FINAL

IMA

ADDENDUM #25
TO THE
WORK PLAN

FOR

3d Inf Div (Mech)

PRELIMINARY GROUNDWATER AND CORRECTIVE ACTION PLAN–PART A/PART B INVESTIGATIONS AT FORMER UNDERGROUND STORAGE TANK SITES, HUNTER ARMY AIRFIELD AND FORT STEWART, GEORGIA

Prepared for

U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT

Contract No. FA4890-04-D-0004
Delivery Orders CV01

August 2007

SAIC
From Science to Solutions

07-091(E)/080707

DOCUMENT 31

FINAL

ADDENDUM #25
TO THE
WORK PLAN
FOR
PRELIMINARY GROUNDWATER AND
CORRECTIVE ACTION PLAN–PART A/PART B INVESTIGATIONS
AT
FORMER UNDERGROUND STORAGE TANK SITES,
HUNTER ARMY AIRFIELD
AND
FORT STEWART, GEORGIA

Prepared for

U.S. Army Corps of Engineers
Savannah District
Under Contract Number FA4890-04-D-0004
Delivery Orders CV01

Prepared by

Science Applications International Corporation
151 Lafayette Drive
Oak Ridge, TN 37830

August 2007

APPROVALS

ADDENDUM #25
TO THE
WORK PLAN
FOR
PRELIMINARY GROUNDWATER AND
CORRECTIVE ACTION PLAN–PART A/PART B INVESTIGATIONS
AT
FORMER UNDERGROUND STORAGE TANK SITES,
HUNTER ARMY AIRFIELD
AND
FORT STEWART, GEORGIA

Sharon Stoller 8/8/07

Sharon Stoller, Program Manager — Date

Patty Stoll 8/8/07

Patty Stoll, Project Manager — Date

TABLE OF CONTENTS

List of Appendices

List of Figure

List of Tables

List of Abbreviations and Acronyms

BFF	Bulk Fuel Facility
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAP	Corrective Action Plan
CQC	chemical quality control
DAACG	Departure/Arrival Control Group
DO	dissolved oxygen
FTA	Fire Training Area
HAAF	Hunter Army Airfield
MTBE	methyl tertiary butyl ether
PAH	polyaromatic hydrocarbon
PCE	tetrachloroethene
PDO	Old Property Disposal
pH	hydrogen-ion concentration
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
Redox	oxidation-reduction potential
SAIC	Science Applications International Corporation
SAP	Sampling and Analysis Plan
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TBD	to be determined
UST	underground storage tank
VOC	volatile organic compound

1.0 INTRODUCTION

This addendum supplements the following work plans: *Work Plan for Preliminary Groundwater and Corrective Action Plan–Part A/Part B Investigations at Former Underground Storage Tank Sites, Fort Stewart Georgia* (SAIC 1996) and *Sampling and Analysis Plan for Corrective Action Plan–Part A and B Investigations for Former Underground Storage Tanks at Hunter Army Airfield, Georgia* (SAIC 1998). It presents changes to the work plans and the specific sampling requirements for the performance of additional investigations to support the various Corrective Action Plans (CAPs). Investigations are required at additional underground storage tank (UST) sites in response to comments received from the Georgia Department of Natural Resources, UST Management Program Branch, on several CAP–Part A and Part B reports.

Five sites at Fort Stewart have been identified as requiring additional investigations based on analytical results obtained during previous investigations. These sites are former USTs 208 & 209, UST 210, USTs 255 & 256, USTs 276–279, and Solid Waste Management Unit (SWMU) 13 (Appendix A, Figures A-1 through A-5, respectively). Table 1 identifies general site-specific information and presents the proposed activities for each site at Fort Stewart.

Four sites at Hunter Army Airfield (HAAF) have been identified as requiring additional investigations based on analytical results obtained during previous investigations. These sites are the Fire Training Area (FTA), the Departure/Arrival Air Control Group (DAACG) site and Pumphouse #2 (Appendix B, Figures B-1 and B-2, respectively). Table 2 identifies general site-specific information and presents the proposed activities for each site at HAAF.

2.0 PROJECT ORGANIZATION

The organizational chart for the Fort Stewart and HAAF investigations is presented in Figure 1.

3.0 FIELD ACTIVITIES

3.1 FIELD ACTIVITIES GROUP 1 (BASE SCOPE)

At the FTA/DAACG site at HAAF, ten wells will be sampled for benzene, toluene, ethylbenzene, and xylenes (BTEX), semivolatile organic compounds (SVOCs); and lead and ten wells will be sampled for volatile organic compounds (VOCs) during two rounds of semiannual sampling. The sampling locations for the site are presented in Appendix B, Figure B-1.

At the Pumphouse #2 site at HAAF, 13 wells will be sampled for BTEX during two rounds of semiannual sampling. The sampling locations for the site are presented in Appendix B, Figure B-1.

At the SWMU 13 site, one round of sampling will be conducted. Seven wells will be sampled for VOCs, SVOCs, Resource Conservation and Recovery Act (RCRA) metals, nitrate, nitrite, sulfate, sulfide, carbon dioxide, total phosphorous, and methane. The sampling locations for the site are presented in Appendix A, Figure A-5.

3.2 FIELD ACTIVITIES GROUP 2 (OPTION 1 SCOPE)

3.2.1 Option 1 Scope

At the USTs 276–279 site, 13 wells will be sampled for BTEX and methyl tertiary butyl ether (MTBE) during two rounds of semiannual sampling. The sampling locations for the site are presented in Appendix A, Figure A-4.

3.3 FIELD ACTIVITIES GROUP 3 (OPTIONS 2 SCOPE)

3.3.1 Option 2 Scope

At the USTs 208 & 209 site, five wells will be sampled for BTEX during two rounds of semiannual sampling. The sampling locations for the site are presented in Appendix A, Figure A-1. In addition, if free product is measured before or during sampling, absorbent socks will be installed in the monitoring wells identified with free product.

At the UST 210 site, three wells will be sampled for BTEX during two rounds of semiannual sampling. The sampling locations for the site are presented in Appendix A, Figure A-2. In addition, if free product is measured before or during sampling, absorbent socks will be installed in the monitoring wells identified with free product.

At the USTs 255 & 256 site, 11 wells will be sampled for BTEX during two rounds of semiannual sampling. The sampling locations for the site are presented in Appendix A, Figure A-3.

Tables 1 and 2 present the site-specific investigation events at Fort Stewart and HAAF, respectively. Table 3 presents the sample numbering system that will be used for these investigations. Table 4 presents a summary of the field and quality control (QC) soil and groundwater samples to be collected during the investigations.

