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Under Contract Number
W91ZLK-05-D-0015 D.O. 0003

Final Site Investigation Summary Report

HAA-18 Boundary Investigation
Hunter Army Airfield
Savannah, Georgia

April 15, 2009

DOCUMENT 3

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ARCADIS

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Final Site Investigation Summary Report

HAA-18, Boundary Investigation
Hunter Army Air field

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Our Ref.:
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Date:
April 15, 2009

Tables

Figures

Acronyms

bgs	Below Ground Suface
BTEX	Benzene, Toluene, Ethyl Benzene, Xylenes
DPT	Direct Push Technology
EPA	Environmental Protection Agency
HAAF	Hunter Army Airfield
HGL	HydroGeoLogic
µg/kg	Micrograms per Kilogram
µg/L	Micrograms per Liter
PID	Photo-ionization Detector
USACE	U.S. Army Corps of Engineers
VOC	Volatile Organic Compound

1. Introduction

The U.S. Army Environmental Command (USAEC) has retained ARCADIS on behalf of Hunter Army Airfield (HAAF) to investigate the impacted soil and groundwater at the Boundary Investigation Site, also known as site HAA-18. During the March 2006 sampling event conducted to delineate the contamination at HAA-15 (MCA Barracks Site) at HAAF, petroleum hydrocarbons were detected in a monitor well located along the North Perimeter Road. The contamination was determined to be unrelated to the HAA-15 TCE plume and the area was designated as HAA-18, Boundary Investigation Site (Figure 1-1). A soil and groundwater investigation was conducted in 2007 and additional groundwater sampling and elevation data collection were conducted in 2008 and early 2009 (Figure 1-2).This site data summary includes tables and figures presenting all data collected to date for the HAA-18 investigation.

2. Previous Investigation Activities

2.1 Initial Discovery (2006)

During the March 2006 sampling event for the investigation at the MCA Barracks Site (HAA-15) conducted by HydroGeoLogic (HGL), petroleum compounds (benzene, toluene, ethyl benzene, xylenes) were detected in groundwater near the northern boundary of HAAF at monitor well HGL-3C. Benzene was detected at 14 micrograms per liter (µg/L) and total BTEX was detected at 38 µg/L (HGL, 2007). Monitor well HGL-3C is screened from approximately 29 to 39 feet below ground surface (bgs) (Table 2-1). No contaminants were detected at shallow well HGL-3B (screened from 15 to 25 feet bgs), which is paired with deep well HGL-3C. Based on these findings, a preliminary investigation was conducted by the U.S. Army Corps of Engineers (USACE) as described below.

2.2 Preliminary Investigation (2007)

In May 2007, the USACE utilized direct push technology (DPT) for collection of groundwater and soil samples at 25 temporary locations (DPT-1S through DPT-25D) oriented in a grid pattern. At each location, groundwater was collected from two depth intervals (10 ft and 25 ft) for analysis of volatile organic compounds (VOCs) in accordance with U.S. Environmental Protection Agency (EPA) Method 8260. Macro core soil samples were also collected for headspace gas analysis of shallow soils using a photo-ionization detector (PID) and for lithologic description at the sample interval. DPT ground water results included detections of volatile organic compounds at 10 of the 25 sampled locations. The samples from DPT-1D and DPT-6D contained BTEX and naphthalene, confirming the presence of petroleum VOCs in the deeper interval (25 ft bgs). The detections in the other samples mostly consisted of low levels of naphthalene. Table 2-2 presents DPT ground water results. Figure 2-1 shows DPT sample locations and results for shallow groundwater (10 ft bgs). DPT sample results for deep groundwater (25 ft bgs) are presented on Figure 2-2. The USACE report stated that the soil PID results consisted of random readings that suggested moisture was affecting instrument performance (USACE, 2008).

Following analysis of the data collected during the DPT work, confirmation soil samples were collected in August 2007 to identify any potential source area above the water table. The soil samples were collected at 10 locations (SS-1 through SS-10) at depths between 1.2 and 4.0 ft bgs and analyzed for VOCs in accordance with U.S. EPA Method 8260. Analytical results indicated detections of VOCs at 8 of the 10 sample

locations. All detections were less than 100 microgram per kilogram (µg/kg) and were predominantly acetone and methylene chloride. These soil sample results did not indicate a contaminant source area above the water table. The soil sampling results from August 2007 are presented in Table 2-3 and on Figure 2-3.

Five monitor wells were installed to depths between 25.5 and 30.5 feet below grade based on the groundwater data collected in May 2007. On September 5, 2007, groundwater samples were collected from the 5 new wells (MW-1 through MW-5) and 1 existing well (HGL-3C) for analysis of VOCs. VOCs were detected in 2 of the 6 wells (MW-2 and HGL-3C). Naphthalene was the only compound detected above 10 µg/L and was detected at 14 and 360 µg/L in MW-2 and HGL-3C respectively. Ground water monitor well sample results are presented in Table 2-4 and Figure 2-2.

2.3 Groundwater Elevation Determination and Sampling (2008 – 2009)

On December 12, 2008, a survey of well location and top-of-casing elevation was performed by a licensed surveyor under contract with ARCADIS. These data were used to calculate relative groundwater elevations from data collected in September 2007 and December 2008 and data subsequently collected in February 2009. The groundwater elevations from September 2007, December 2008 and February 2009 are presented on Figures 2-4, 2-5 and 2-6 respectively. These groundwater elevations consistently indicated a southern groundwater flow direction.

On December 16, 2008, groundwater samples were collected by ARCADIS from the 6 onsite monitor wells for analysis of VOCs in accordance with U.S. EPA Method 8260. VOCs were detected in all wells except HGL-3C. Samples from HGL-3C, which had contained 360 µg/L of naphthalene in September 2007, were below detection limits for all VOCs in December 2008. BTEX was detected in samples from MW-1 and MW-4, which had previously been below detection limits for all VOCs. Table 2-4 presents a historical summary of groundwater monitor well sample results. The analytical results are presented on Figure 2-2.

In February 2009, ARCADIS collected groundwater elevation measurements to confirm the groundwater flow direction. The data confirmed that groundwater was flowing in a southern direction in the HAA-18 area (Figure 2-6). Table 2-5 presents a summary of historical groundwater elevations.

3. Conclusions

Based on the available data, the following conclusions are presented.

- Soil sample results did not indicate a source area. Soil samples were not collected beyond the property line.
- Dissolved concentrations of volatile organic compounds in groundwater samples were low (< 100 µg/L) and were also not indicative of a source.
- Benzene and other petroleum related compounds in groundwater are predominantly at depths ranging between 25 and 39 feet bgs. The groundwater results from September 2007 and December 2008 provide different indications of contaminant distribution.
- All three groundwater elevation data sets indicate that groundwater flows predominantly in a southern direction in the HAA-18 area. This flow direction would indicate that groundwater flows from offsite toward HAAF in this area.

4. References

ARCADIS 2008. Sampling and Analysis Plan and Quality Assurance Project Plan, Hunter Army Airfield, Georgia, November.

HGL 2007, Draft Compliance Status Report, MCA Barracks Site, Hunter Army Airfield, Savannah, Georgia, Volume 1, August.

USACE 2008, North Perimeter Road, Preliminary Investigation, Hunter Army Airfield, Georgia, January.

