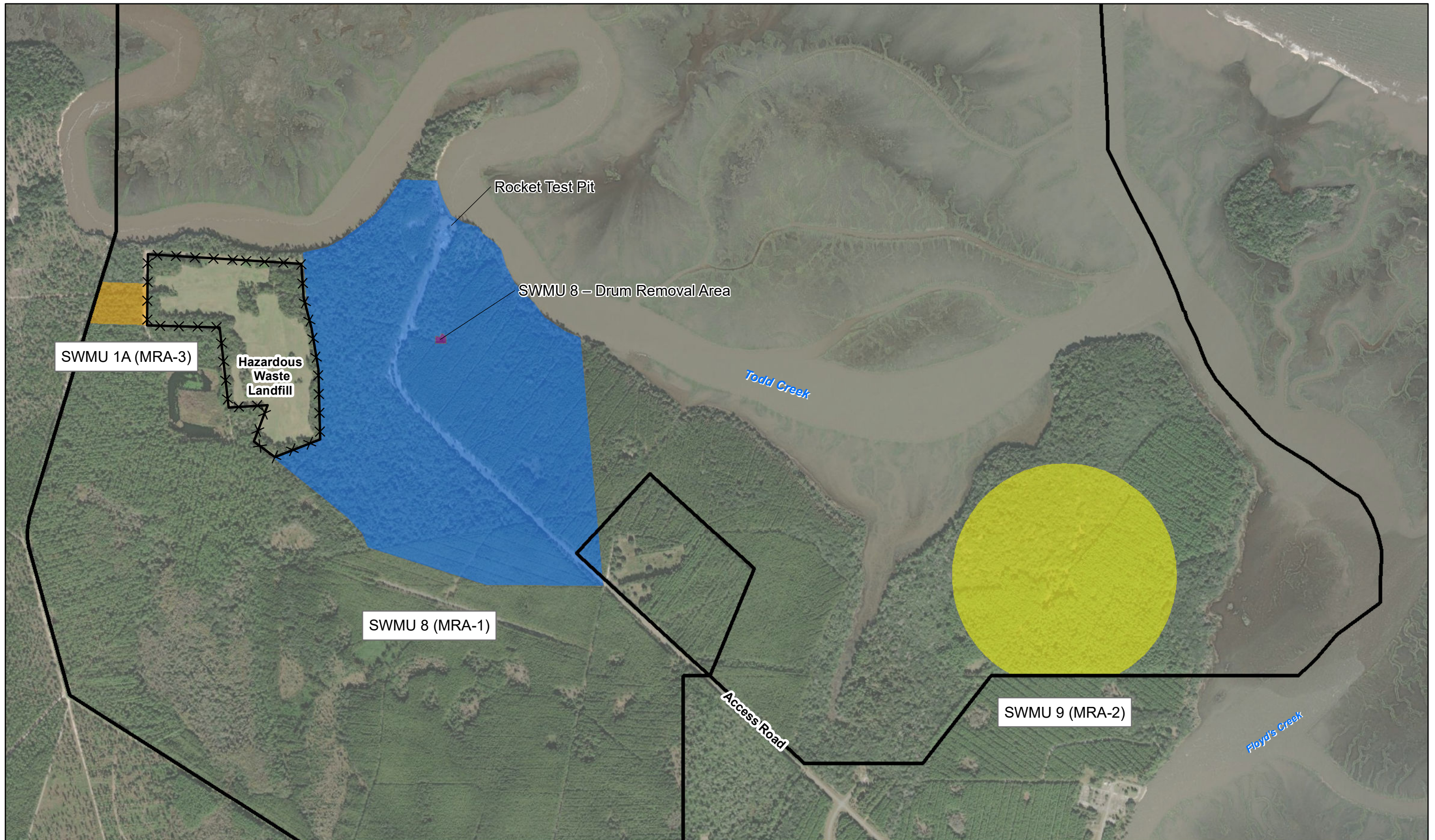


Figure 42. Groundwater Corrective Action Location
 Union Carbide Corporation
 UCC Woodbine, Camden County, Georgia



- | | |
|-----------------|-------------------|
| Site Boundary | SWMU 9 (MRA-2) |
| SWMU 1A (MRA-3) | Drum Removal Area |
| SWMU 8 (MRA-1) | Landfill Fence |

Note:
ESRI Aerial from ArcGIS Online, Dated 11/18/2020

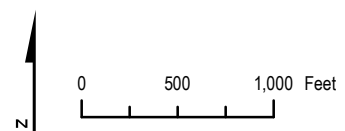


Figure 43. Location of SWMUs 8, 9, and 1A
Union Carbide Corporation
UCC Woodbine, Camden County, Georgia

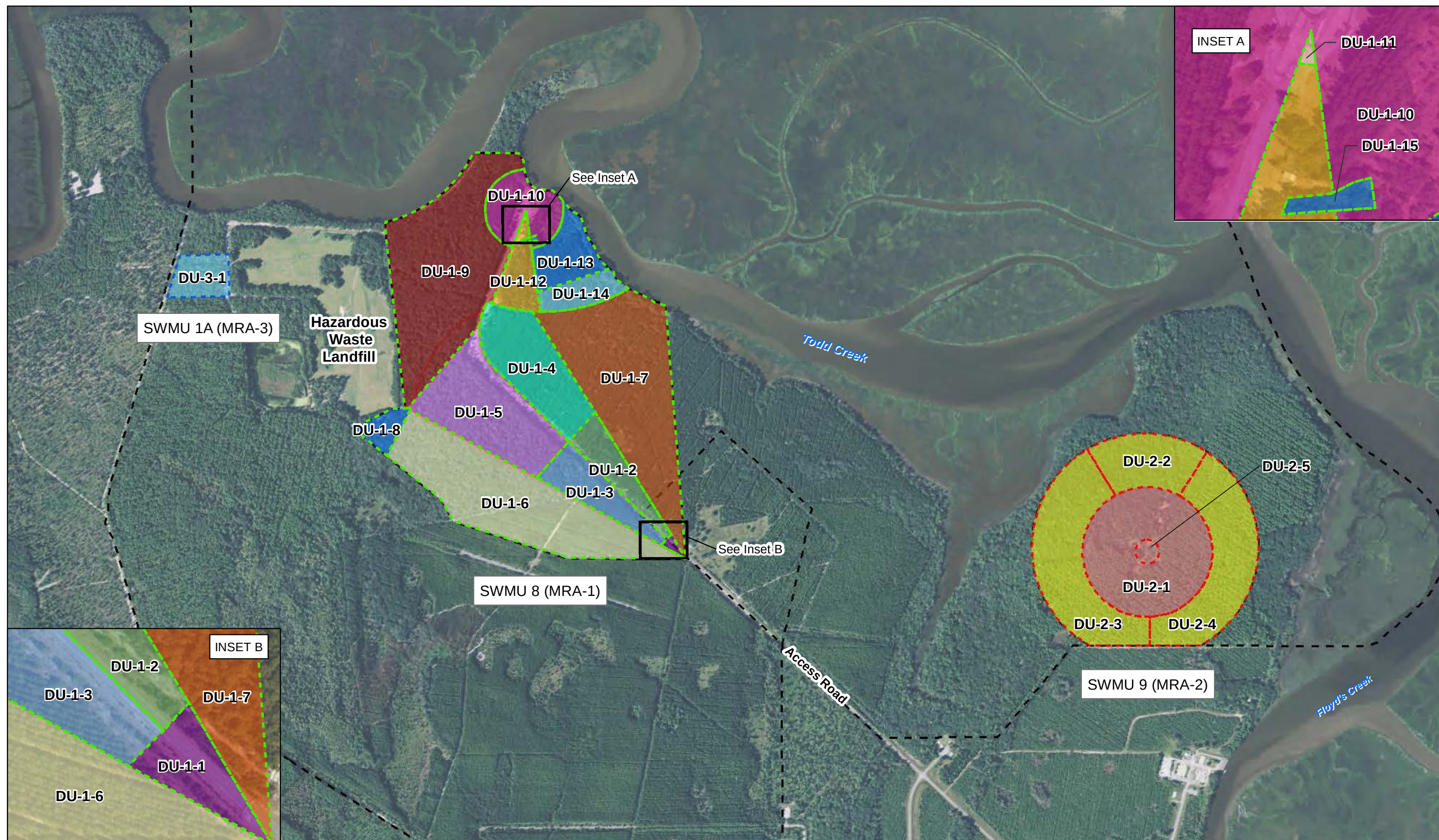


Figure 44. Surface Soil Sampling Decision Units
 Union Carbide Corporation
 Woodbine, Georgia



- Monitoring Well Location
- Test Pit Location
- Road
- SWMU 2 Area
- Salt Marsh and Wetlands
- Property Boundary
- Past Industrial Use Areas

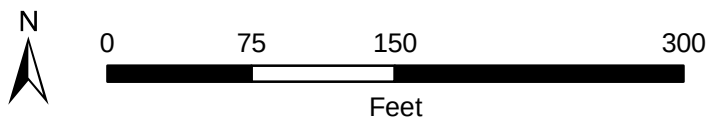
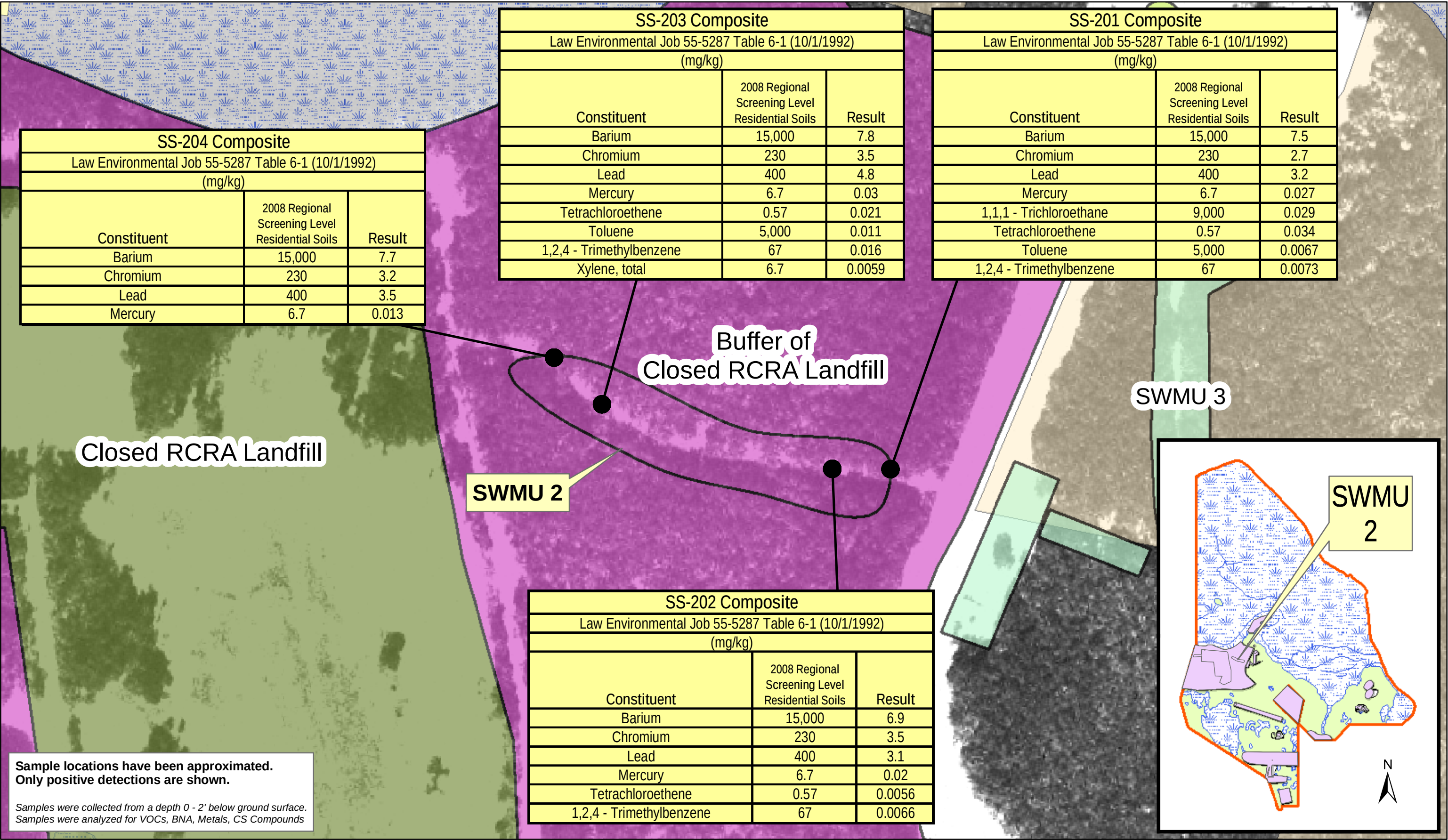