4.0 GROUNDWATER SAMPLING

Low-flow techniques will be used to collect groundwater samples from all 2-in. monitoring wells. Field measurements performed during the investigations will include hydrogen-ion concentration (pH), specific conductance, temperature, oxidation-reduction potential (Redox), and dissolved oxygen (DO). Procedures and equipment for measurement of pH, specific conductance, temperature, Redox, and DO are presented in the Sampling and Analysis Plan (SAP) (SAIC 1998).

Groundwater samples will be collected from the 3/4-in. monitoring wells and piezometers using peristaltic pumps for purging and disposable bailers for sampling. Field measurements performed during the investigations will include pH, specific conductance, temperature, Redox, and DO. Procedures and equipment for measurement of pH, specific conductance, temperature, Redox, and DO are presented in the SAP (SAIC 1998).

5.0 WATER-LEVEL MEASUREMENTS

Before the sampling team leaves the sites, a complete set of water-level measurements will be collected from all wells at each site. Procedures and equipment for water-level measurements are presented in the SAP (SAIC 1998).

6.0 REFERENCES

SAIC (Science Applications International Corporation) 1996. *Work Plan for Preliminary Groundwater and Corrective Action Plan–Part A/Part B Investigations at Former Underground Storage Tank Sites, Fort Stewart, Georgia,* Oak Ridge, Tennessee.

SAIC 1998. *Sampling and Analysis Plan for Corrective Action Plan–Part A and B Investigations for Former Underground Storage Tanks at Hunter Army Airfield, Georgia,* Oak Ridge, Tennessee.

USACE (U.S. Army Corps of Engineers) 2001. *Requirements for the Preparation of Sampling and Analysis Plans*, EM 200-1-3, February.

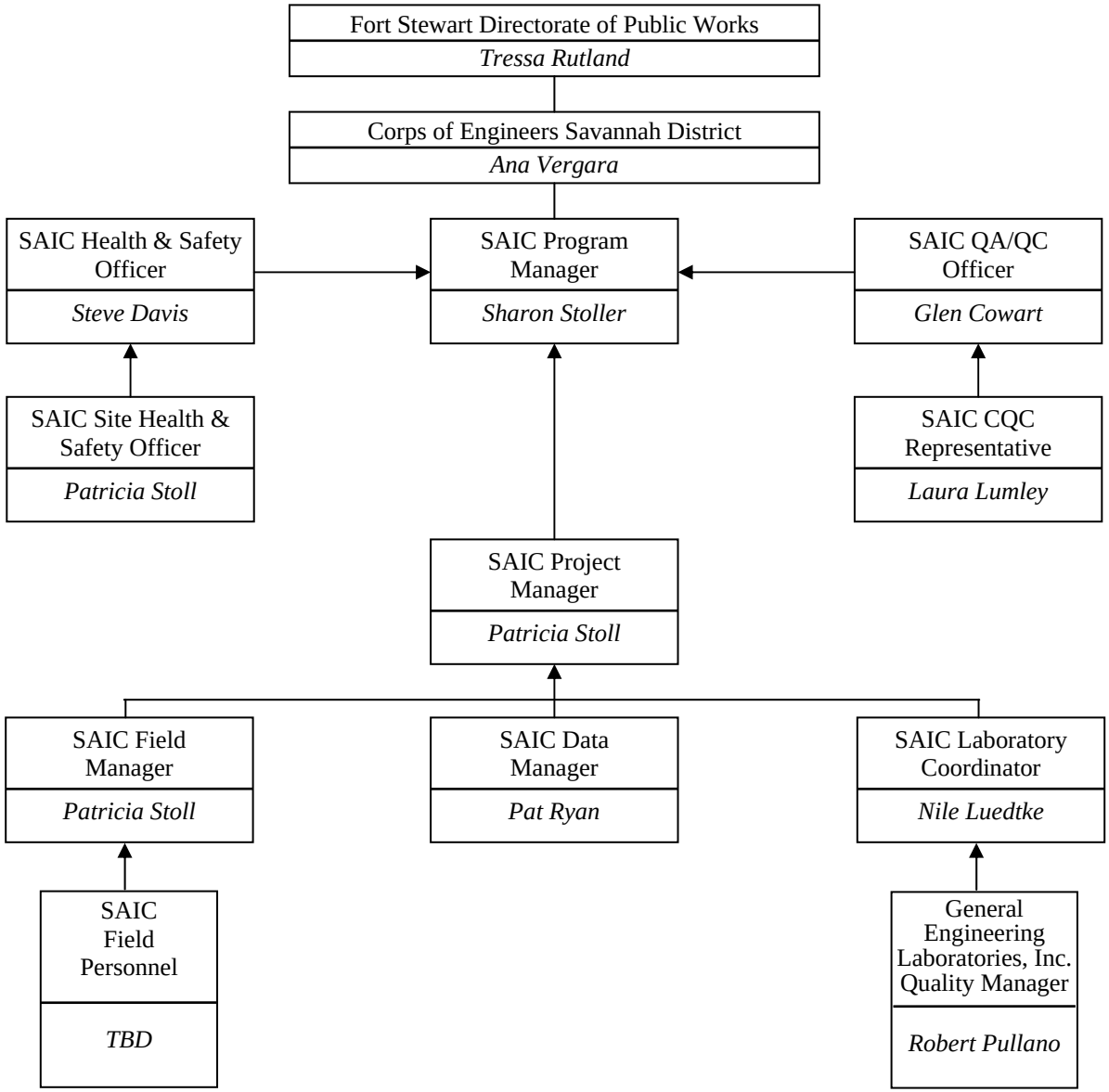


Figure 1. Revised Organizational Chart for Fort Stewart/Hunter Army Airfield Investigations

Table 1. Proposed Fort Stewart Investigations

Site Name	Facility ID #	Bldg.	Type of Tank	Wells to Be Sampled	Lab Analyses	Sampling Times
USTs 208 & 209	9-089036	276	Gas/diesel	42-05, 42-07, 42-10, 42-11, 42-12 (5)	GW: BTEX	July 2007 January 2008
UST 210	9-089035	272	Waste oil	43-08/11, 43-09, 43-10 (3)	GW: BTEX	July 2007 January 2008
USTs 255 & 256	9-089087	16012	Gas/diesel	93-08R, 93-14, 93-15, 93-17R, 93-18R, 93-19, 93-20, 93-25, 93-28, 93-30, 93-31 (11)	GW: BTEX	July 2007 January 2008
USTs 276–279	9-089156	939	Gas	MW-1, MW-2, MW-3, MW-4, MW-5R, MW-6, MW-7, MW-8, MW-12, 1A-18, 1A-20, 1A-21, 1A-22 (13)	GW: BTEX, MTBE	July 2007 January 2008
SWMU 13				MW-3, MW-4, MW-10, MW-15, MW-16, MW-18, MW-19 (7)	GW: VOCs, SVOCs, RCRA metals, nitrate, nitrite, sulfate, carbon dioxide, phosphorous, sulfide, methane	July 2007

BTEX = Benzene, toluene, ethylbenzene, and xylenes.
GW = Groundwater.
MTBE = Methyl tertiary butyl ether.
RCRA = Resource Conservation and Recovery Act.
SVOC = Semivolatile organic compound.
UST = Underground storage tank.
VOC = Volatile organic compound.