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Tables

Table 2-1
Monitor Well Construction Detail
Hunter Army Airfield, Savannah, Georgia
HAA-18 (North Perimeter Road)

Well ID	Installation Date	Well Depth (ft bgs)	Screen Interval (ft bgs)	TOC Elevation (ft above MSL)	Ground Elevation (ft above MSL)	Northing Coordinate	Easting Coordinate
MW-1	9/1/2007	28.8 ft	18.8 - 28.8	13.31	13.43	741307.62	976478.18
MW-2	9/1/2007	30.5 ft	20.5 - 30.5	15.90	16.11	741511.53	975936.10
MW-3	9/1/2007	25.5 ft	15.5 - 25.5	14.62	14.86	741505.30	975758.78
MW-4	9/1/2007	29.1 ft	19.1 - 29.1	15.65	15.75	741294.55	975562.77
MW-5	9/1/2007	30.0 ft	20 - 30	14.70	14.96	740922.90	975626.24
HGL-3C	3/14/2006	39.42 ft	29.4 - 39.4	14.49	15.09	741608.26	976012.63

Notes:
Wells surveyed on December 16, 2008 by Chatham Surveying Services, Inc.
Well coordinates are based on State Plane (NAD '83)
Elevations are based on NAVD 1988
Installation Date for MW-1 through 5 is approximate
ft bgs: feet below ground surface
TOC: Top of casing

Table 2-2
DPT Groundwater Results
Hunter Army Airfield, Savannah, Georgia
HAA-18 (North Perimeter Road)

DPT Boring Location	DPT-1S	DPT-1D	DPT-2S	DPT-2D	DPT-3S	DPT-3D	DPT-4S	DPT-4D	DPT-5S	DPT-5D
Sample ID	PR-DPT-1S	PR-DPT-1D	PR-DPT-2S	PR-DPT-2D	PR-DPT-3S	PR-DPT-3D	PR-DPT-4S	PR-DPT-4D	PR-DPT-5S	PR-DPT-5D
Date	5/23/2007	5/23/2007	5/23/2007	5/23/2007	5/23/2007	5/23/2007	5/23/2007	5/23/2007	5/23/2007	5/23/2007
Depth	10 ft	25 ft	10 ft	25 ft	10 ft	25 ft	10 ft	25 ft	10 ft	25 ft
Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analyte:										
VOCs, 8260B:										
Acetone	< 5.0	< 5.0	< 5.0	< 5.0	**13**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	< 1.0	**9.3**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	< 1.0	**7.6**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	< 1.0	**2**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m-Xylene/p-Xylene	< 2.0	**2.1**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Naphthalene	< 1.0	**950**	**42**	**74**	**6.4**	< 1.0	20	< 1.0	< 1.0	< 1.0
o-Xylene	< 1.0	**5.7**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	< 1.0	**1.8**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

DPT Boring Location	DPT-6S	DPT-6D	DPT-7S	DPT-7D	DPT-8S	DPT-8D	DPT-9S	DPT-9D	DPT-10S	DPT-10D
Sample ID	PR-DPT-6S	PR-DPT-6D	PR-DPT-7S	PR-DPT-7D	PR-DPT-8S	PR-DPT-8D	PR-DPT-9S	PR-DPT-9D	PR-DPT-10S	PR-DPT-10D
Date	5/23/2007	5/23/2007	5/23/2007	5/23/2007	5/22/2007	5/22/2007	5/22/2007	5/22/2007	5/22/2007	5/22/2007
Depth	10 ft	25 ft	10 ft	25 ft	10 ft	25 ft	10 ft	25 ft	10 ft	25 ft
Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analyte:										
VOCs, 8260B:										
1,2,4-Trimethylbenzene	< 1.0	< 1.0	< 1.0	< 1.0	**1.2**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	< 1.0	**18**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	< 1.0	**6.8**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m-Xylene/p-Xylene	< 2.0	**3.2**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Naphthalene	< 1.0	**45**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	< 1.0	**6.3**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	< 1.0	**0.72**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl chloride	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	3	< 1.0

Table 2-2
DPT Groundwater Results
Hunter Army Airfield, Savannah, Georgia
HAA-18 (North Perimeter Road)

DPT Boring Location	DPT-11S	DPT-11D	DPT-12S	DPT-12D	DPT-13S	DPT-13D	DPT-14S	DPT-14D	DPT-15S	DPT-15D
Sample ID	PR-DPT-11S	PR-DPT-11D	PR-DPT-12S	PR-DPT-12D	PR-DPT-13S	PR-DPT-13D	PR-DPT-14S	PR-DPT-14D	PR-DPT-15S	PR-DPT-15D
Date	5/22/2007	5/22/2007	5/23/2007	5/23/2007	5/23/2007	5/23/2007	5/23/2007	5/23/2007	5/23/2007	5/23/2007
Depth	10 ft	25 ft	10 ft	25 ft	10 ft	25 ft	10 ft	25 ft	10 ft	25 ft
Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analyte:										
VOCs, 8260B:										
Acetone	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**12**	< 5.0	< 5.0
Naphthalene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**14**	< 1.0	< 1.0	< 1.0

DPT Boring Location	DPT-16S	DPT-16D	DPT-17S	DPT-17D	DPT-18S	DPT-18D	DPT-19S	DPT-19D	DPT-20S	DPT-20D
Sample ID	PR-DPT-16S	PR-DPT-16D	PR-DPT-17S	PR-DPT-17D	PR-DPT-18S	PR-DPT-18D	PR-DPT-19S	PR-DPT-19D	PR-DPT-20S	PR-DPT-20D
Date	5/24/2007	5/24/2007	5/23/2007	5/23/2007	5/24/2007	5/24/2007	5/24/2007	5/24/2007	5/24/2007	5/24/2007
Depth	10 ft	25 ft	10 ft	25 ft	10 ft	25 ft	10 ft	25 ft	10 ft	25 ft
Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analyte:										
VOCs, 8260B:										
Acetone	**7.2**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Naphthalene	< 1.0	**5**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

DPT Boring Location	DPT-21S	DPT-21D	DPT-22S	DPT-22D	DPT-23S	DPT-23D	DPT-24S	DPT-24D	DPT-25S	DPT-25D
Sample ID	PR-DPT-21S	PR-DPT-21D	PR-DPT-22S	PR-DPT-22D	PR-DPT-23S	PR-DPT-23D	PR-DPT-24S	PR-DPT-24D	PR-DPT-25S	PR-DPT-25D
Date	5/24/2007	5/24/2007	5/24/2007	5/24/2007	5/23/2007	5/23/2007	5/24/2007	5/24/2007	5/24/2007	5/24/2007
Depth	10 ft	25 ft	10 ft	25 ft	10 ft	25 ft	10 ft	25 ft	10 ft	25 ft
Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analyte:										
VOCs, 8260B:										
Acetone	< 5.0	< 5.0	< 5.0	**34**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Methylene Chloride	< 1.0	< 1.0	**2.6**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Notes:
Bold = Detection
VOCs = Volatile Organic Compounds

Table 2-3
DPT Soil Sampling Results
Hunter Army Airfield, Savannah, Georgia
HAA-18 (North Perimeter Road)