Figure 45. SWMU 2 - Surface Storage of Empty Drums
Union Carbide Corporation
Woodbine, Georgia

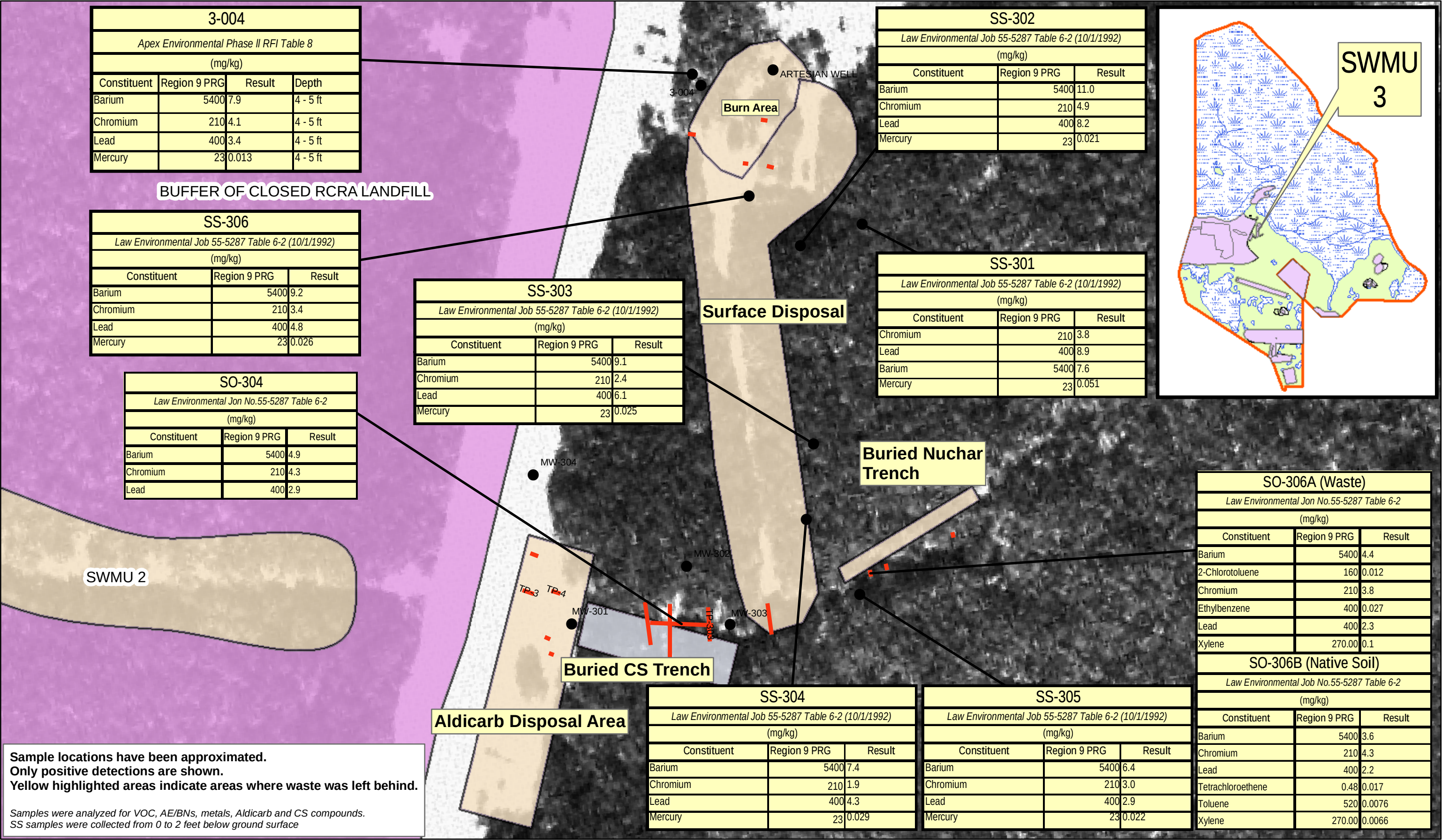


Salt Marsh and Wetlands

Site Boundary



0 75 150 300
Feet



Site Boundary



0 75 150 300
Feet

Figure 47. SWMU 3 - Historical Soil Data
Union Carbide Corporation
Woodbine, Georgia

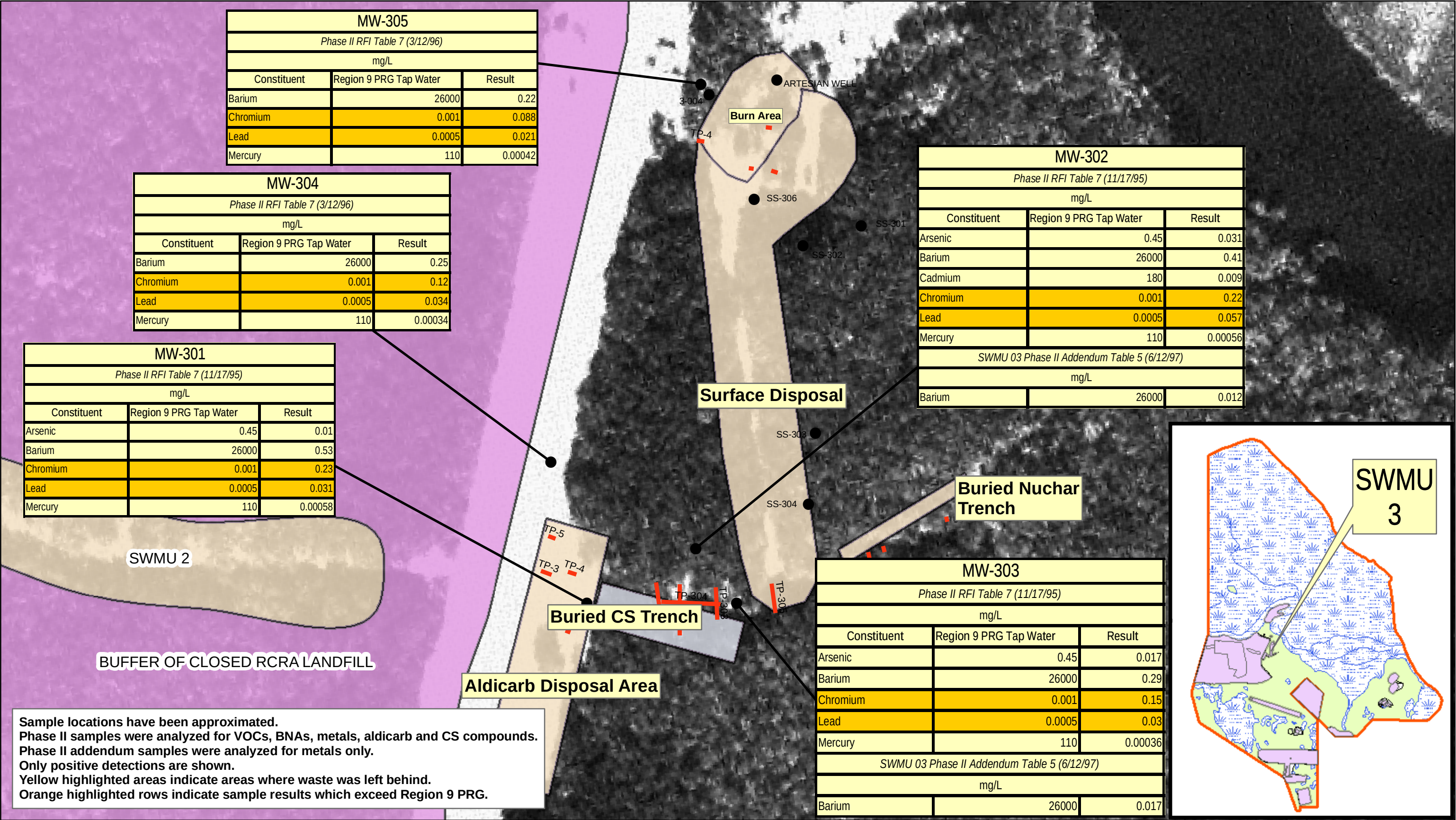
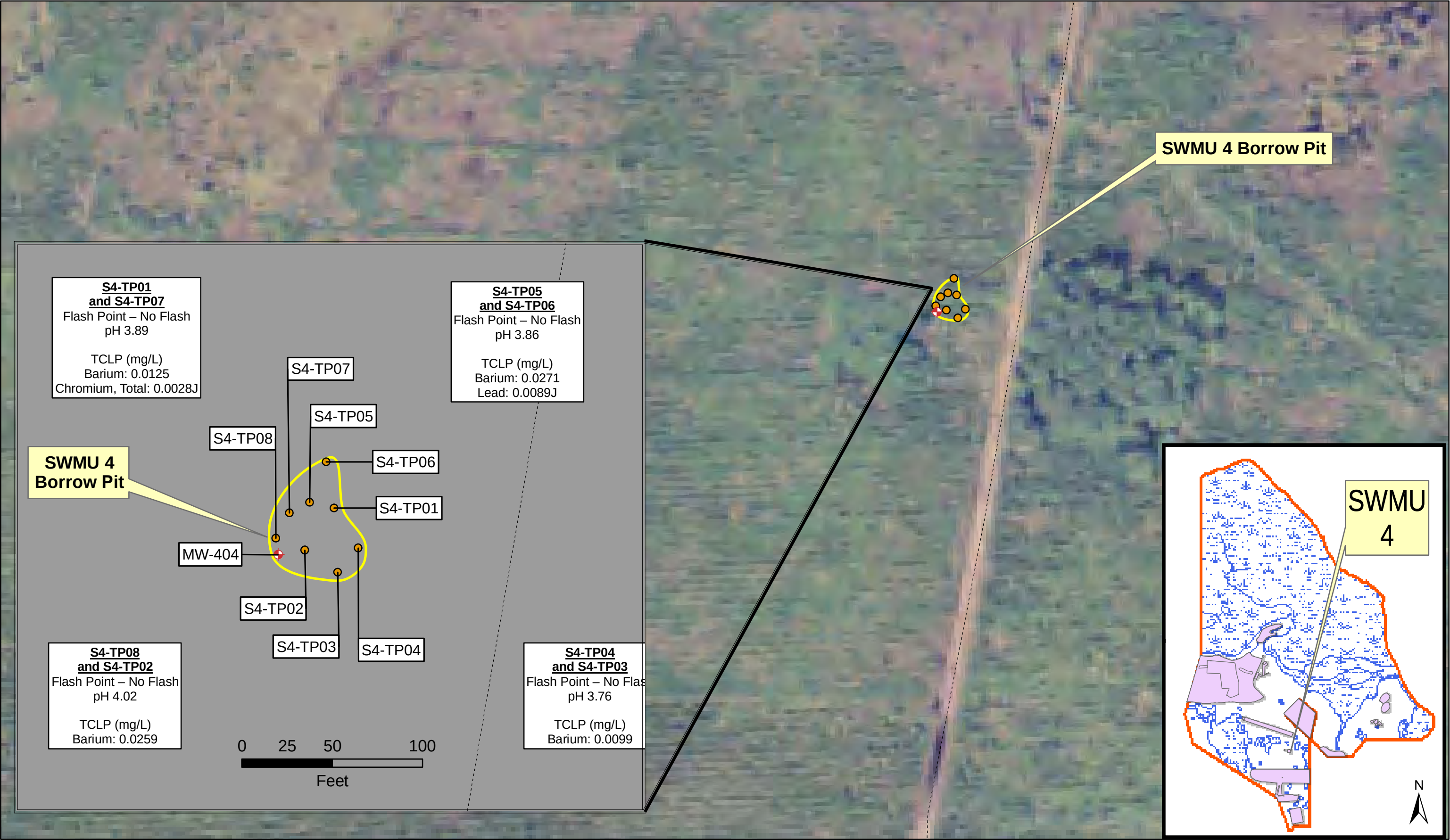


Figure 48. SWMU 3 - Historical Groundwater Data
Union Carbide Corporation
Woodbine, Georgia



Monitoring Well Location
Test Pit Location
Road
SWMU 4 Area
Salt Marsh and Wetlands
Property Boundary
Past Industrial Use Areas

mg/L = milligrams per liter
J = Estimated
Note: Data shows detections only.