Table 2. Proposed Hunter Army Airfield Investigations

Site Name	Facility ID #	Bldg.	Type of Tank	Wells to Be Sampled or to Have Socks Installed	Lab Analyses	Sampling Times
Fire Training Area/ DAACG				HMW-02, HMW-04, HMW-06, HMW-08, HMW-09, HMW-10, HMW-11, HMW-13, HMW-23, HMW-24 (10 BTEX) COE-MW-01, COE-MW-02, COE-MW-03, COE-MW-04, COE-MW-05, COE-MW-06, COE-MW-07, COE-MW-08, HMW-14R, HMW-21 (10 VOCs)	GW: BTEX (10), SVOCs (10), and lead (10) GW: VOCs (10)	July 2007 January 2008
Pumphouse #2	9-025085	8060	JP-8	TMP-1, TMP-2, TMP-3, TMP4R, TMP-5, TMP-6 TMP-7, TMP-8, TMP-9R, TMP-10, TMP-11, TMP-12, P2-MW-4 (13)	GW: BTEX (13)	July 2007 January 2008

BTEX = Benzene, toluene, ethylbenzene, and xylenes.
DAACG = Departure/Arrival Control Group.
GW = Groundwater.
SVOC = Semivolatile organic compound.
UST = Underground storage tank.
VOC = Volatile organic compound.

Table 3. Sample Numbering System for Fort Stewart/Hunter Army Airfield Activities

Sample Identification: XX##NT	
XX = Area designator Examples: Fort Stewart 42 = INV – 42 (USTs 208 & 209) 43 = INV – 43 (UST 210) 93 = INV – 93 (USTs 255 & 256) 1A = INV – 1A (USTs 276–279) 13 = INV – 13 (SWMU 13)	Area designators used for the project will be the data-cluster identifiers presented in Table 1-1 of the project Sampling and Analysis Plan (SAIC 1998). Examples: Hunter Army Airfield AC = INV – AC (Former HAAF Fire Training Area) AM = INV – AM (Pumphouse #2)
## = Sample location	Sample locations will be consecutive starting from the last sample location. Example 05 = Monitoring well 05
N = Sample depth	Sample depth will be represented by a number for each laboratory sample. Examples 1 = First interval 2 = Second interval
T = Sample type	Examples 1 = Soil sample 2 = Groundwater sample 3 = Soil duplicate 4 = Groundwater duplicate 5 = Rinsate blank (soil equipment) 6 = Rinsate blank (groundwater equipment) 7 = Soil QA split sample 8 = Groundwater QA split sample 9 = Surface water sample 0 = Sediment sample A = Vertical-profile groundwater sample X = IDW soil

All trip blank samples used during the project will be consecutively identified.
HAAF = Hunter Army Airfield.
IDW = Investigation-derived waste.
PDO = Old Property Disposal.
QA = Quality assurance.
SWMU = Solid waste management unit.
UST = Underground storage tank.

Table 4. Summary of Analytical Samples to Be Collected during Fort Stewart Investigations

Matrix	Analysis	Analytical Procedure	No. Field Samples	QC Dups.[a]	Field Rnsts.[b]	QC Trip Blanks	Total Samples	Holding Time	Preservation Requirements	Sample Containers
Groundwater	BTEX	EPA 8260B	64	7	4	6	81	14 days	Cool 4°C HCl pH <2	Two 40-mL GSV[c]
	VOC	EPA 8260B	7	1	1	2	11	14 days	Cool 4°C HCl pH <2	Two 40-mL GSV[c]
	MTBE	EPA 8260B	26	3	2	0	31	14 days	Cool 4°C HCl pH <2	Two 40-mL GSV[c]
	SVOC	EPA 8270C	7	1	1	0	9	14 days	Cool 4°C	Two 1-L AG
	RCRA Metals	EPA 6010B	7	1	1	0	9	180 days	Cool 4°C HNO_3 pH<2	One 1-L HDPE
	Nitrate	EPA 300.0	7	1	1	0	9	48 hours	Cool 4°C	One 250-mL HDPE
	Nitrite	EPA 300.0	7	1	1	0	9	48 hours	Cool 4°C	None[d]
	Sulfate	EPA 300.0	7	1	1	0	9	48 hours	Cool 4°C	None[d]
	Sulfide	EPA 376.2	7	1	1	0	9	7 days	Cool 4°C zinc acetate plus NaOH to pH>9	One 500-mL HDPE
	Carbon dioxide	SM 4500	7	1	1	0	9	14 days	Cool 4°C	One 250-mL HDPE
	Methane	EPA 8000	7	1	1	0	9	14 days	Cool 4°C	Two 40-mL GSV[c]
	Total phosphorous	EPA 365.4	7	1	1	0	9	28 days	Cool 4°C H_2SO_4 pH<2	One 250-mL HDPE
IDW water	VOC	EPA 8260B	2	0	0	0	2	14 days	Cool 4°C HCl pH <2	Two 40-mL GSV[c]
	Oil and grease	EPA 413.2	2	0	0	0	2	28 days	Cool 4°C H_2SO_4 pH<2	Two 1-L AG
	Total phenols	EPA 420.1/420.2	2	0	0	0	2	28 days	Cool 4°C H_2S0_4 pH<2	Two 1-L AG
	pH	EPA 150.1	2	0	0	0	2	ASAP	Cool 4°C	One 250-mL HDPE

[a] The number of QC duplicate samples represents a 10% distribution between the different types of investigations to be conducted; however, the actual number of duplicates collected for each investigation type might vary slightly from the distribution presented.
[b] The number of QC rinsate blank samples represents a 5% distribution between the different types of investigations to be conducted; however, the actual number of blanks collected for each investigation type might vary slightly from the distribution presented.
[c] Sample containers will be filled so that no headspace is present.
[d] Analysis will be performed on matrix in nitrate sample container.