Sample ID	HSRA	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6	SS-7	SS-8	SS-9	SS-10
Sample Depth	Notification	2.5-3.2 ft	3.0-4.0 ft	2.4-2.9 ft	1.4-1.9 ft	1.4-1.9 ft	1.2-1.8 ft	1.6-2.2 ft	3.0-3.5 ft	2.9-3.6 ft	2.2-2.9 ft
Date	Concentrations	8/10/2007	8/10/2007	8/10/2007	8/10/2007	8/10/2007	8/10/2007	8/10/2007	8/10/2007	8/10/2007	8/10/2007
Unit	(µg/Kg)	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
Analyte:											
VOCs, 8260B:											
1,1-Dichloropropene	1,000,000	< 6.0	< 5.5	< 6.9	**9.4**	**8.7**	< 5.8	< 6.7	< 4.2	< 5.8	< 7.0
1,2,3-Trichloropropane	540	< 6.0	< 5.5	< 6.9	**29**	**30**	< 5.8	< 6.7	< 4.2	< 5.8	< 7.0
2-Hexanone	--	< 60	< 55	< 69	< 65	**9.6**	< 58	< 67	< 42	< 58	< 70
Acetone	2740	< 60	**25**	**56**	**63**	**78**	**76**	**19**	**7.2**	< 58	**58**
Methylene Chloride	80	< 6.0	< 5.5	< 6.9	**4.1**	< 6.6	< 5.8	**4.2**	**3.1**	< 5.8	< 7.0
p-Isopropyltoluene	--	< 6.0	< 5.5	< 6.9	< 6.5	< 6.6	**2.1**	< 6.7	< 4.2	< 5.8	< 7.0
Toluene	14,400	< 6.0	< 5.5	< 6.9	< 6.5	< 6.6	**1.2**	< 6.7	**0.86**	< 5.8	< 7.0

Notes:
VOCs = Volatile Organic Compounds
Bold = Detection
= Exceeds Notification Concentration
There is no 1,1-Dichloropropene notification concentration, listed concentration based on dichloropropene mixture.
-- = No HSRA Notification Concentration exists for this compound

Table 2-4
Groundwater Monitor Well Sample Results
Hunter Army Airfield, Savannah, Georgia
HAA-18 (North Perimeter Road)

Sample Location	MW-1	MW-1	MW-2	MW-2	MW-3	MW-3	MW-3	MW-4	MW-4	MW-5	MW-5	HGL-3C	HGL-3C	HGL-3C
Sample ID	P-MW-1-9-07	P-MW1 (121608)	P-MW-2-9-07	P-MW2 (121608)	P-MW-3-9-07	P-DUP	P-MW3 (121608)	P-MW-4-9-07	P-MW4 (121608)	P-MW-5-9-07	P-MW5 (121608)	MCA-GWHGL-3C-0306	P-HGL-3-9-07	P-HGL (121608)
Date	9/5/2007	12/16/2008	9/5/2007	12/16/2008	9/5/2007	9/5/2007	12/16/2008	9/6/2007	12/16/2008	9/6/2007	12/16/2008	3/1/2006	9/5/2007	12/16/2008
Units	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Analyte:														
VOCs, 8260B:														
1,2,3-Trichlorobenzene	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 0.50	-	**1.7**	< 0.50
1,2,4-Trichlorobenzene	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 0.50	-	**1.1**	< 0.50
1,2-Dichloroethane	< 1.0	**2.2**	< 1.0	< 0.50	< 1.0	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 0.50	-	< 1.0	< 0.50
4-Isopropyltoluene	< 1.0	**1.5**	**2.9**	< 0.50	< 1.0	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 0.50	-	< 1.0	< 0.50
Acetone	< 5.0	**38**	< 5.0	< 10	< 5.0	< 5.0	< 10	< 5.0	**22**	< 5.0	< 10	-	< 5.0	< 10
Benzene	< 1.0	**82**	**9.3**	**3.3**	< 1.0	< 1.0	**1.1**	< 1.0	**76**	< 1.0	< 0.50	**14**	**11**	< 0.50
Chloromethane	< 1.0	< 0.50	< 1.0	< 0.50	< 1.0	< 1.0	< 0.50	< 1.0	**0.63**	< 1.0	< 0.50	-	< 1.0	< 0.50
Cyclohexane	NA	**56**	NA	< 0.50	NA	NA	< 0.50	NA	**10**	NA	< 0.50	-	NA	< 0.50
Ethylbenzene	< 1.0	**8.6**	< 1.0	< 0.50	< 1.0	< 1.0	< 0.50	< 1.0	**6.9**	< 1.0	< 0.50	**10**	**4.7**	< 0.50
Isopropylbenzene	< 1.0	**6.7**	< 1.0	< 0.50	< 1.0	< 1.0	< 0.50	< 1.0	**1**	< 1.0	< 0.50	-	< 1.0	< 0.50
Methylcyclohexane	NA	**15**	NA	< 5.0	NA	NA	< 5.0	NA	< 5.0	NA	< 5.0	-	NA	< 5.0
Methylene Chloride	< 1.0	**1.9**	< 1.0	< 0.50	< 1.0	< 1.0	< 0.50	< 1.0	**3.7**	< 1.0	**1.2**	< 1.0	< 1.0	< 0.50
m-Xylene/p-Xylene	< 2.0	-	< 2.0	-	< 2.0	< 2.0	-	< 2.0	-	< 2.0	-	**5.1**	**0.81**	-
Naphthalene	< 1.0	**20**	**14**	**3.6**	< 1.0	< 1.0	**2.1**	< 1.0	< 0.50	< 1.0	< 0.50	-	**360**	< 0.50
o-Xylene	< 1.0	-	< 1.0	-	< 1.0	< 1.0	-	< 1.0	-	< 1.0	-	**7.6**	**3.4**	-
Toluene	< 1.0	**3.7**	< 1.0	< 0.50	< 1.0	< 1.0	< 0.50	< 1.0	**100**	< 1.0	< 0.50	**1.6**	**1**	< 0.50
Xylenes (total)	-	**8.8**	-	< 0.50	-	-	**20**	-	**60**	-	< 0.50	**12.7**	**4.21**	< 0.50

Notes:
VOCs: Volatile Organic Compounds
Bold = Detection
NA: Laboratory did not analyze particular analyte in 8260B run
"-": Not Reported