Figure 49. SWMU 4 - Borrow Pit Historical Soil Data
Union Carbide Corporation
Woodbine, Georgia

SO-402A		
(collected 3 ft bgs in waste)		
Law Environmental Job 55-5287 Table 6-3		
(mg/kg)		
Constituent	2008 Regional Screening Level Residential Soils	Result
Barium	15,000	3.4
Chromium	230	4.9
Lead	400	3.1
Mercury	6.7	0.013
4-Methylphenol (p-cresol)	310	0.41
Toluene	5,000	0.0075

SO-402B		
(collected from native soils beneath waste)		
Law Environmental Job 55-5287 Table 6-3		
(mg/kg)		
Constituent	2008 Regional Screening Level Residential Soils	Result
Aldicarb	61	0.24
1,2-Dichloroethane	0.45	0.019
Methyl Chloride	11	0.025
Tetrachloroethene	0.57	0.035
Toluene	5,000	0.2
1,1,1-Trichloroethane	9,000	0.019

Sample locations have been approximated.
Only positive detections are shown.

Samples were analyzed for VOC, AE/BNs, metals, Aldicarb and pH

E – See lab report included as Appendix D of the Phase 1 RFI

Samples were collected from indigenous soils @ 2' intervals.
Sample interval with greatest PID reading was selected for laboratory analysis.

 Salt Marsh and Wetlands

 Site Boundary

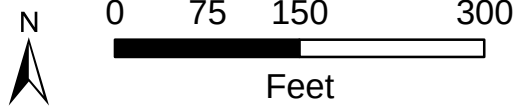
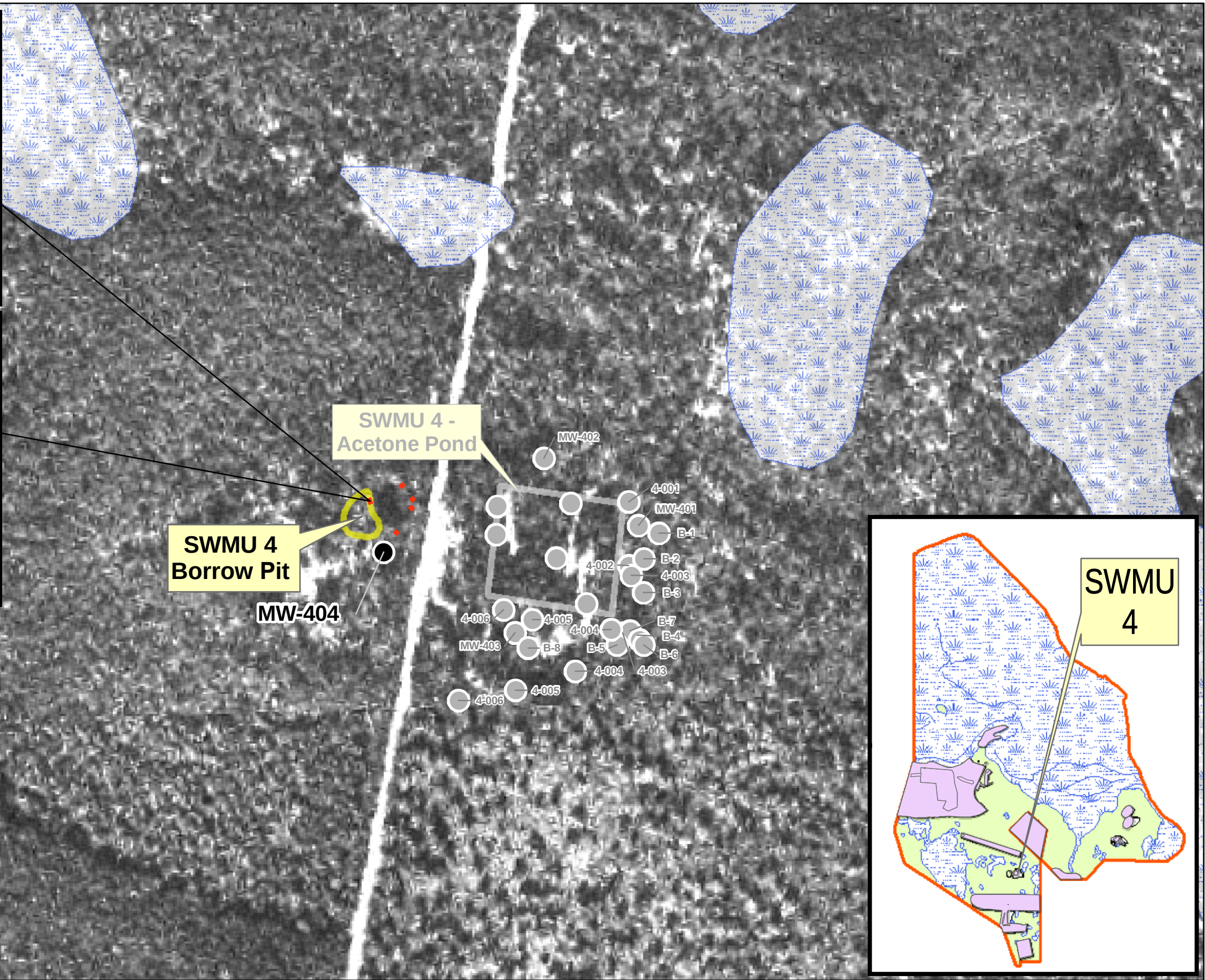
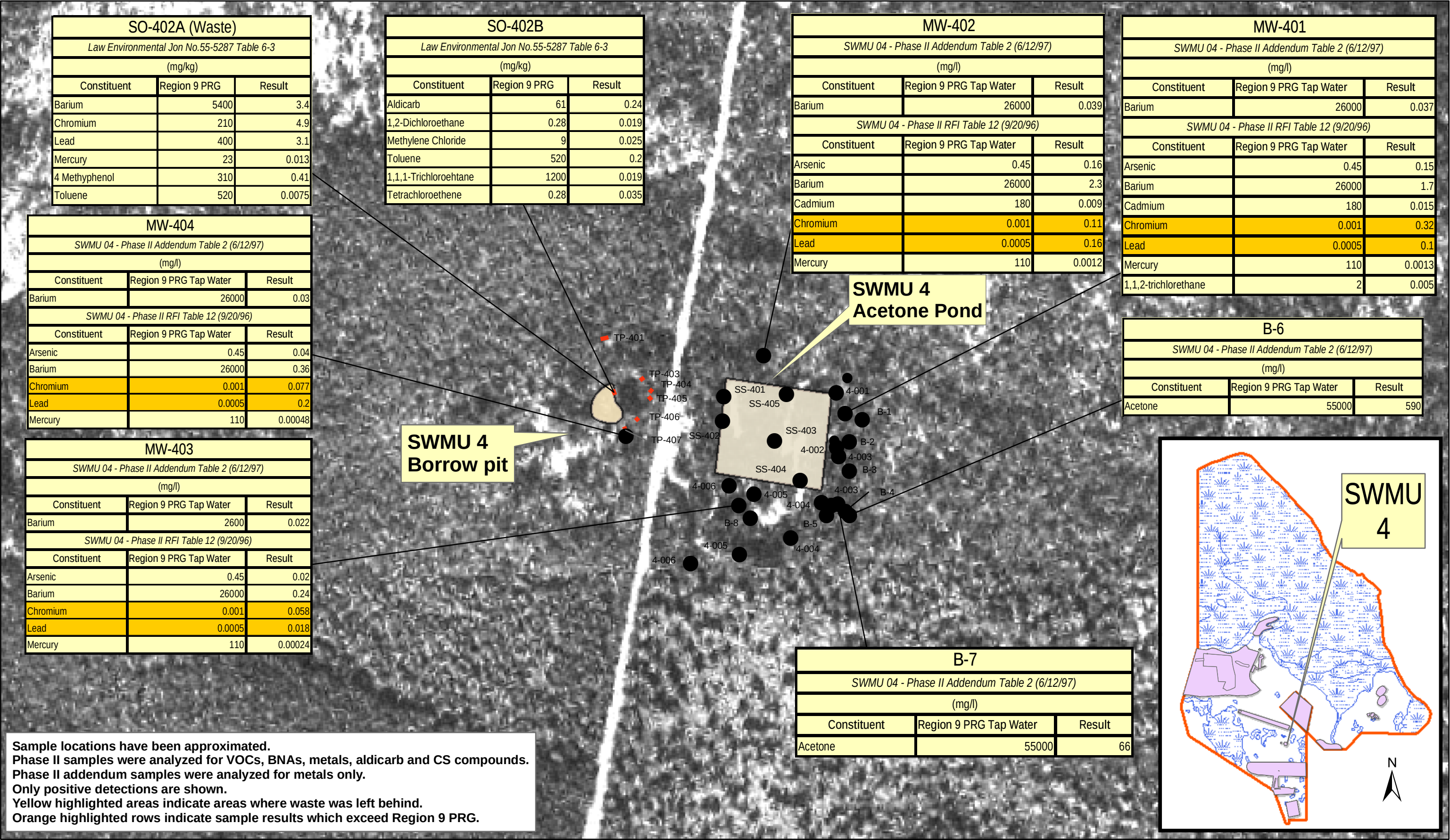


Figure 50. SWMU 4 - Borrow Pit Area Historical Soil Data
Union Carbide Corporation
Woodbine, Georgia



Site Boundary

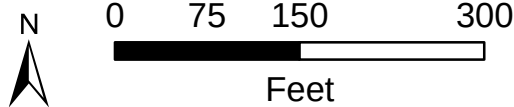


Figure 51. SWMU 4 - Historical Groundwater Data
Union Carbide Corporation
Woodbine, Georgia



Figure 52. SWMU 4 - Acetone Pond Historical Soil Data
Union Carbide Corporation
Woodbine, Georgia



SWMU 5 - Surface Disposal Area

SWMU 5 - Surface Disposal Area

SWMU 5

- Property Boundary
- Salt Marsh and Wetlands
- SWMU 5 - Surface Disposal Area
- Past Industrial Use Area

Figure 53. SWMU 5 - Disposal Area
Union Carbide Corporation
Woodbine, Georgia

SS-502			
Law Environmental Job 55-5287 Table 6-4			
(mg/kg)			
Constituent	2008 Regional Screening Level Residential Soils	Result	Depth
Barium	15,000	2.1	2 ft
Chromium	230	2.3	2 ft
Lead	6.7	2.8	2 ft
Mercury	0.57	0.016	2 ft
Tetrachloroethene	0.48	0.011	2 ft
Toluene	5,000	0.064	2 ft