Table 4. Summary of Analytical Samples to Be Collected during Fort Stewart Investigations (continued)

AG = Amber glass.
ASAP = As soon as possible.
BTEX = Benzene, toluene, ethylbenzene, and xylenes.
CWM = Clear, wide-mouth glass jar.
EPA = U.S. Environmental Protection Agency.
GSV = Glass septa vial.
HDPE = High-density polyethylene.
IDW = Investigation-derived waste.
MTBE = Methyl tertiary butyl ether.
QC = Quality control.
SVOC = Semivolatile organic compound.
TCLP = Toxicity Characteristic Leaching Procedure.
VOC = Volatile organic compound.
[This table is in conformance with EM-200-1-3 (USACE 2001)].

Table 5. Summary of Analytical Samples to Be Collected during Hunter Army Airfield Investigations

Matrix	Analysis	Analytical Procedures	No. Field Samples	QC Dups.[a]	Field Rnsts.[b]	QC Trip Blanks	Total Samples	Holding Time	Preservation Requirements	Sample Containers
Groundwater	BTEX	EPA 8260B	46	5	3	5	59	14 days	Cool 4°C HCl pH<2	Two 40-mL GSV[c]
	VOC	EPA 8260B	20	2	1	2	22	14 days	Cool 4°C HCl pH<2	Two 40-mL GSV[c]
	SVOCs	EPA 8100	20	2	1	0	23	14 days	Cool 4°C	Two 1-L AG
	Lead	EPA 6010B	20	2	1	0	23	14 days	Cool 4°C HNO3 pH<2	One 250-mL HDPE
IDW water	VOC	EPA 8260B	2	0	0	0	2	14 days	Cool 4°C HCl pH<2	Two 40-mL GSV[c]
	Oil and grease	EPA 413.2	2	0	0	0	2	28 days	Cool 4°C H_2SO_4 pH<2	Two 1-L AG
	Total phenols	EPA 420.1/420.2	2	0	0	0	2	28 days	Cool 4°C H_2SO_4 pH<2	Two 1-L AG
	pH	EPA 150.1	2	0	0	0	2	ASAP	Cool 4°C	One 250-mL HDPE

[a] The number of QC duplicate samples represents a 10% distribution between the different types of investigations to be conducted; however, the actual number of duplicates collected for each investigation type might vary slightly from the distribution presented.
[b] The number of QC rinsate blank samples represents a 5% distribution between the different types of investigations to be conducted; however, the actual number of blanks collected for each investigation type might vary slightly from the distribution presented.
[c] Sample containers will be filled so that no headspace is present.

AG = Amber glass.
ASAP = As soon as possible.
BTEX = Benzene, toluene, ethylbenzene, and xylenes.
CWM = Clear, wide-mouth glass jar.
EPA = U.S. Environmental Protection Agency.
GSV = Glass septa vial.
HDPE = High-density polyethylene.
IDW = Investigation-derived waste.
PAH = Polyaromatic hydrocarbon.
PCE = Tetrachloroethene.
QC = Quality control.
TCLP = Toxicity Characteristic Leaching Procedure.
VOC = Volatile organic compound.
[This table is in conformance with EM-200-1-3 (USACE 2001)].