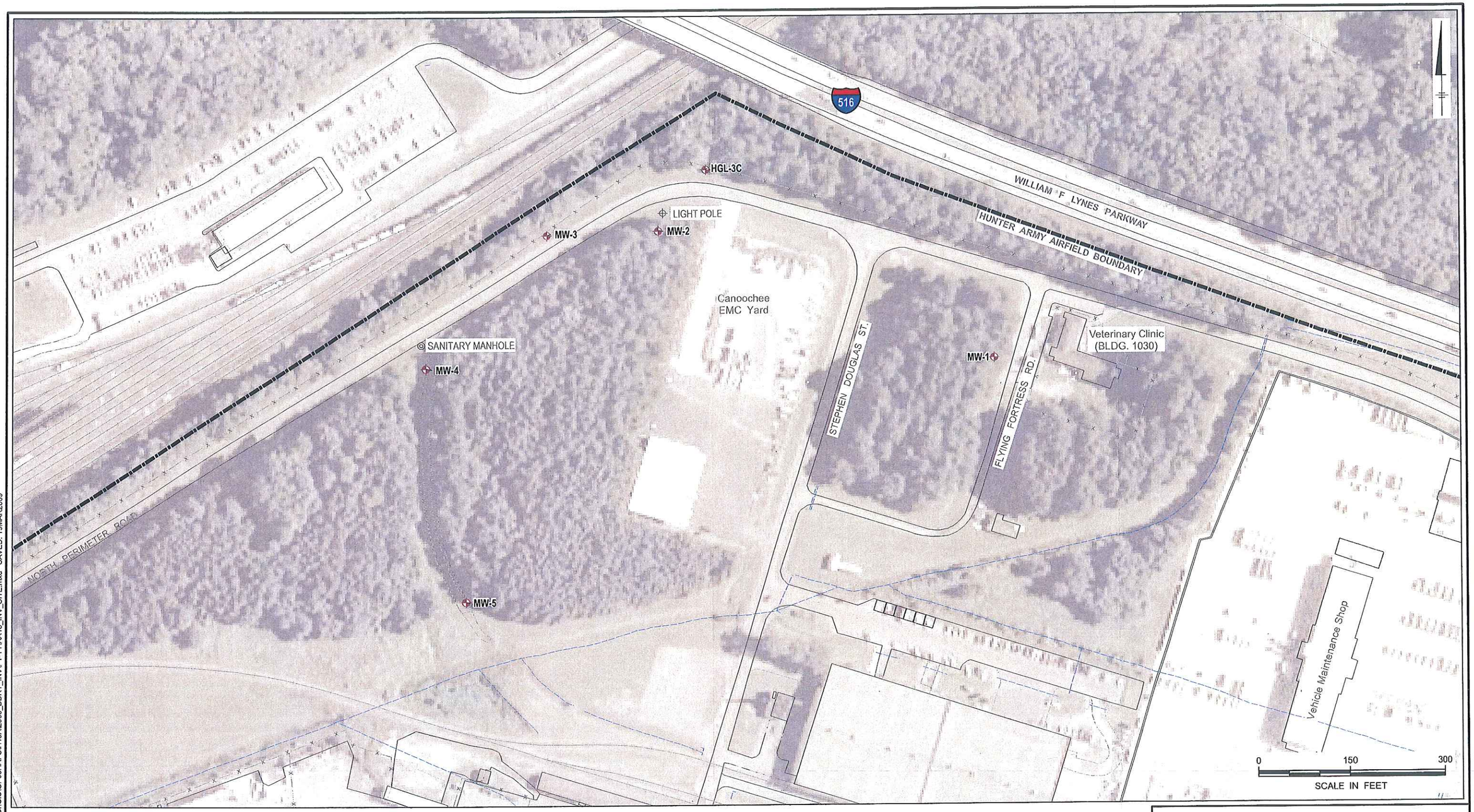
Table 2-5
Groundwater Elevation Data
Hunter Army Airfield, Savannah, Georgia
HAA-18 (North Perimeter Road)

Well ID	Date	Well Depth (ft BGS)	TOC Elevation (ft above MSL)	Water Level (ft BTOC)	Groundwater Elevation (ft above MSL)
MW-1	9/5/2007	28.8	13.31	1.15	12.16
MW-1	12/16/2008	28.8	13.31	1.60	11.71
MW-1	2/26/2008	28.8	13.31	2.23	11.08
MW-2	9/5/2007	30.5	15.90	3.73	12.17
MW-2	12/16/2008	30.5	15.90	4.00	11.90
MW-2	2/26/2008	30.5	15.90	4.93	10.97
MW-3	9/5/2007	25.5	14.62	-	-
MW-3	12/16/2008	25.5	14.62	1.57	13.05
MW-3	2/26/2008	25.5	14.62	2.67	11.95
MW-4	9/6/2007	29.1	15.65	3.66	11.99
MW-4	12/16/2008	29.1	15.65	3.98	11.67
MW-4	2/26/2008	29.1	15.65	4.94	10.71
MW-5	9/6/2007	30.0	14.70	3.10	11.60
MW-5	12/16/2008	30.0	14.70	3.65	11.05
MW-5	2/26/2008	30.0	14.70	4.30	10.40
HGL-3C	9/5/2007	39.4	14.49	2.25	12.24
HGL-3C	12/16/2008	39.4	14.49	2.44	12.05
HGL-3C	2/26/2008	39.4	14.49	3.36	11.13
HGL-3B	9/5/2007	24.7	14.57*	-	-
HGL-3B	12/16/2008	24.7	14.57*	-	-
HGL-3B	2/26/2008	24.7	14.57*	3.39	11.18

Notes:
ft BGS: feet below ground surface
ft BTOC: feet below top of casing
MSL: mean sea level
- : No data
Water level data for September 2007 were obtained from groundwater sampling logs in the North Perimeter Road Preliminary Investigation (USACE, 2008).
* TOC elevation for HGL-3B is from historical survey data

ARCADIS

Figures



LEGEND:

- Monitor Well (deep)
- Storm Water System

REFERENCE:
1) AERIAL: CHATHAM COUNTY, GEORGIA, NRCS (NAIP 2007).
2) JAMES M. KEATON SURVEY, DECEMBER 15, 2008.

HUNTER ARMY AIRFIELD, GEORGIA

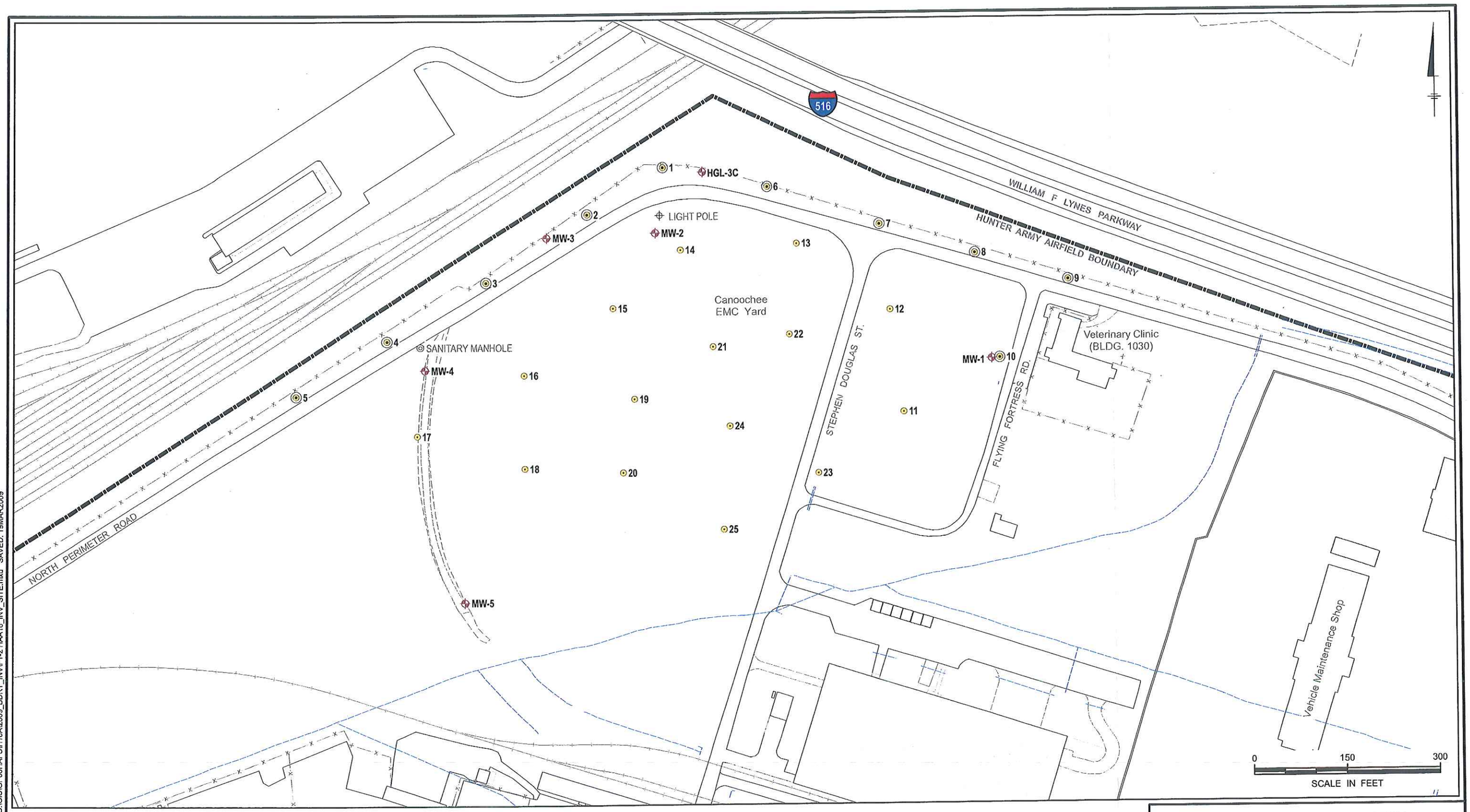
HAAF BOUNDARY INVESTIGATION (HAA-18)