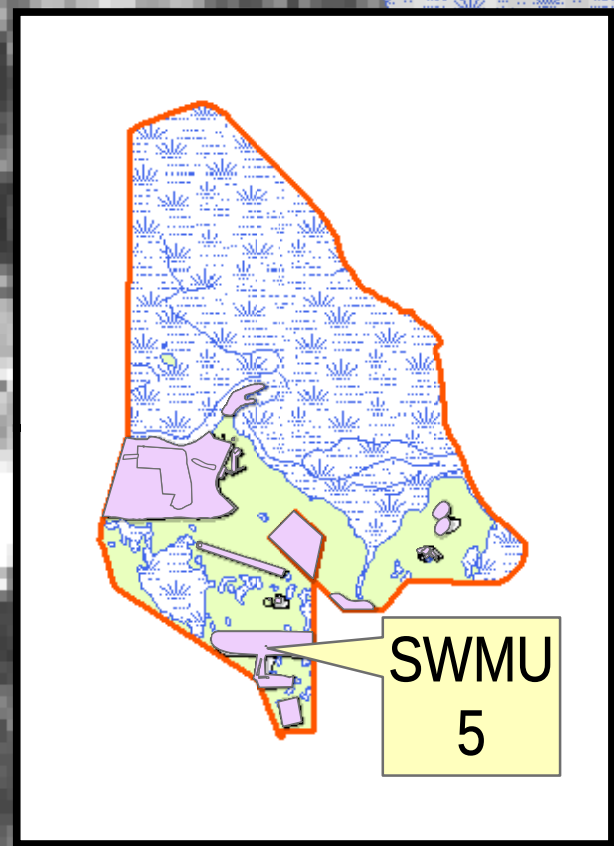
SS-503			
Law Environmental Job 55-5287 Table 6-4			
(mg/kg)			
Constituent	2008 Regional Screening Level Residential Soils	Result	Depth
Barium	15,000	2.7	2 ft
Chromium	230	2.7	2 ft
Lead	400	3.3	2 ft
Mercury	6.7	0.015	2 ft

SS-504			
Law Environmental Job 55-5287 Table 6-4			
(mg/kg)			
Constituent	2008 Regional Screening Level Residential Soils	Result	Depth
Barium	15,000	4.1	2 ft
Chromium	230	2.5	2 ft
Lead	400	3.9	2 ft
Mercury	6.7	0.013	2 ft
bis(2-ethylhexyl)phthalate	35	0.43	2 ft

SS-501			
Law Environmental Job 55-5287 Table 6-4			
(mg/kg)			
Constituent	2008 Regional Screening Level Residential Soils	Result	Depth
Barium	15,000	2.7	2 ft
Chromium	230	3.4	2 ft
Lead	400	2.5	2 ft
Mercury	6.7	0.028	2 ft

SS-501 Waste			
Law Environmental Job 55-5287 Table 6-4			
(mg/kg)			
Constituent	2008 Regional Screening Level Residential Soils	Result	Depth
Aldicarb	61	0.035	10 in
Barium	15,000	3.6	10 in

SS-505			
Law Environmental Job 55-5287 Table 6-4			
(mg/kg)			
Constituent	2008 Regional Screening Level Residential Soils	Result	Depth
Barium	15,000	2.5	2 ft
Chromium	230	3	2 ft
Lead	400	2.6	2 ft
Mercury	6.7	0.022	2 ft
Tetrachloroethene	0.57	0.0075	2 ft
Toluene	5,000	0.085	2 ft
bis(2-ethylhexyl)phthalate	35	0.47	2 ft



Sample locations have been approximated
Only positive detections are shown
All samples analyzed for VOCs, BNAs, metals and aldicarb

Loop Rd - Equipment & Material Surface Storage

SWMU 5 - Aldicarb Oxime Disposal

- Salt Marsh and Wetlands
- Site Boundary

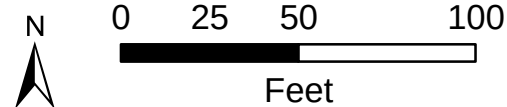
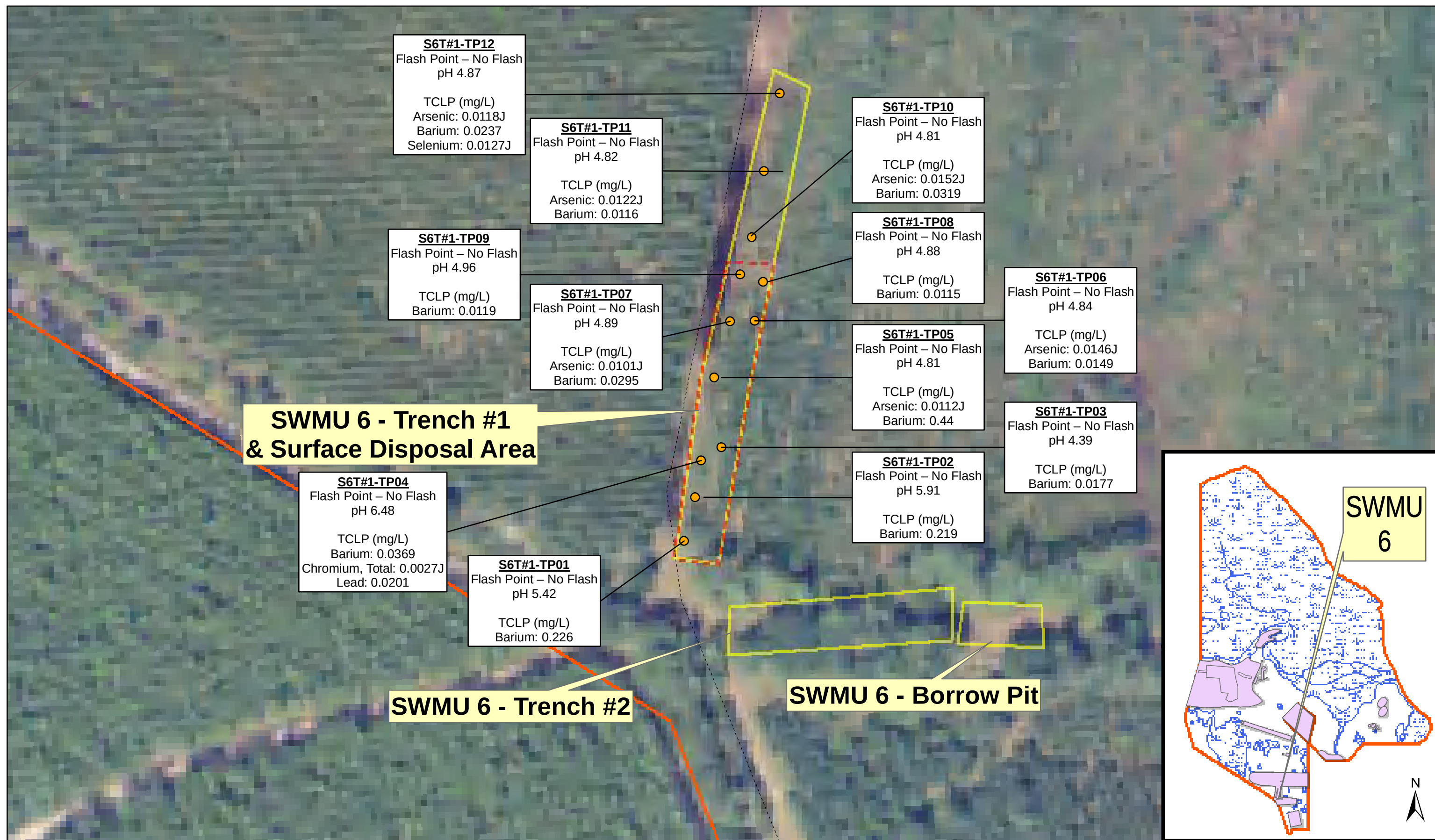


Figure 54. SWMU 5 - Disposal Area Historical Soil Data
Union Carbide Corporation
Woodbine, Georgia



- - - - - SWMU 6 - Trench #1 Impacted Area
 Salt Marsh and Wetlands
 Site Boundary
 ● Test Pit Sample Location
 - - - - - Road

mg/L = milligrams per liter
 J = Estimated
 Note: Data shows detections only.

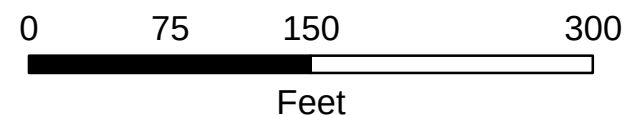


Figure 55. SWMU 6 - Surface Disposal Area/Disposal Trench #1
 Historical Soil Data
 Union Carbide Corporation
 Woodbine, Georgia

SS-603		
Law Environmental Job 55-5267 Table 6-5		
(mg/kg)		
Constituent	2008 Regional Screening Level Residential Soils	Result
Barium	15,000	7.4
Chromium	230	3.6
Lead	400	3.5
Mercury	6.7	0.018

SS-602		
Law Environmental Job 55-5267 Table 6-5		
(mg/kg)		
Constituent	2008 Regional Screening Level Residential Soils	Result
Barium	15,000	1.9
Chromium	230	1.9
Lead	400	2.6
Mercury	6.7	0.015

SS-601		
Law Environmental Job 55-5267 Table 6-5		
(mg/kg)		
Constituent	2008 Regional Screening Level Residential Soils	Result
Barium	15,000	2.3
Chromium	230	2.1
Lead	400	1.3
Mercury	6.7	0.023
Toluene	5,000	0.02