APPENDIX A

PROPOSED SAMPLING LOCATIONS FOR FORT STEWART INVESTIGATIONS

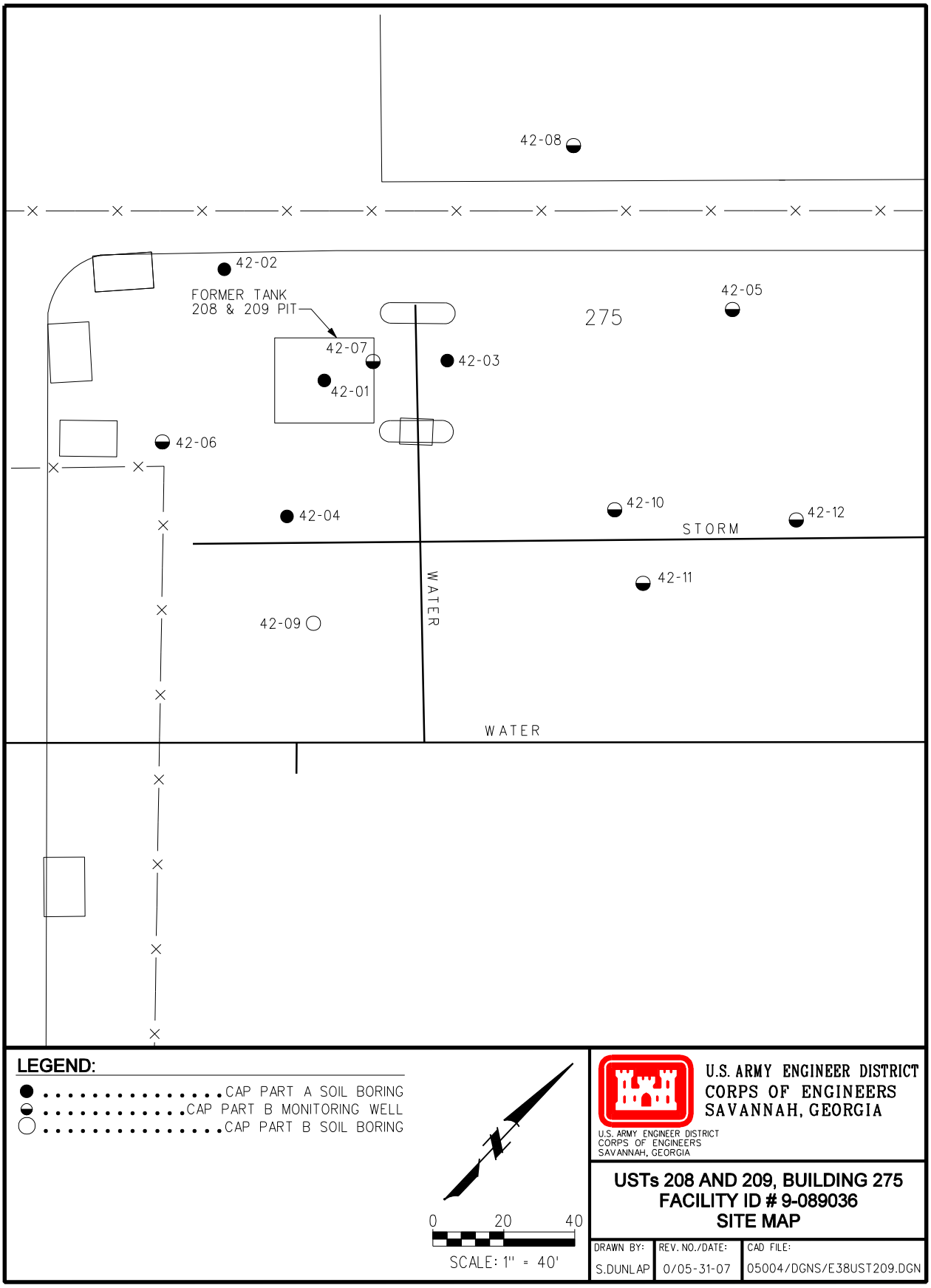


Figure A-1. Site Location