Site Aerial with Monitor Wells

ARCADIS

FIGURE 1-1

CITY:(KNOXVILLE) DIV/GROUP:(ENV) DB:(B.ALTOM) LD:(B.ALTOM) PIC:(M.FENNER) PM:(C.BERTZ) TM:(S.BOSTIAN/H.ENGLISH)
PROJECT: GP08HAFS.F18A_DPORP PATH: G:\GIS\GP08HAFS\H18A\2009_BDRY_INV\F1-1 HAA18_INV_SITE.mxd SAVED: 19MAR2009



LEGEND:

- Monitor Well (deep)
- Direct Push Boring, May 2007
- Shallow Soil Sample, August 2007
- Storm Water System

REFERENCE:
JAMES M. KEATON SURVEY, DECEMBER 15, 2008.

HUNTER ARMY AIRFIELD, GEORGIA

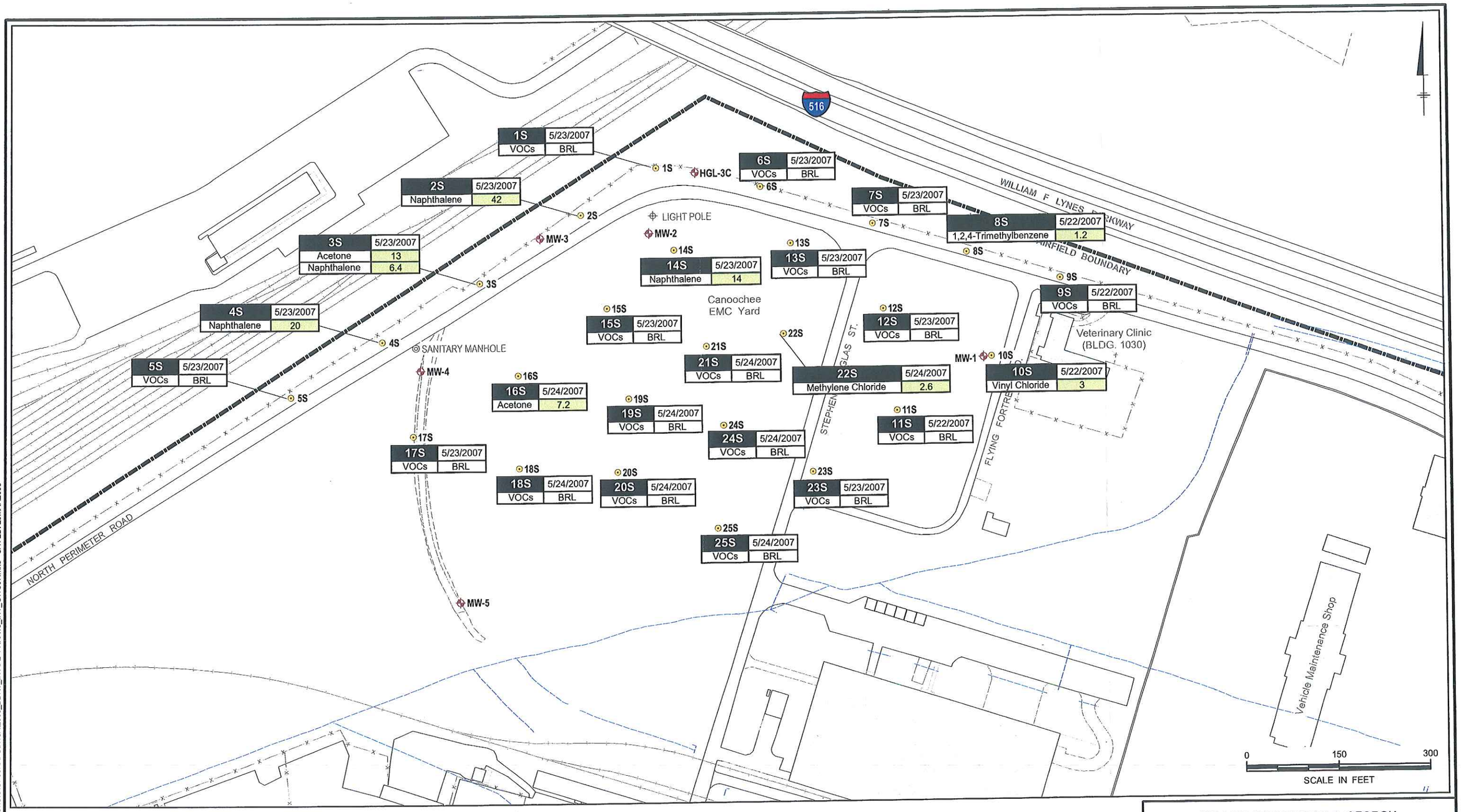
HAAF BOUNDARY INVESTIGATION (HAA-18)

Site Map with Monitor Wells and Boring Locations

ARCADIS

FIGURE 1-2

CITY:(KNOXVILLE) DIV/GROUP:(ENV) DB:(B.ALTOM) LD:(B.ALTOM) PIC:(M.FENNER) PM:(C.BERTZ) TM:(S.BOSTIAN/H.ENGLISH)
PROJECT: GP08HAFS.F18A.DPORP PATH: G:\GIS\GP08HAFS\H18A\2009_BDRY_INV\FI-2 HAA18_INV_SITE.mxd SAVED: 19MAR2009



LEGEND:

- Monitor Well (deep)
- Direct Push Boring, May 2007

DPT Sample	Sample Date
Analyte	Result

DPT - Direct Push Technology
VOCs - Volatile Organic Compounds
BRL - Below Laboratory Reporting Limit

NOTES:
1) All samples were collected from depth of 10 ft bgs.
2) Samples analyzed for VOCs by 8260B.
3) All concentrations in micrograms per liter (µg/L).
4) Only those analytes with at least one detection are shown.

REFERENCE:
JAMES M. KEATON SURVEY, DECEMBER 15, 2008.