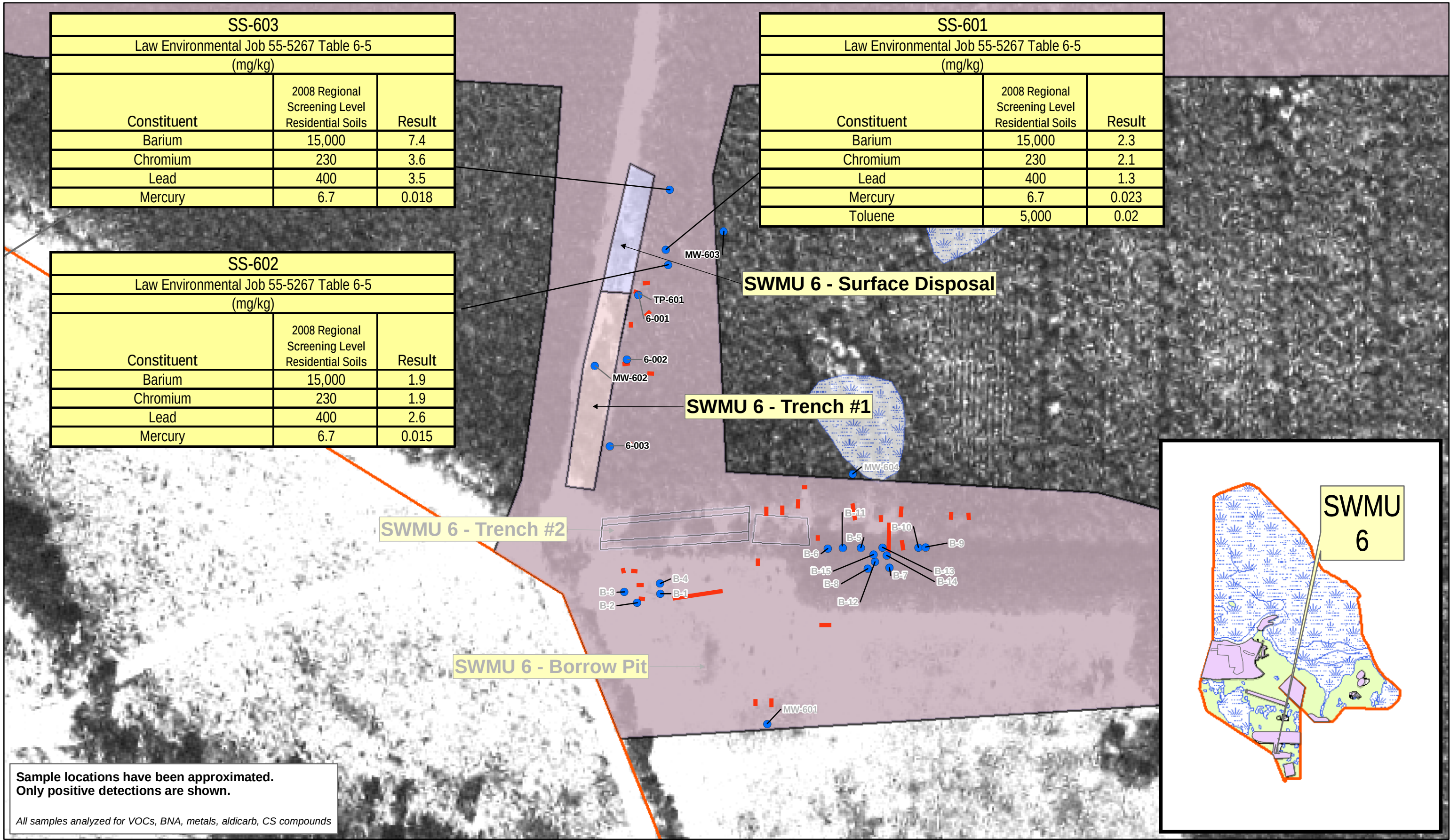
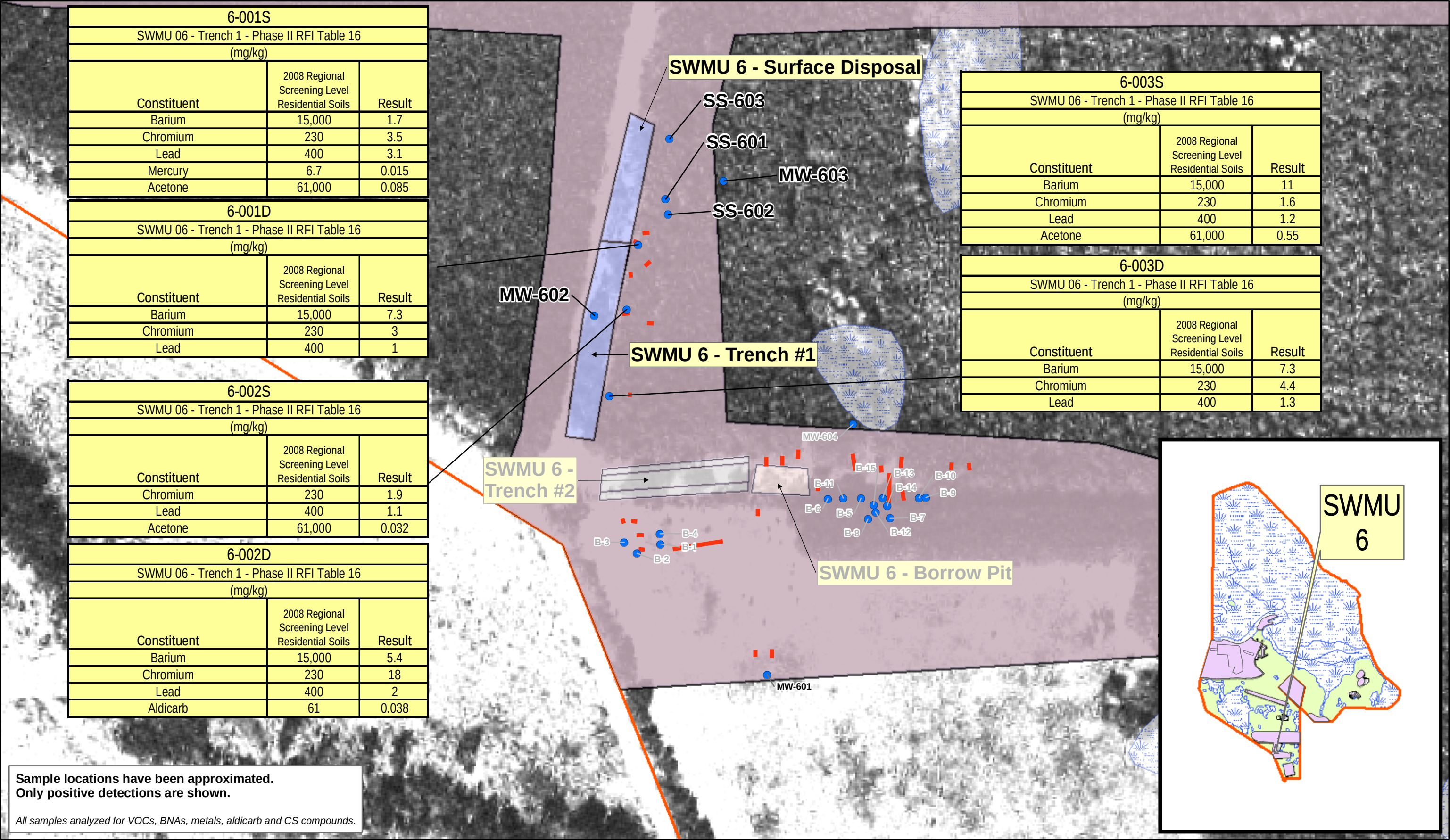
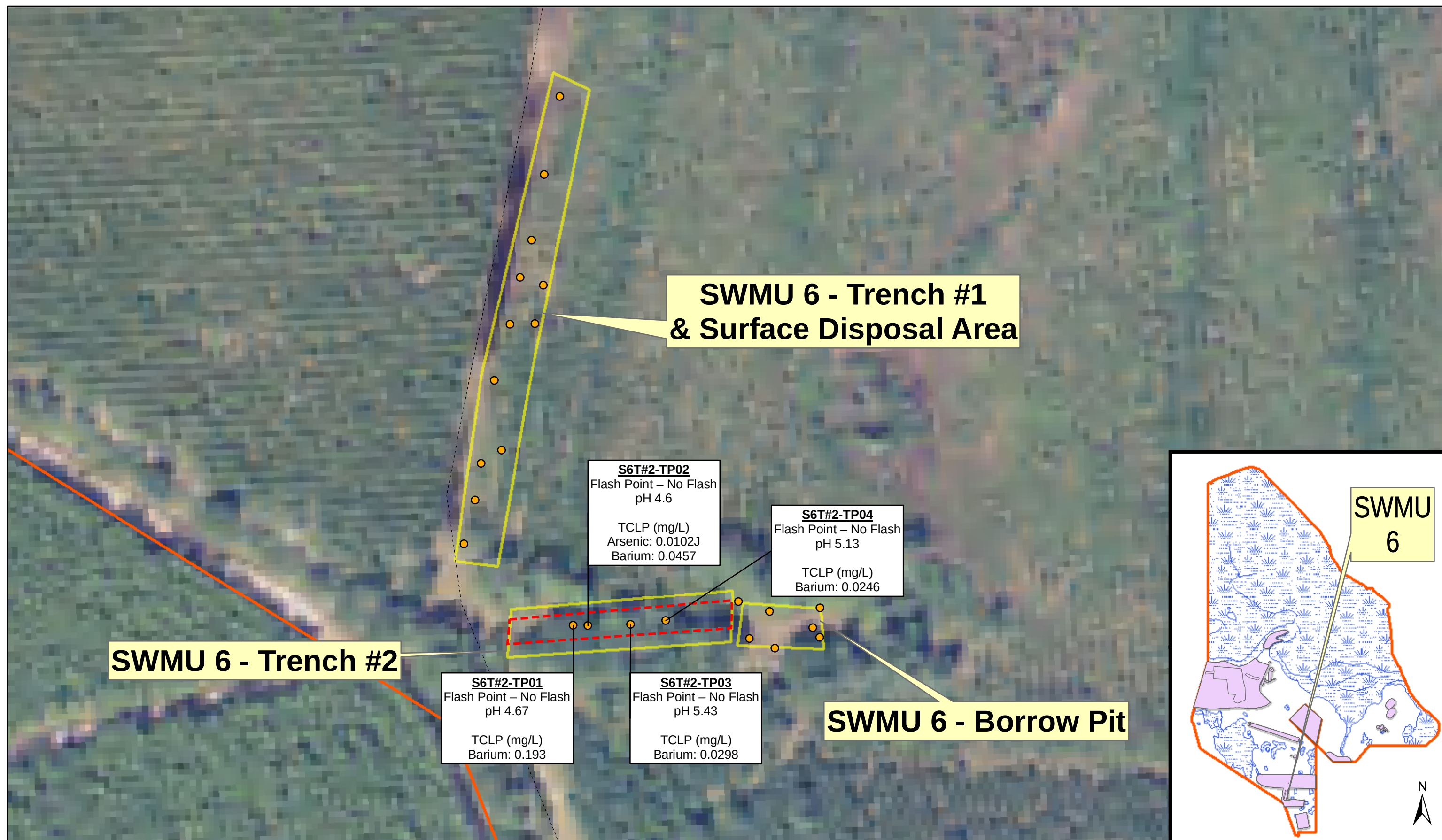


Figure 56. SWMU 6 - Surface Disposal Area/Disposal Trench #1
 Historical Soil Data
 Union Carbide Corporation
 Woodbine, Georgia





- SWMU 6 - Trench #2 Impacted Area
- SWMU 6
- Salt Marsh and Wetlands
- + Monitoring Well Location
- Site Boundary
- Test Pit Sample Location
- Past Industrial Use Areas
- Road

mg/L = milligrams per liter
J = Estimated

Note: Data shows detections only.

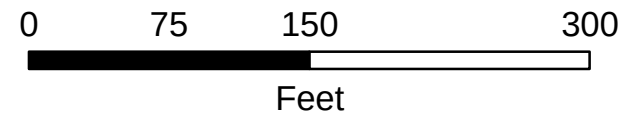
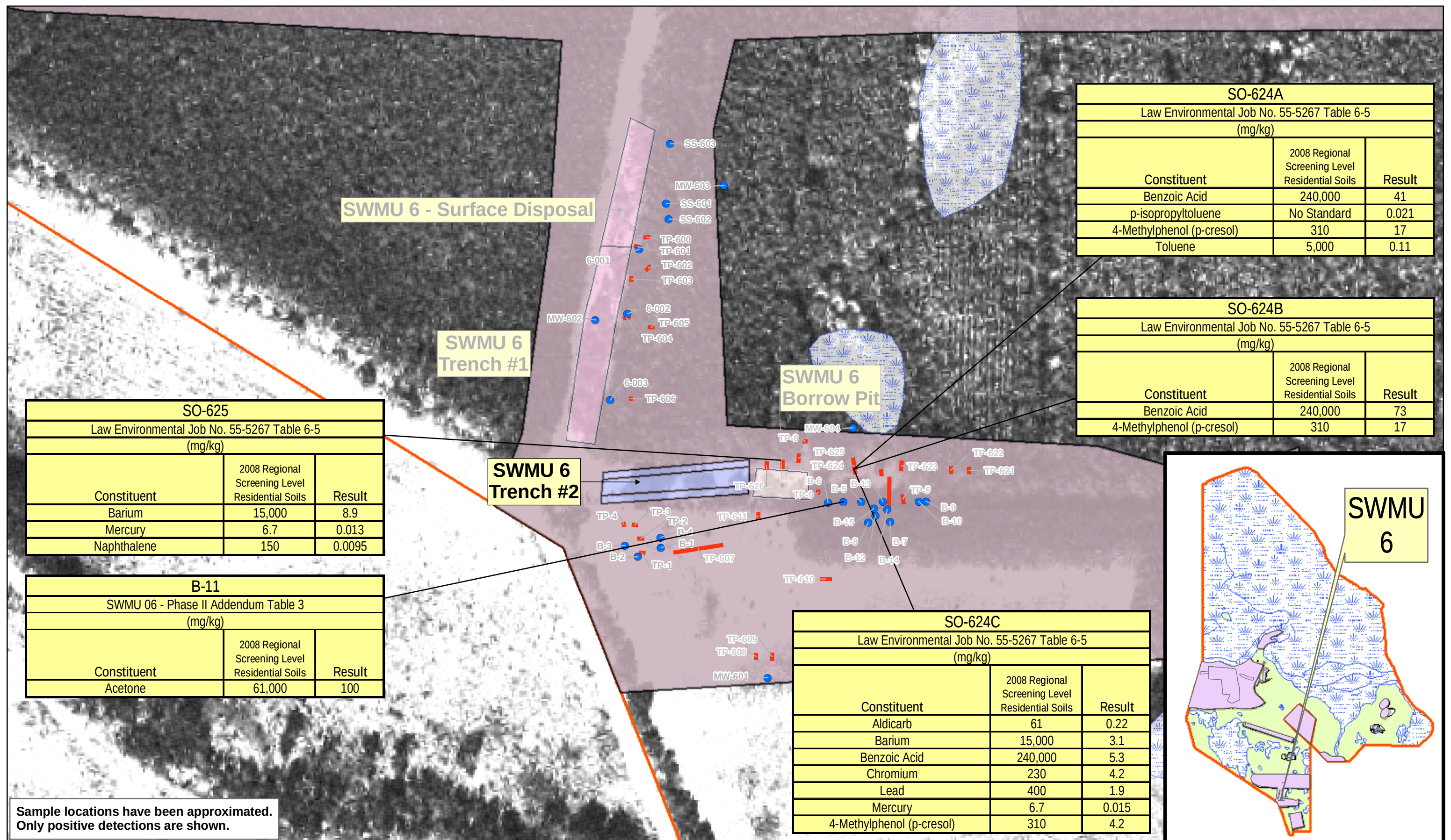