Map of USTs 208 & 209

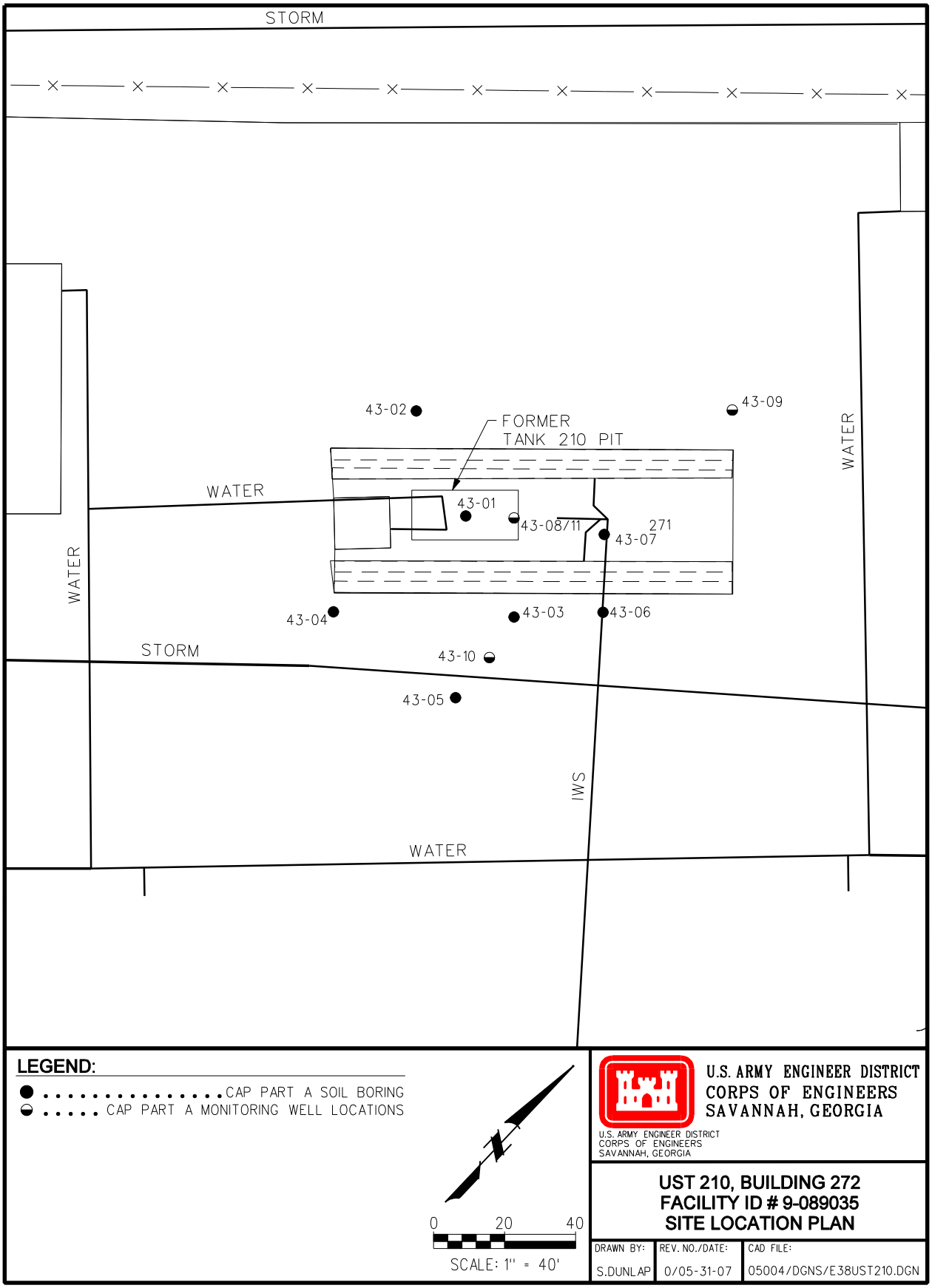


Figure A-2. Site Location Map of UST 210

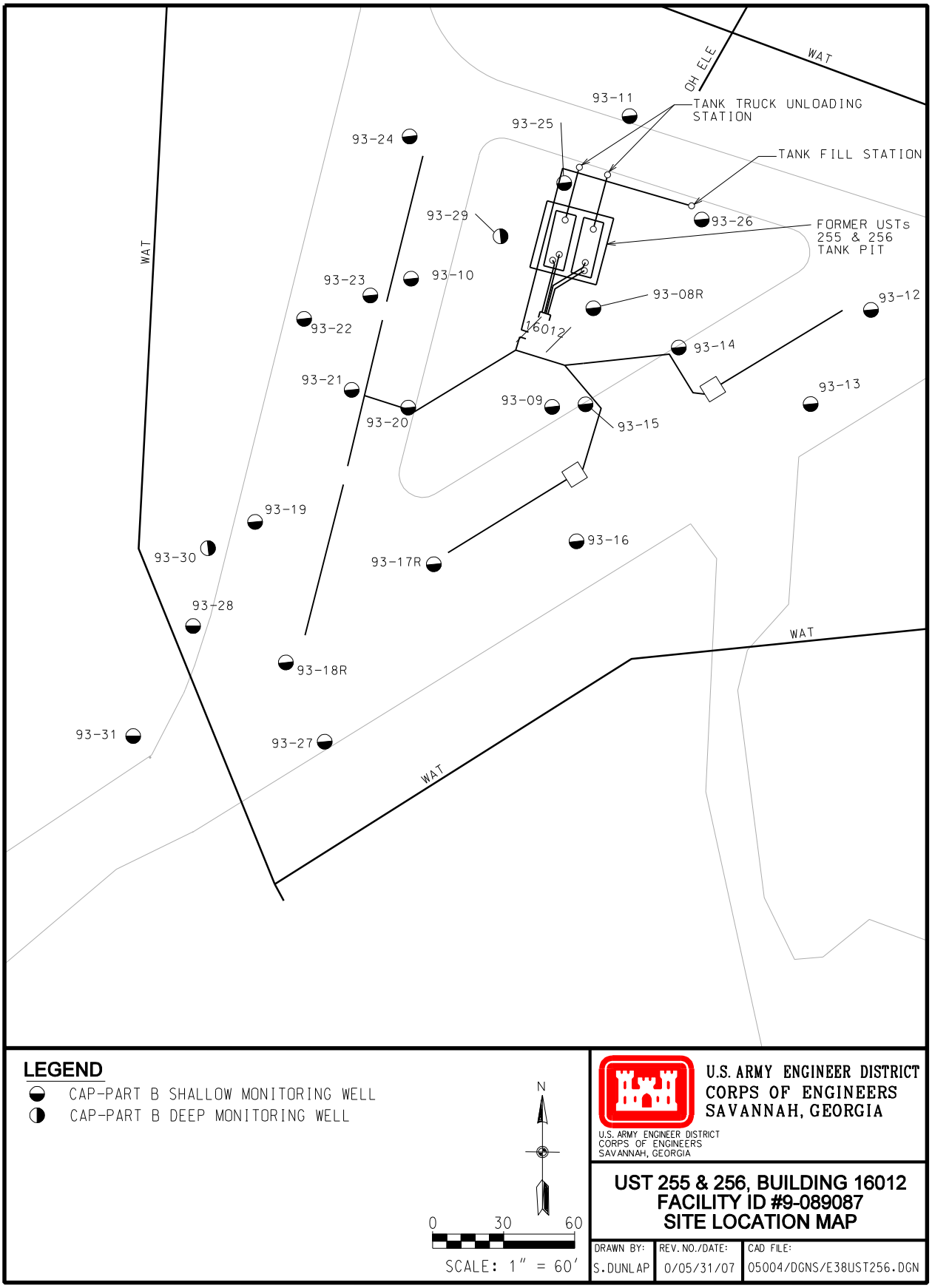