HUNTER ARMY AIRFIELD, GEORGIA
HAAF BOUNDARY INVESTIGATION (HAA-18)

Shallow Groundwater Analytical Summary, Direct Push Sampling (2007)

ARCADIS

FIGURE
2-1

CITY:(KNOXVILLE) DIV/GROUP:(ENV) DB:(B.ALTOM) LD:(B.ALTOM) PIC:(M.FENNER) PM:(C.BERTZ) TM:(S.BOSTIAN/H.ENGLISH)
PROJECT: GP08HAFS.F18A_DPORP PATH: G:\GIS\GP08HAFS\H18A\2009_BDRY_INV\F2-1 HAA18_INV_GWS07.mxd SAVED: 20MAR2009

MW-2	9/5/2007	12/16/2008
4-Isopropyltoluene	2.9	< 0.50
Benzene	9.3	3.3
Naphthalene	14	3.6

1D	5/23/2007
Benzene	9.3
Ethylbenzene	7.6
Isopropylbenzene	2
m-Xylene/p-Xylene	2.1
Naphthalene	950
o-Xylene	5.7
Toluene	1.8

HGL-3C	3/1/2006	9/5/2007	12/16/2008
1,2,3-Trichlorobenzene	---	1.7	< 0.50
1,2,4-Trichlorobenzene	---	1.1	< 0.50
Benzene	14	11	< 0.50
Ethylbenzene	10	4.7	< 0.50
m-Xylene/p-Xylene	5.1	0.81	NA
o-Xylene	7.6	3.4	NA
Xylenes (total)	NA	NA	<0.50
Naphthalene	---	360	< 0.50
Toluene	1.6	1	< 0.50

6D	5/23/2007
Benzene	18
Ethylbenzene	6.8
m-Xylene/p-Xylene	3.2
Naphthalene	45
o-Xylene	6.3
Toluene	0.72

MW-3	9/5/2007	9/5/2007(DUP)	12/16/2008
Benzene	< 1.0	< 1.0	1.1
Naphthalene	< 1.0	< 1.0	2.1
Xylenes (total)	NA	NA	20

2D	5/23/2007
Naphthalene	74

3D	5/23/2007
VOCs	BRL

4D	5/23/2007
VOCs	BRL

5D	5/23/2007
VOCs	BRL

MW-4	9/6/2007	12/16/2008
Acetone	< 5.0	22
Benzene	< 1.0	76
Chloromethane	< 1.0	0.63
Cyclohexane	NA	10
Ethylbenzene	< 1.0	6.9
Isopropylbenzene	< 1.0	1
Methylene Chloride	< 1.0	3.7
Toluene	< 1.0	100
m-Xylene/p-Xylene	< 2.0	NA
o-Xylene	< 1.0	NA
Xylenes (total)	NA	60

MW-5	9/6/2007	12/16/2008
Methylene Chloride	< 1.0	1.2

7D	5/23/2007
VOCs	BRL

8D	5/22/2007
VOCs	BRL

9D	5/22/2007
VOCs	BRL

10D	5/22/2007
VOCs	BRL

11D	5/22/2007
VOCs	BRL

12D	5/23/2007
VOCs	BRL

13D	5/23/2007
VOCs	BRL

14D	5/23/2007
Acetone	12

15D	5/23/2007
VOCs	BRL

16D	5/24/2007
Naphthalene	5

17D	5/23/2007
VOCs	BRL

18D	5/24/2007
VOCs	BRL

19D	5/24/2007
VOCs	BRL

20D	5/24/2007
VOCs	BRL

21D	5/24/2007
VOCs	BRL

22D	5/24/2007
Acetone	34

23D	5/23/2007
VOCs	BRL

24D	5/24/2007
VOCs	BRL

25D	5/24/2007
VOCs	BRL

MW-1	9/5/2007	12/16/2008
1,2-Dichloroethane	< 1.0	2.2
4-Isopropyltoluene	< 1.0	1.5
Acetone	< 5.0	38
Benzene	< 1.0	82
Cyclohexane	NA	56
Ethylbenzene	< 1.0	8.6
Isopropylbenzene	< 1.0	6.7
Methylcyclohexane	NA	15
Methylene Chloride	< 1.0	1.9
Naphthalene	< 1.0	20
Toluene	< 1.0	3.7
Xylenes (total)	NA	8.8

WILLIAM F LYNES PARKWAY
HUNTER army AIRFIELD BOUNDARY
NORTH PERIMETER ROAD
STEPHEN DOUGLAS ST.
LIGHT POLE
SANITARY MANHOLE
Canoochee EMC Yard
Veterinary Clinic (BLDG. 1030)
Vehicle Maintenance Shop
0 150 300
SCALE IN FEET

LEGEND:

- Monitor Well (deep)
- Direct Push Boring, May 2007

DPT Sample	Sample Date
Analyte	Result

DPT - Direct Push Technology
VOCs - Volatile Organic Compounds
NA - Laboratory did not analyze particular analyte in 8260B run.
BRL - Below Laboratory Reporting Limit
--- - Data Not Available

NOTES:
1) All DPT samples were collected from depth of 25 ft bgs.
2) Samples analyzed for VOCs by 8260B.
3) All concentrations in micrograms per liter (µg/L).
4) Only those analytes with at least one detection are shown.

Well ID	Screened Interval (ft bgs)	Total Depth (ft bgs)
MW-1	18.8 - 28.8	28.8
MW-2	20.5 - 30.5	30.5
MW-3	15.5 - 25.5	25.5
MW-4	19.1 - 29.1	29.1
MW-5	20 - 30	30
HGL-3C	29.4 - 39.4	39.42

REFERENCE:
JAMES M. KEATON SURVEY, DECEMBER 15, 2008.

HUNTER ARMY AIRFIELD, GEORGIA
HAAF BOUNDARY INVESTIGATION (HAA-18)

Deep Groundwater Analytical Summary, Direct Push and Monitor Well Sampling (2007-2008)

ARCADIS

FIGURE 2-2

SS-1	
2.5-3.2 ft	8/10/2007
VOCs	BRL

SS-2	
3.0-4.0 ft	8/10/2007
Acetone	25

SS-3	
2.4-2.9 ft	8/10/2007
Acetone	56

SS-4	
1.4-1.9 ft	8/10/2007
1,1-Dichloropropene	9.4
1,2,3-Trichloropropane	29
Acetone	63
Methylene Chloride	4.1

SS-5	
1.4-1.9 ft	8/10/2007
1,1-Dichloropropene	8.7
1,2,3-Trichloropropane	30
2-Hexanone	9.6
Acetone	78

SS-6	
1.2-1.8 ft	8/10/2007
Acetone	76
p-Isopropyltoluene	2.1
Toluene	1.2

SS-7	
1.6-2.2 ft	8/10/2007
Acetone	19
Methylene Chloride	4.2

SS-8	
3.0-3.5 ft	8/10/2007
Acetone	7.2
Methylene Chloride	3.1
Toluene	0.86

SS-9	
2.9-3.6 ft	8/10/2007
VOCs	BRL

SS-10	
2.2-2.9 ft	8/10/2007
Acetone	58

HGL-3C
MW-1
MW-2
MW-3
MW-4
MW-5
LIGHT POLE
SANITARY MANHOLE
Canoochee EMC Yard
Veterinary Clinic (BLDG. 1030)
Vehicle Maintenance Shop
STEPHEN DOUGLAS ST.
FLYING FORTRESS RD.
NORTH PERIMETER ROAD
HUNTER AIRFIELD BOUNDARY

0 150 300
SCALE IN FEET

LEGEND:

- Monitor Well (deep)
- Direct Push Boring, May 2007
- Shallow Soil Sample, August 2007

Soil Sample Location	
Sample Depth	Sample Date
Analyte	Result

VOCs - Volatile Organic Compounds
BRL - Below Laboratory Reporting Limit

NOTES:
1) Samples analyzed for VOCs by 8260B.
2) All concentrations in micrograms per kilogram (ug/kg).
3) Only those analytes with at least one detection are shown.

REFERENCE:
JAMES M. KEATON SURVEY, DECEMBER 15, 2008.