Figure 58. SWMU 6 - Disposal Trench #2
Historical Soil Data
Union Carbide Corporation
Woodbine, Georgia



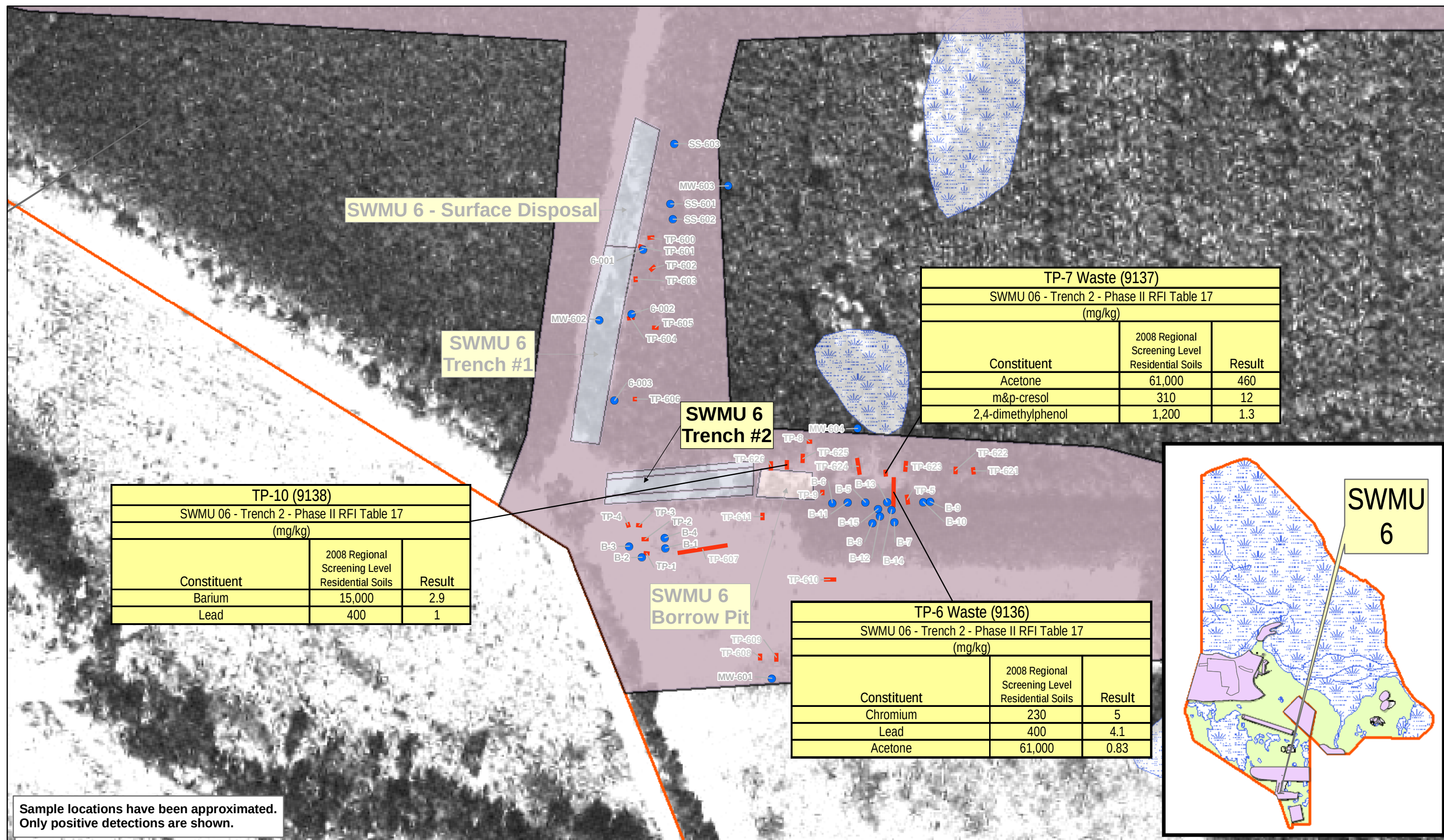


Figure 60. SWMU 6 - Disposal Trench #2
Phase II RFI Historical Soil Data
Union Carbide Corporation
Woodbine, Georgia

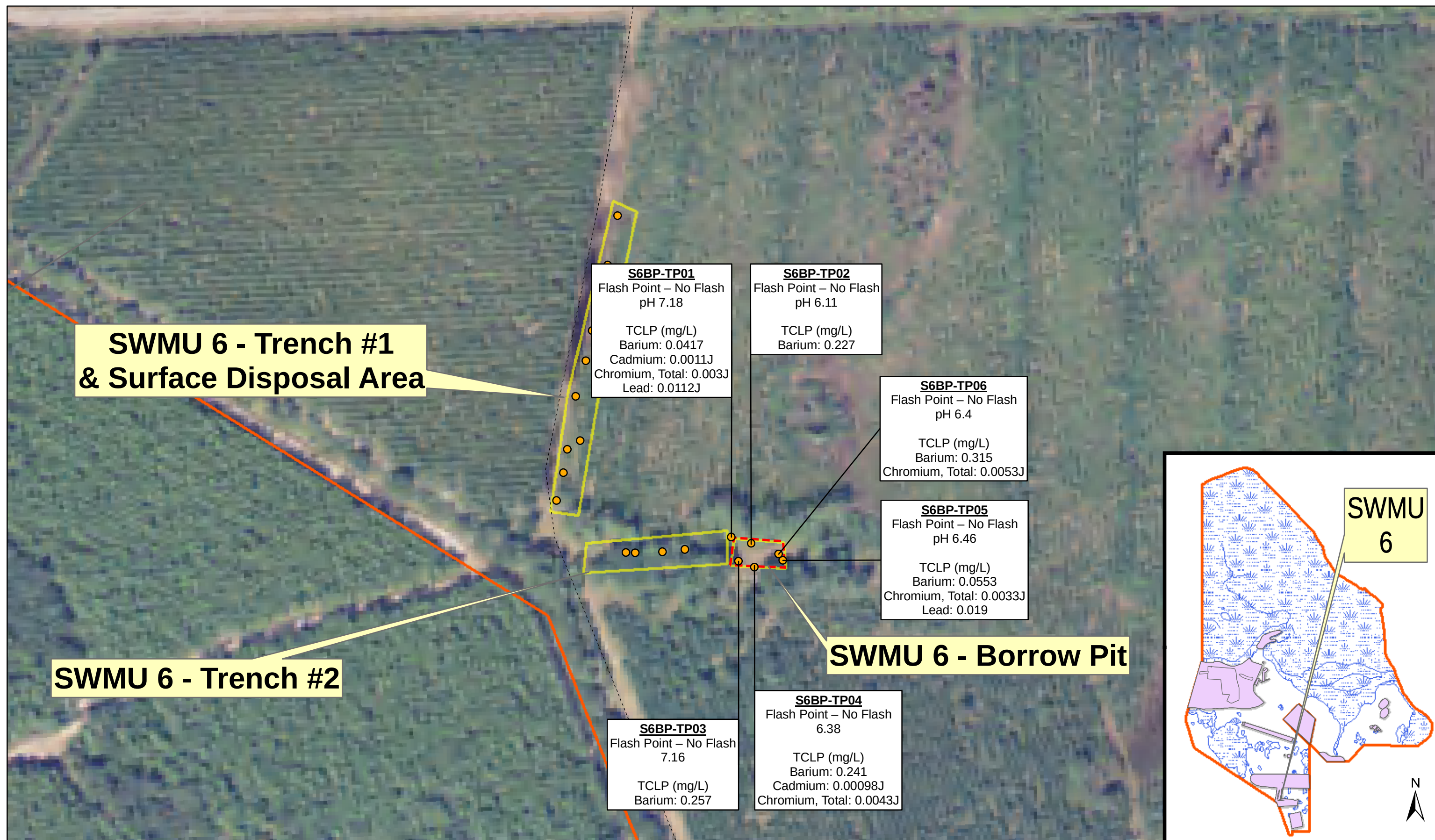


Figure 61. SWMU 6 - Borrow Pit Area Historical Soil Data
Union Carbide Corporation
Woodbine, Georgia