Figure A-3. Site Location Map of USTs 255 & 256

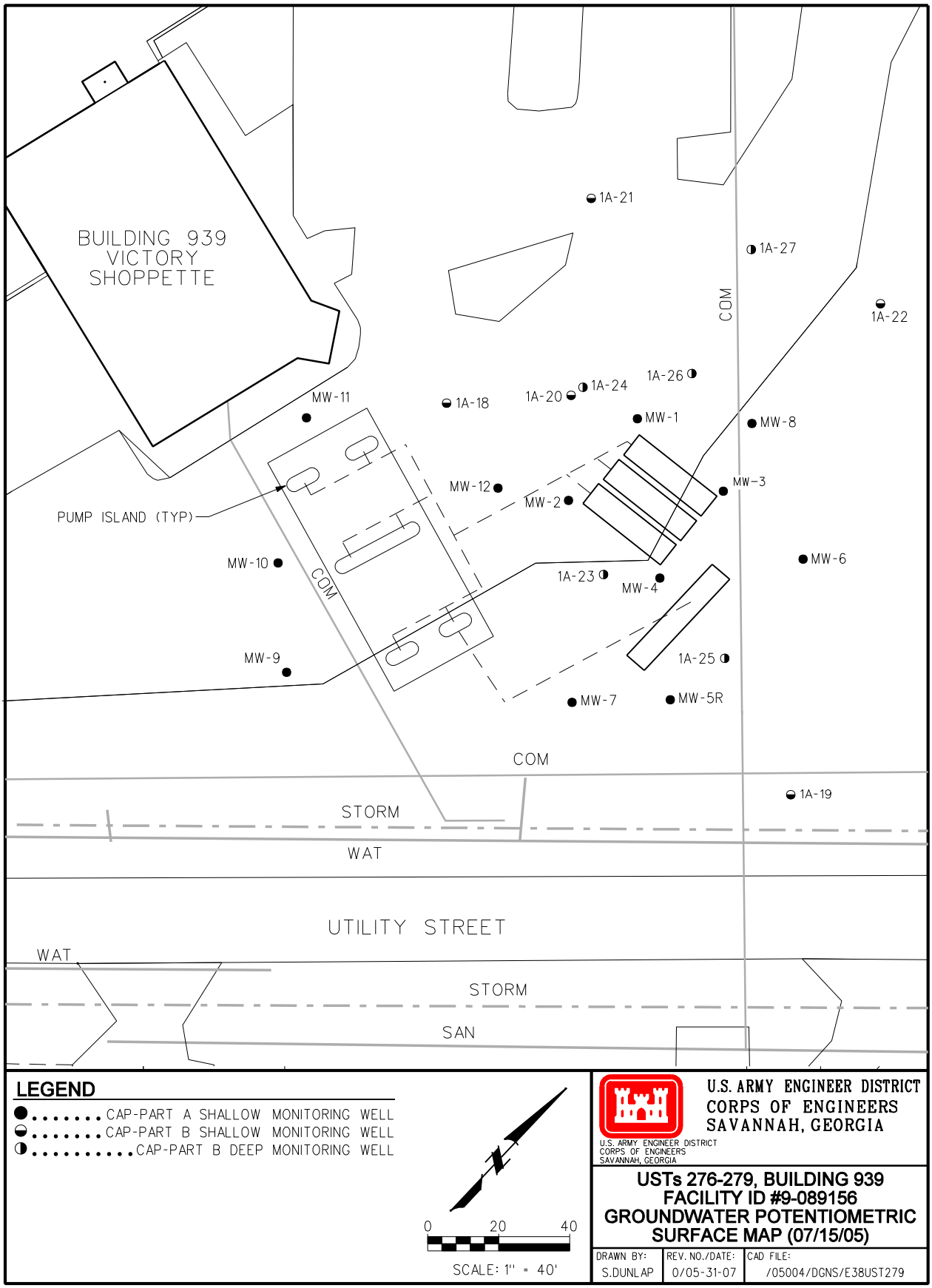
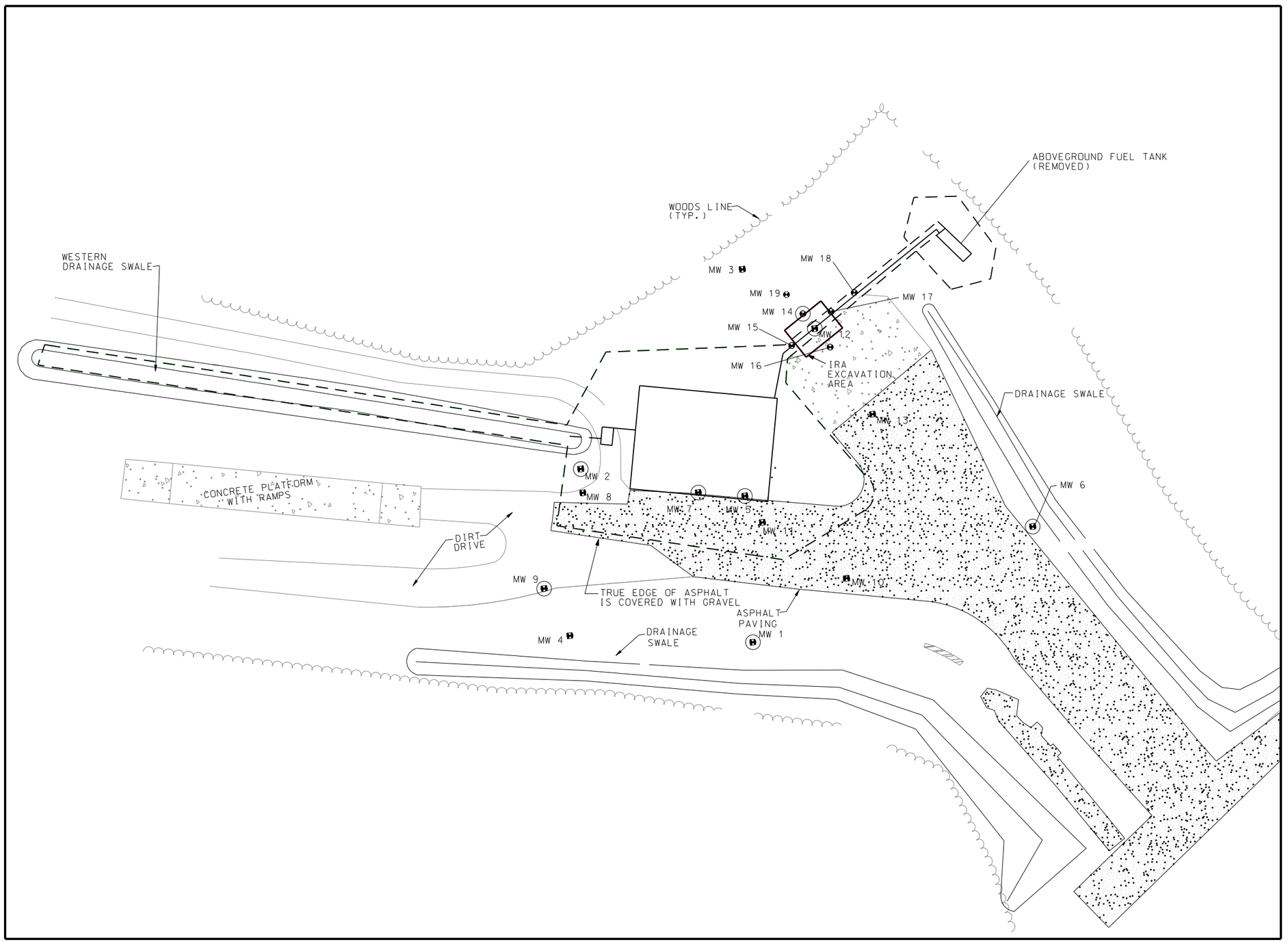