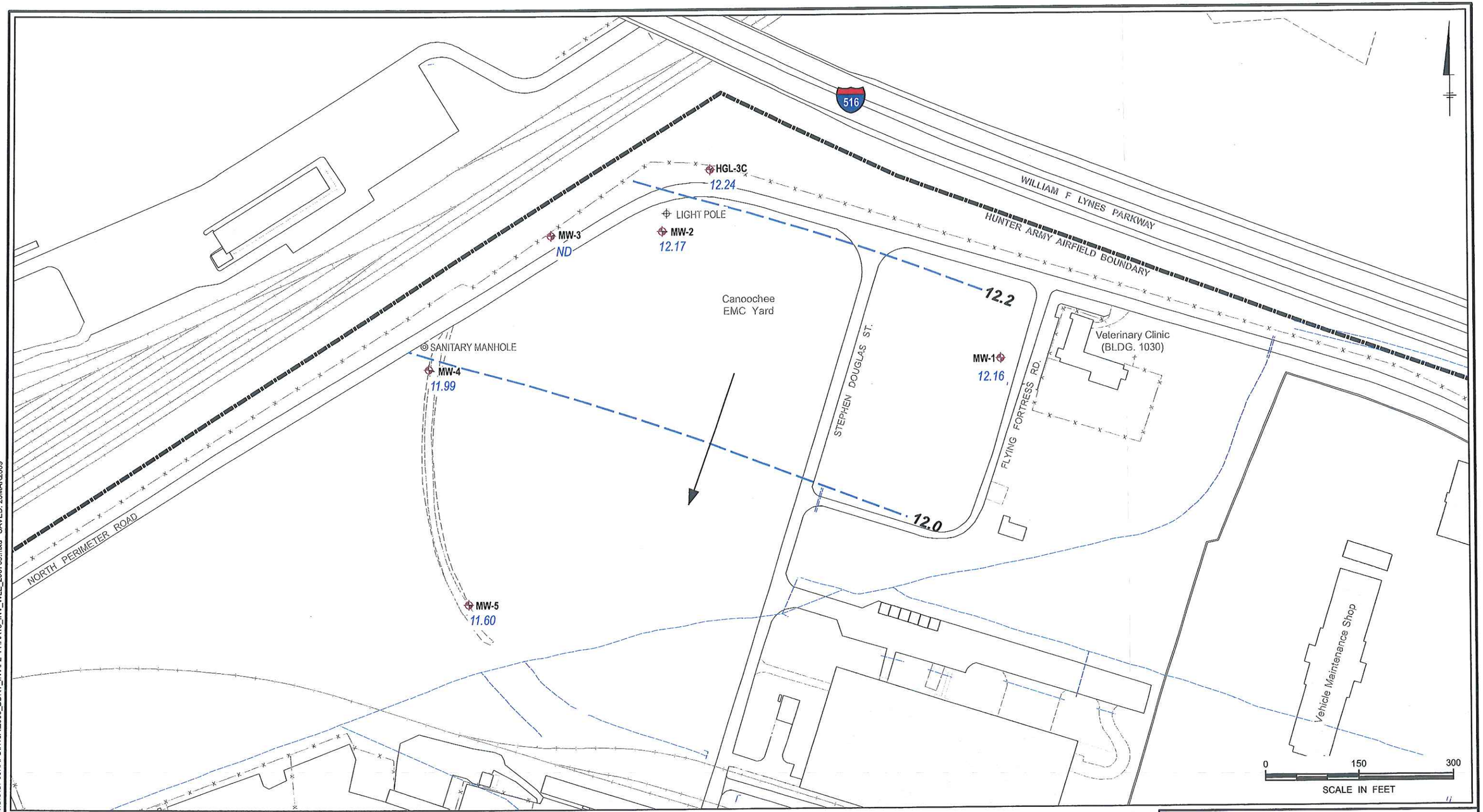
HUNTER ARMY AIRFIELD, GEORGIA
HAAF BOUNDARY INVESTIGATION (HAA-18)

Soil Analytical Summary (August 2007)

ARCADIS

FIGURE
2-3

CITY:(KNOXVILLE) DIV/GROUP:(ENV) DB:(B.ALTOM) LD:(B.ALTOM) PIC:(M.FENNER) PM:(C.BERTZ) TM:(S.BOSTIAN/H.ENGLISH)
PROJECT: GP08HAFS.F18A.DPORP PATH: G:\GIS\GP08HAFS\H18A\2009_BDRY_INV\F2-3 HAA18_INV_SOIL07.mxd SAVED: 19MAR2009



LEGEND:

- Monitor Well (deep)
- *11.60* Water-Level Elevation, (ft, msl) Measured September 5-6, 2007
- *ND* Not Usable Data
- Groundwater Contour (ft, msl) (Inferred where dashed)
- General Direction of Groundwater Flow

NOTE:
Water-level data obtained from sampling logs in "North Perimeter Road Preliminary Investigation" (USACE, 2008). Logs for wells MW-4 and MW-5 are dated September 6, 2007; logs for all other wells are dated September 5, 2007.

REFERENCE:
JAMES M. KEATON SURVEY, DECEMBER 15, 2008.

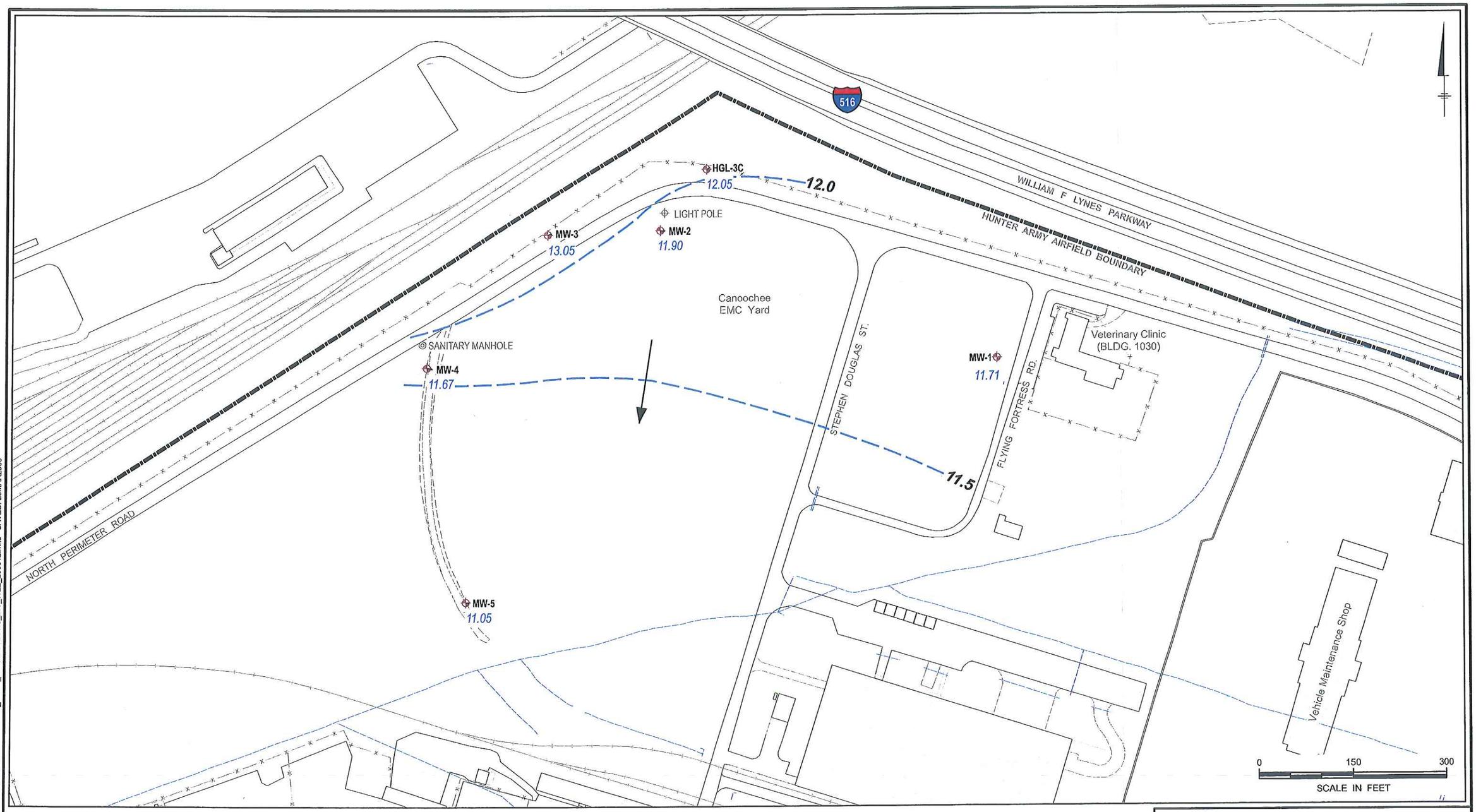
HUNTER ARMY AIRFIELD, GEORGIA
HAAF BOUNDARY INVESTIGATION (HAA-18)