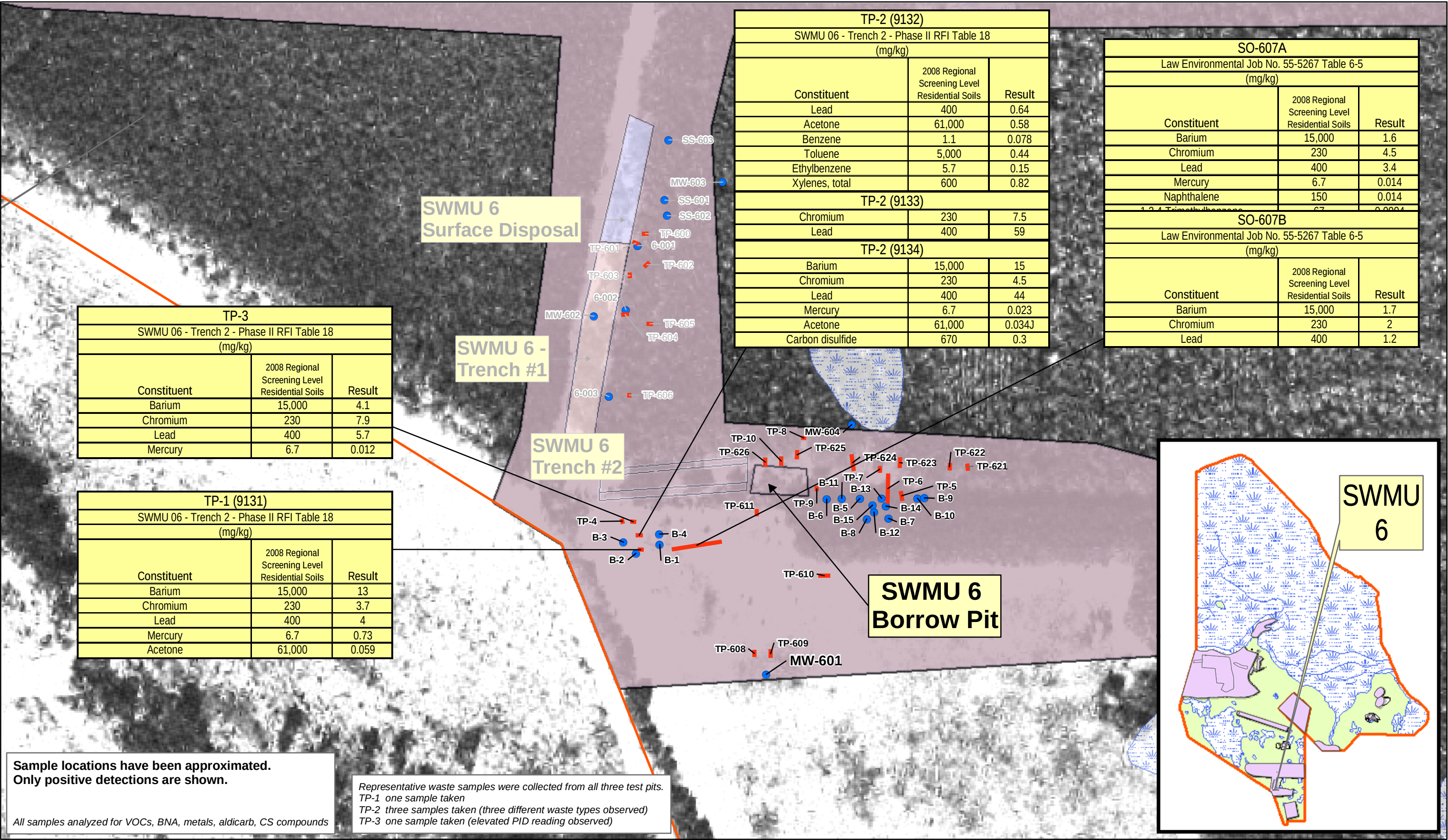


Figure 62. SWMU 6 - Borrow Pit Area Historical Soil Data
Union Carbide Corporation
Woodbine, Georgia

MW-703		
SWMU 07- Phase II RFI Table 21 (9/20/96)		
(mg/l)		
Constituent	Region 9 PRG Tap Water	Result
Arsenic	0.45	0.011
Barium	26000	0.15
Chromium	0.001	0.052
Lead	0.0005	0.023
Mercury	110	0.00024
SWMU 07 - Phase II RFI Addendum Table 9 (6/12/97)		
Constituent	Region 9 PRG Tap Water	Result
Barium	26000	0.018

MW-704		
SWMU 07- Phase II RFI Table 21 (9/20/96)		
(mg/l)		
Constituent	Region 9 PRG Tap Water	Result
Barium	26000	0.071
Chromium	0.001	0.046
Lead	0.0005	0.006
Xylenes, total	2100	0.04

MW-702		
SWMU 07- Phase II RFI Table 21 (9/20/96)		
(mg/l)		
Constituent	Region 9 PRG Tap Water	Result
Arsenic	0.45	0.11
Barium	26000	0.71
Cadmium	180	0.0069
Chromium	0.001	0.25
Lead	0.0005	0.075
Mercury	110	0.00065

MW-701		
SWMU 07- Phase II RFI Table 21 (9/20/96)		
(mg/l)		
Constituent	Region 9 PRG Tap Water	Result
Arsenic	0.45	0.011
Barium	26000	0.11
Chromium	0.001	0.12
Lead	0.0005	0.029
Mercury	110	0.00052
Bis(2-ethylhexyl) phthalate	48	0.03

Sample locations have been approximated
Phase II samples were analyzed for VOCs, BNAs, metals, aldicarb and CS compounds.
Phase II addendum samples were analyzed for metals only.
Only positive detections are shown.
Orange highlighted rows indicate sample results which exceed
Region 9 PRG.

- Groundwater Sample Location
- Test Pit Location
- Approximate Boundary of SWMU 7 Area

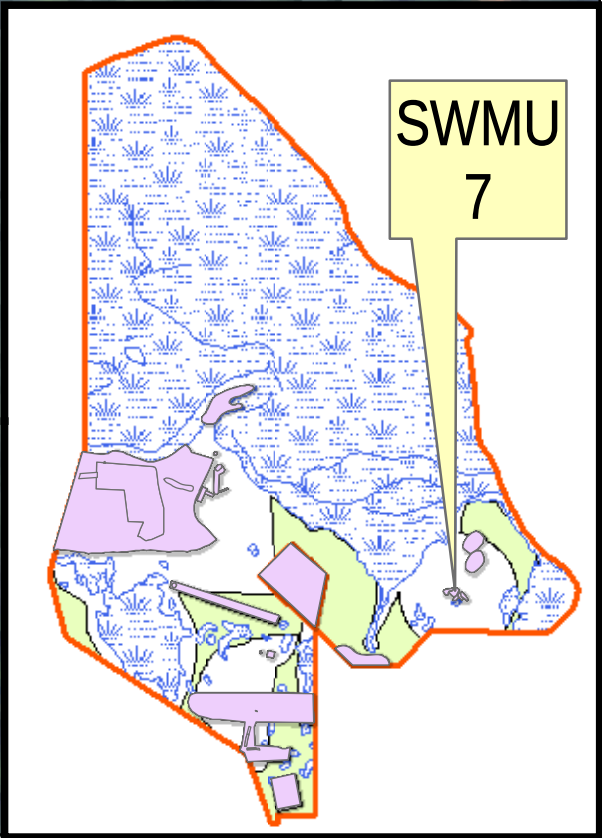
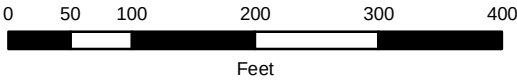
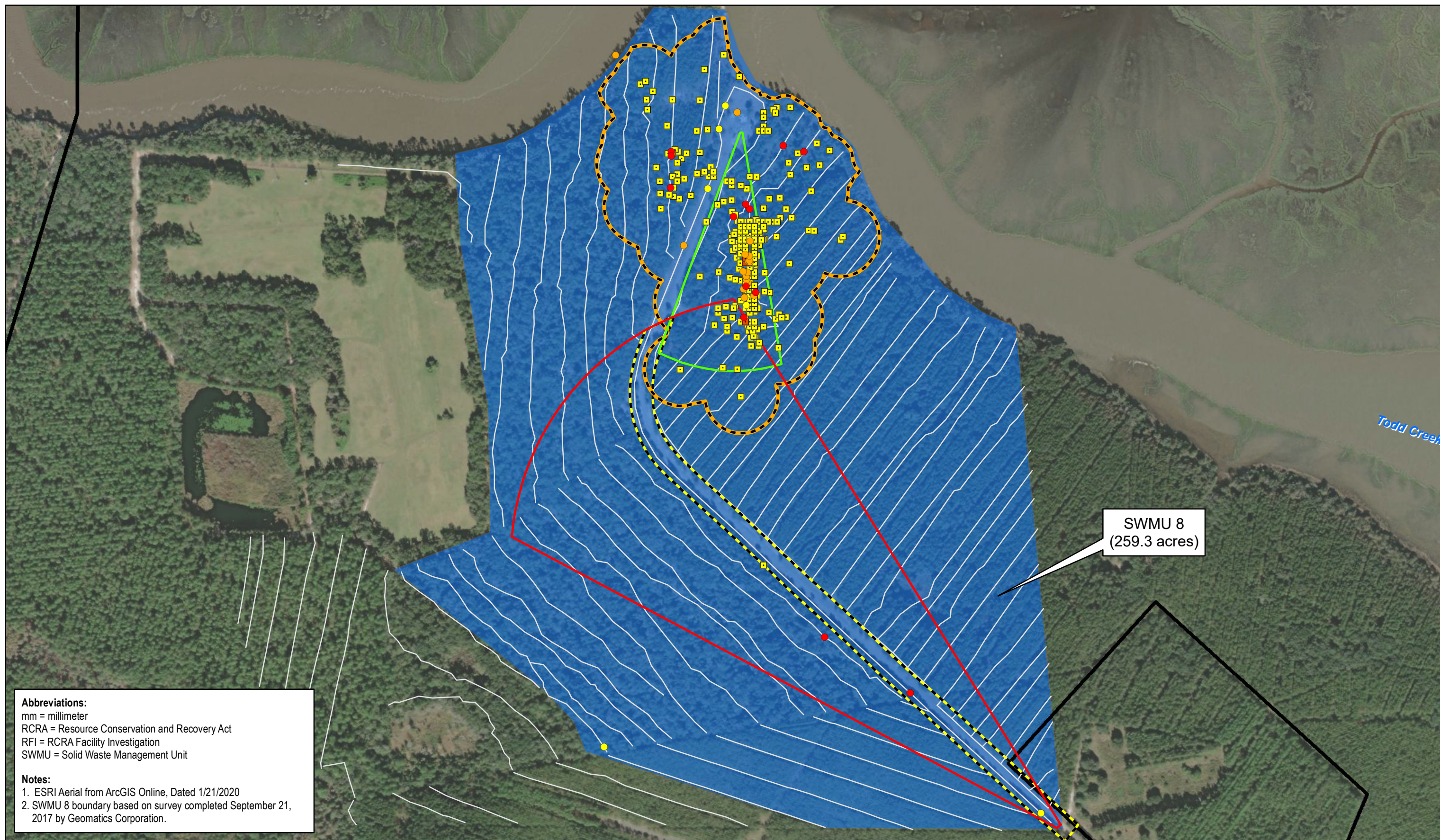


Figure 63. SWMU 7 - Groundwater Sample Locations
Union Carbide Corporation
Woodbine, Georgia



Abbreviations:

mm = millimeter
 RCRA = Resource Conservation and Recovery Act
 RFI = RCRA Facility Investigation
 SWMU = Solid Waste Management Unit

Notes:

1. ESRI Aerial from ArcGIS Online, Dated 1/21/2020
2. SWMU 8 boundary based on survey completed September 21, 2017 by Geomatics Corporation.

- | | | |
|--|---------------------------|---|
| ■ MEC (Interim Measures Corrective Action) | □ 40-mm Test Range | □ 40-mm Test Range Removal Action Area (49.6 Acres) |
| ■ MPPEH (Interim Measures Corrective Action) | □ 81-mm Mortar Test Range | □ 81-mm Mortar Test Range Removal Action Area (8.8 Acres) |
| ● MEC (Phase I RFI) | □ Property Boundary | — MEC RFI Phase I & II Transects |
| ● MEC (Phase II RFI) | ■ SWMU 8 | |
| ● MPPEH (Phase II RFI) | | |