Figure A-4. Site Location Map of USTs 276 & 279



LEGEND:

- LIMITS OF INTERIM MEASURES EXCAVATION
- MW 2 — MONITORING WELL (DAMAGED OR NO LONGER EXISTING)
- MW 4 — MONITORING WELL
- ASPHALT PAVEMENT
- CONCRETE PAVEMENT
- DITCH
- WOODS LINE

NOTES:

MW 1 AND MW 6 WERE DESTROYED BY HEAVY EQUIPMENT BACKING OVER THEM AND WERE NOT SAMPLED IN DECEMBER 2000.

MW 15 - MW 19 WERE INSTALLED IN APRIL 2001.

MW 12 WAS REMOVED AND MW 14 WAS DAMAGED DURING THE 2001/2002 INTERIM REMOVAL ACTION (IRA).

MW 2, MW 5, MW 7, AND MW 9 WERE ABANDONED IN 2001/2002.

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SAVANNAH, GEORGIA

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SAVANNAH, GEORGIA

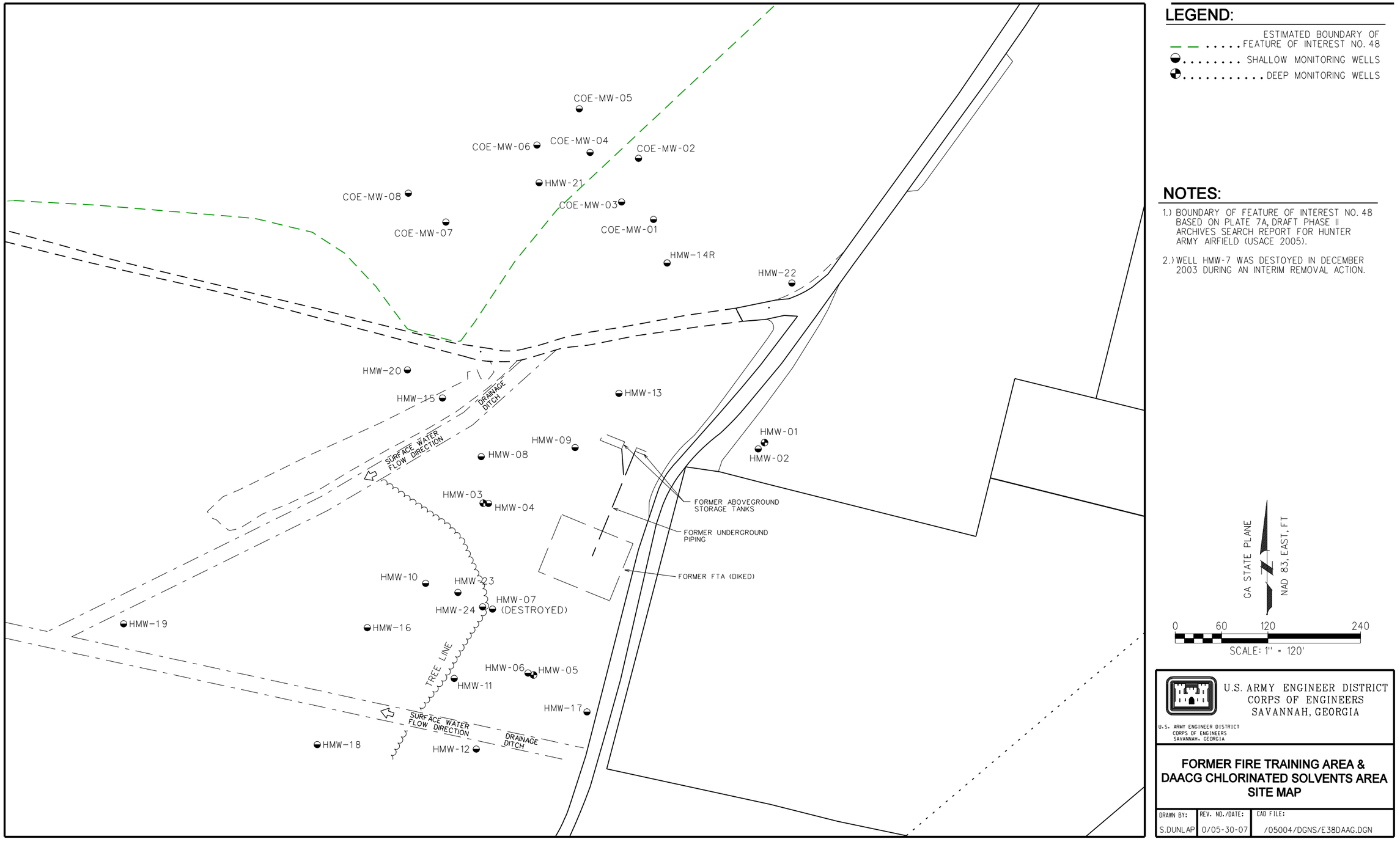
FORMER FIRE TRAINING AREA (SWMU 13) FORT STEWART, GA

DRAWN BY:	REV. NO./DATE:	CAD FILE:
S.DUNLAP	0/05-31-07	05004/DGNS/E38SWMU13.DGN

Figure A-5. Site Location Map of the Former Fire Training Area (SWMU 13)

APPENDIX B

PROPOSED SAMPLING LOCATIONS FOR HUNTER ARMY AIRFIELD INVESTIGATIONS



LEGEND:

- ESTIMATED BOUNDARY OF FEATURE OF INTEREST NO. 48
- SHALLOW MONITORING WELLS
- DEEP MONITORING WELLS

NOTES:

1.) BOUNDARY OF FEATURE OF INTEREST NO. 48 BASED ON PLATE 7A, DRAFT PHASE II ARCHIVES SEARCH REPORT FOR HUNTER ARMY AIRFIELD (USACE 2005).

2.) WELL HMW-7 WAS DESTOYED IN DECEMBER 2003 DURING AN INTERIM REMOVAL ACTION.

GA STATE PLANE
NAD 83, EAST, FT

0 60 120 240
SCALE: 1" = 120'

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SAVANNAH, GEORGIA

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
SAVANNAH, GEORGIA

FORMER FIRE TRAINING AREA & DAACG CHLORINATED SOLVENTS AREA SITE MAP

DRAWN BY:	REV. NO./DATE:	CAD FILE:
S.DUNLAP	0/05-30-07	/05004/DGNS/E38DAAG.DGN

Figure B-1. Site Location Map for the Former Fire Training Area/DAACG Chlorinated Solvents Area

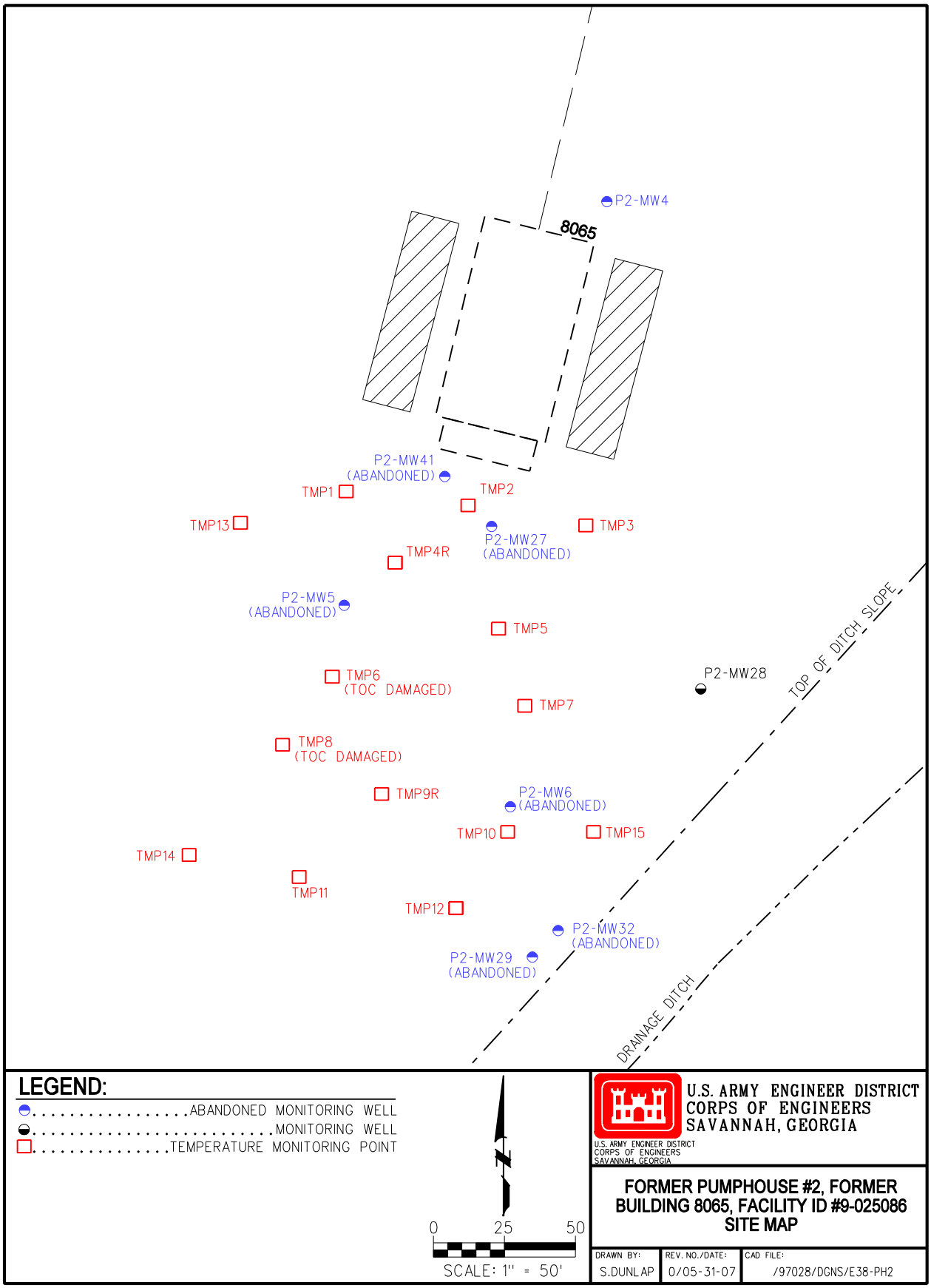


Figure B-2. Site Location Map of the Former Pumphouse #2