Groundwater Elevations (September 2007)

ARCADIS

FIGURE 2-4

CITY:(KNOXVILLE) DIV/GROUP:(ENV) DB:(B.ALTOM) LD:(B.ALTOM) PIC:(M.FENNER) PM:(C.BERTZ) TM:(S.BOSTIAN/H.ENGLISH)
PROJECT: GP08HAFS.F18A.DPORP PATH: G:\GIS\GP08HAFS\H18A\2009_BDRY_INV\F2-4 HAA18_INV_WLE_200709.mxd SAVED: 20MAR2009



LEGEND:

- Monitor Well (deep)
- 11.05 Water-Level Elevation, (ft, msl) Measured December 12, 2008
- Groundwater Contour (ft, msl) (inferred where dashed)
- General Direction of Groundwater Flow

REFERENCE:
JAMES M. KEATON SURVEY, DECEMBER 15, 2008.

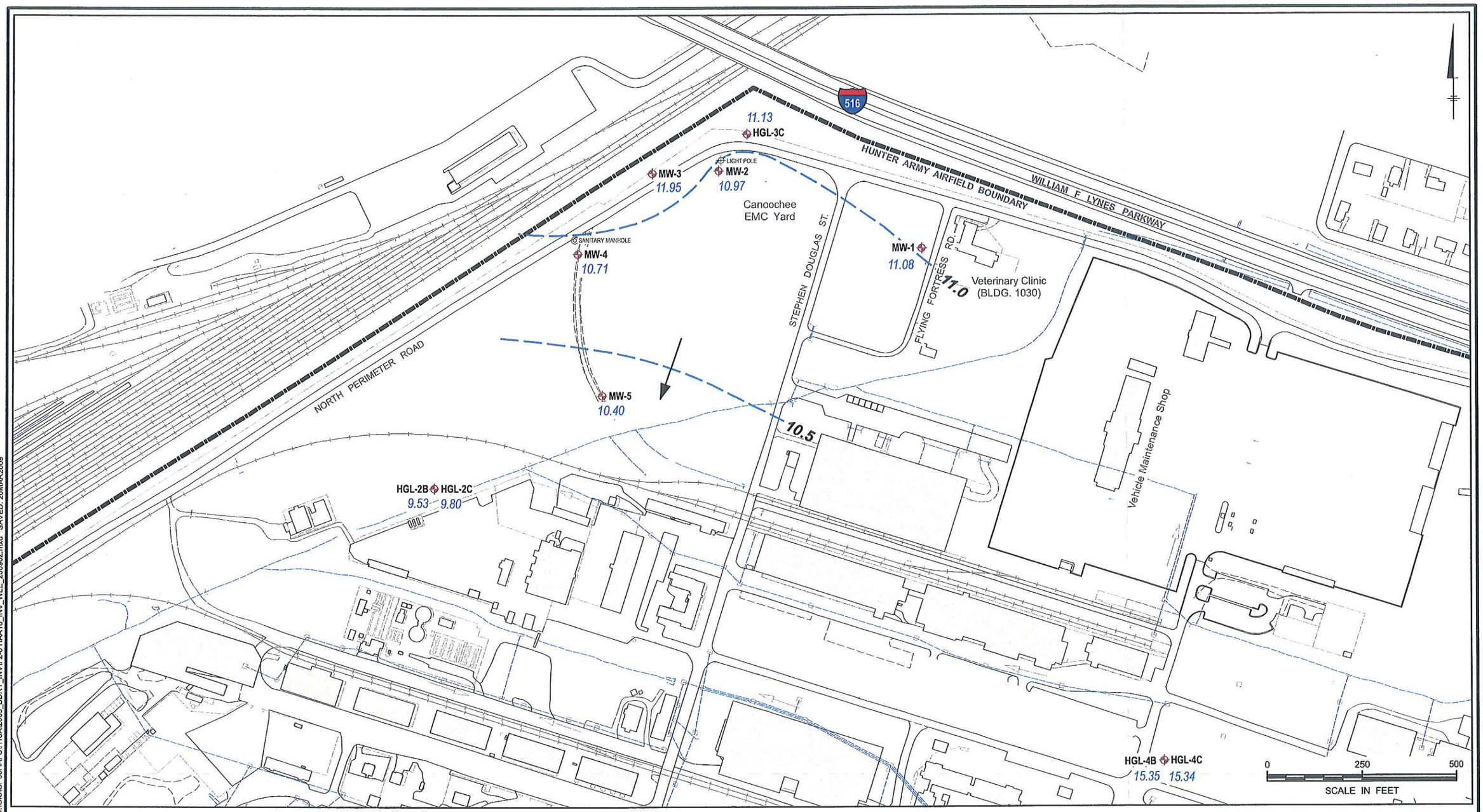
HUNTER ARMY AIRFIELD, GEORGIA
HAAF BOUNDARY INVESTIGATION (HAA-18)

Groundwater Elevations (December 2008)

ARCADIS

FIGURE 2-5

CITY:(KNOXVILLE) DIV/GROUP:(ENV) DB:(B.ALTOM) LD:(B.ALTOM) PIC:(M.FENNER) PM:(C.BERTZ) TM:(S.BOSTIAN/H.ENGLISH)
PROJECT: GP08HAFS:F16A.DPORP PATH: G:\GIS\GP08HAFS\H18A\2009_BDRY_INVF2-5 HAA18_INV_WLE_200812.mxd SAVED: 20MAR2009 (ENGLISH)



LEGEND:

- Monitor Well (deep)
- 9.53 Water-Level Elevation, (ft, msl) Measured February 27, 2009
- Groundwater Contour (ft, msl) (inferred where dashed)
- General Direction of Groundwater Flow

REFERENCE:
JAMES M. KEATON SURVEY, DECEMBER 15, 2008.

HUNTER ARMY AIRFIELD, GEORGIA
HAAF BOUNDARY INVESTIGATION (HAA-18)

Groundwater Elevations (February 2009)

ARCADIS

FIGURE
2-6

CITY:(KNOXVILLE) DIV/GROUP:(ENV) DB:(B.ALTOM) LD:(B.ALTOM) PIC:(M.FENNER) PM:(C.BERTZ) TM:(S.BOSTIAN/H.ENGLISH)
PROJECT: GP08HAFS.F18A.DPORP PATH: G:\GIS\GP08HAFS\H18A2009_BDRY_INV\F2-6 HAA18_INV_WLE_200902.mxd SAVED: 20MAR2009