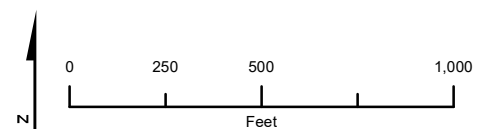
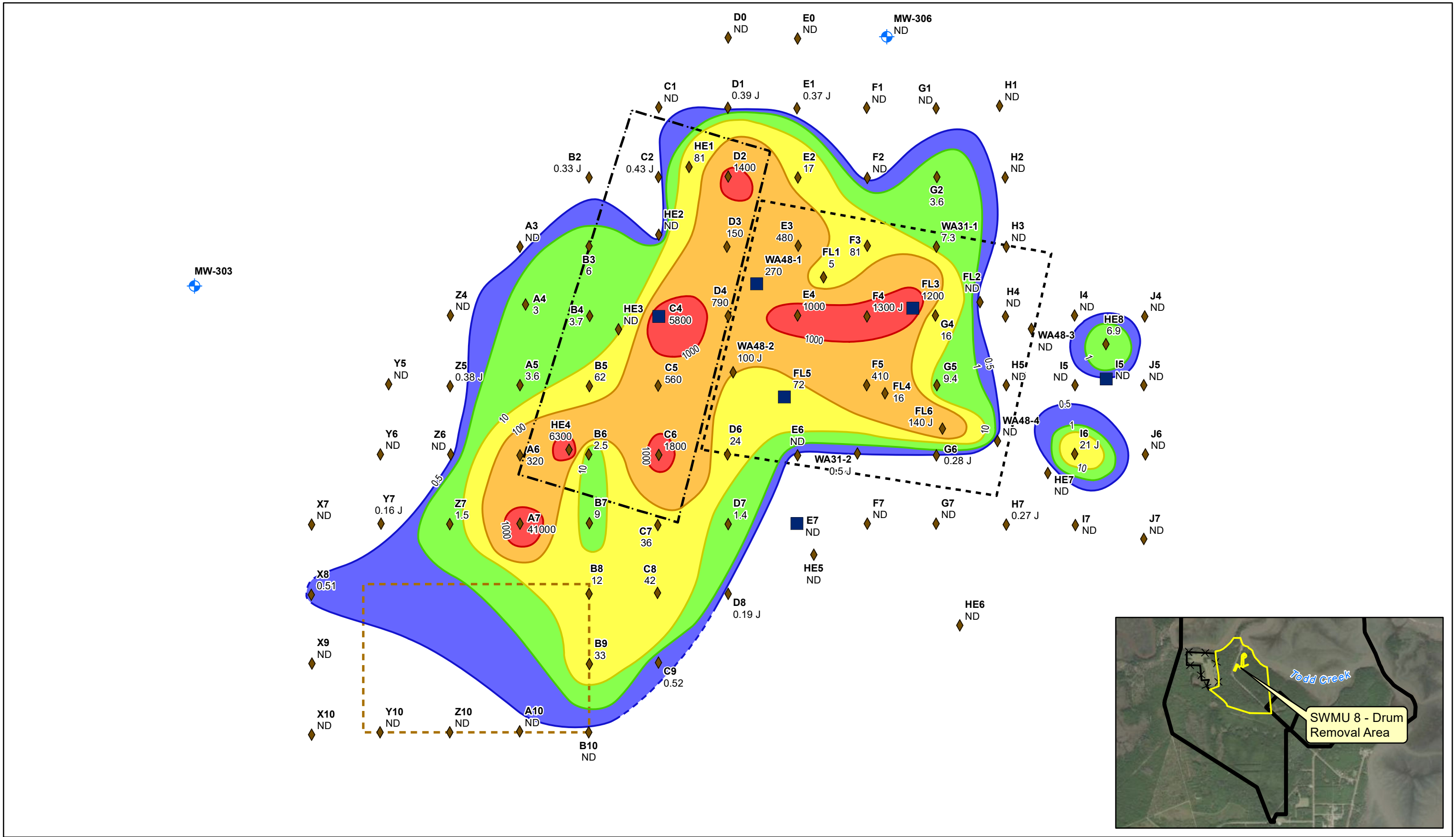


Figure 64. SWMU 8 Removal Action Results
 Union Carbide Corporation
 UCC Woodbine, Camden County, Georgia



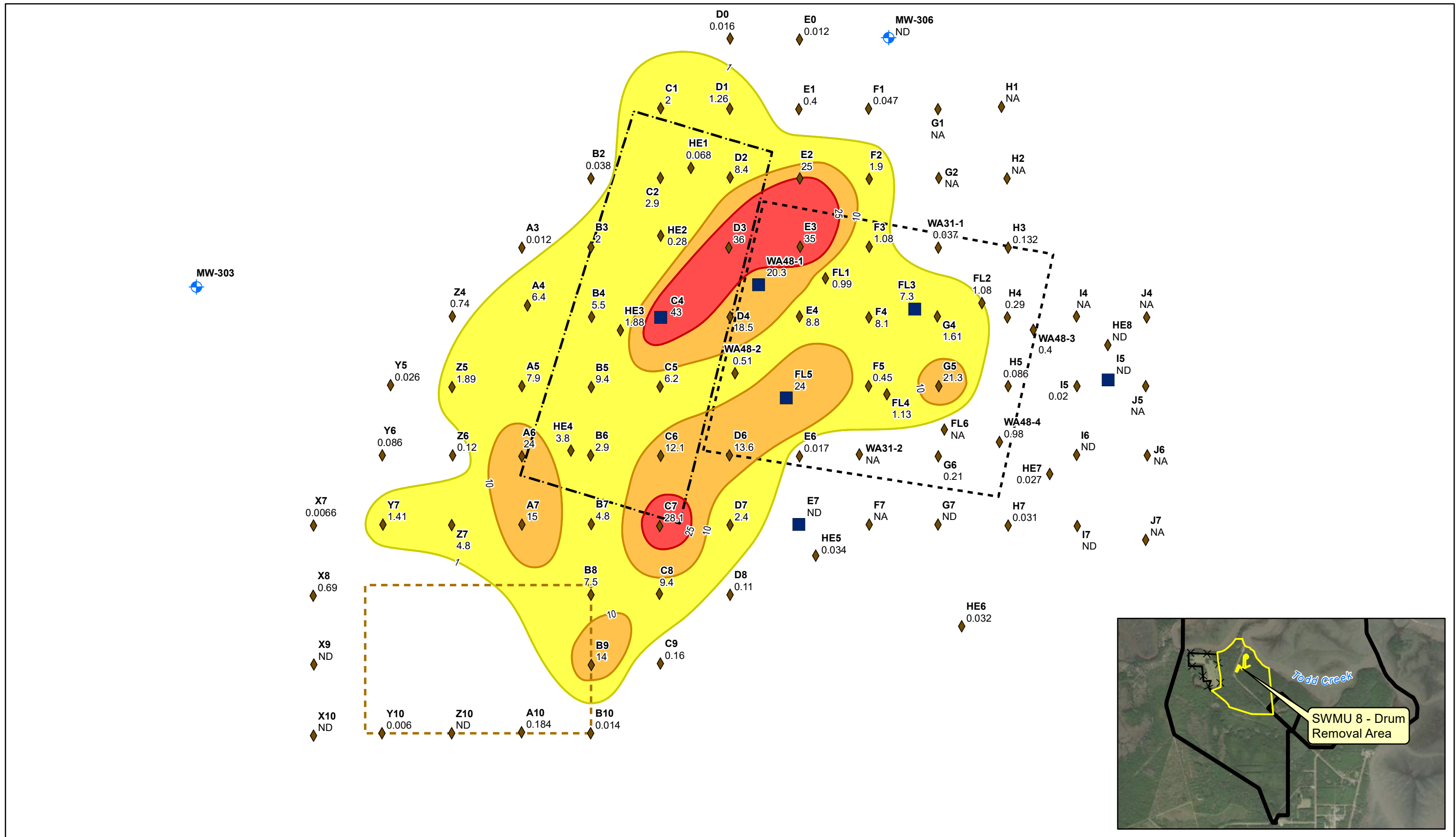
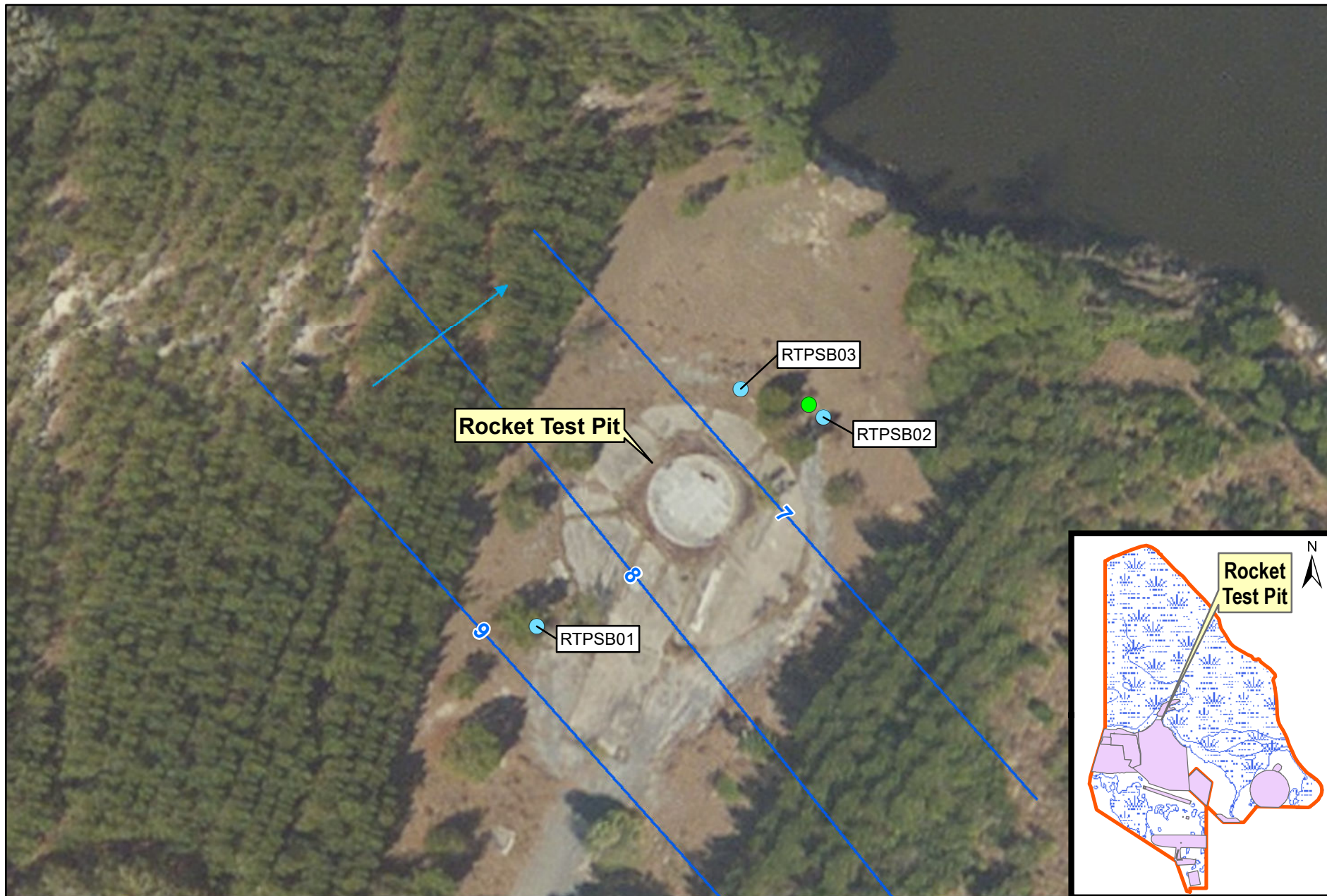


Figure 66. Drum Removal Area – Extent of PCBs in Soil
 Permit Renewal Application
 Union Carbide Corporation
 UCC Woodbine, Camden County, Georgia



● Proposed Monitoring Wells

● 2021 Soil Boring Location

— Potentiometric Contours

→ Groundwater Flow Direction

■ Past Industrial Use Area

■ Salt Marsh and Wetlands

■ Property Boundary

NOTES:

1. Potentiometric contours in feet above mean sea level
2. Groundwater elevations were recorded during the Focused Field Investigation (CH2M 2008).
3. ESRI Aerial (Clarity) from ArcGIS Online, Accessed 11/29/2023

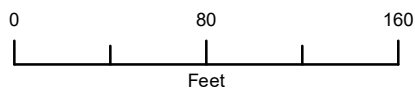


Figure 67. Rocket Test Pit 2021 Investigation Locations

Permit Renewal Application

Union Carbide Corporation

UCC Woodbine, Camden County, Georgia

Jacobs



-  Monitoring Well
-  Past Industrial Use Area
-  Salt Marsh and Wetlands
-  Property Boundary

NOTES:
 1. Aerial Imagery Date: 11/18/2020. Source: Esri, Maxar, Earthstar
 Geographics, and the GIS User Community. Imagery

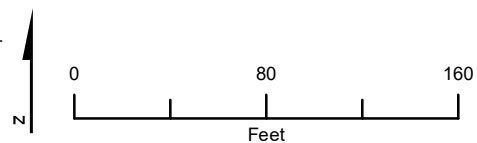


Figure 68. Rocket Test Pit Monitoring Wells
 Permit Renewal Application
 Union Carbide Corporation
 UCC Woodbine, Camden County, Georgia