DAIM-BD-H-MC 12 September 2006

MEMORANDUM FOR RECORD

SUBJECT: Draft Focused Feasibility Study, Former Chemical Laundry and Motor Pool Area 1500, Parcel 94(7), February 2003

1. Subject draft document will not be finalized by the U.S. Army. It is maintained in the Administrative Record and Information Repositories to provide information collected by the Army prior to implementation of the Environmental Services Cooperative Agreement (ESCA) between the Army and the Anniston-Calhoun County Fort McClellan Development Joint Powers Authority (JPA) executed on 15 September 2003, and as modified on 30 September 2005. The JPA will complete environmental services and achieve site closeout in accordance with the requirements of the ESCA.

2. Point of contact for this action is Lisa Holstein, Transition Force, Fort McClellan, AL, at 256-848-7455.

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A Member of The IT Group

February 4, 2003

IT-MC-CK05-0693
Project No. 774645

Mr. Lee Coker
U.S. Army Corps of Engineers, Mobile District
Attn: EN-GE/Lee Coker
109 St. Joseph Street
Mobile, Alabama 36602

Contract: **Contract No. DACA21-96-D-0018/CK05**
Fort McClellan, Alabama

Subject: **Draft Focused Feasibility Study, Former Chemical Laundry and Motor Pool Area 1500, Parcel 94(7)**

Dear Mr. Coker:

I am enclosing one copy of the subject document. The FFS was developed based on information collected during remedial investigation activities and provides a basis for remedy selection consistent with the Army's intent to transfer the site to the public domain for future active recreation reuse. Please review the subject document and provide either a letter of concurrence or written comments with suggested changes.

At your request, I have distributed copies of this document as indicated below. If you have questions, or need further information, please contact me at (770) 663-1429 or Steve Moran at (865) 694-7361.

Sincerely,

Jeanne A. Yacoub, P.E.
Project Manager

Attachments

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Philip Stroud, ADEM (2 copies)
Doyle Brittain, EPA Region 4 (3 copies)
Hugh Vick, Gannett Flemming (3 copies)
Miki Schneider, JPA (1 copy)

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Draft

Focused Feasibility Study
Former Chemical Laundry and Motor Pool Area 1500
Parcel 94(7)

Fort McClellan
Calhoun County, Alabama

Prepared for:

U.S. Army Corps of Engineers, Mobile District
109 St. Joseph Street
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Task Order CK05
Contract No. DACA21-96-D-0018
IT Project No. 774645

February 2003

Revision 0

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Executive Summary

In accordance with Contract Number DACA21-96-D-0018, Task Order CK05, IT Corporation completed a focused feasibility study (FFS) for the Former Chemical Laundry and Motor Pool Area 1500, Parcel 94(7), at Fort McClellan (FTMC) in Calhoun County, Alabama. This FFS is based on information collected during remedial investigation (RI) activities and provides a basis for remedy selection consistent with the Army's intent to transfer Parcel 94(7) to the public domain for future active recreational reuse. The FFS was prepared in accordance with guidance of the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers.

Parcel 94(7) covers approximately five acres in the central area of the FTMC Main Post. The site was formerly used as a vehicle maintenance facility, or motor pool, which housed three gas stations during World War II. Two chemical impregnation plants, the 111th Garment Impregnation Plant and the 317th Garment Impregnation Plant, were reportedly located in this area. The garment impregnation facilities were used to launder and treat military garments used in training exercises to render them impermeable to chemical warfare material.

RI activities were conducted at Parcel 94(7) to determine the nature and extent of contamination and to identify chemicals that pose an unacceptable risk to human health and the environment. Four polynuclear aromatic hydrocarbon (PAH) compounds in soils and two chlorinated hydrocarbons (trichloroethene and vinyl chloride) in groundwater were identified as human health chemicals of concern (COC) during the RI. The source of the PAHs, however, was attributed to asphalt pavement at the site rather than any activity or inadvertent release attributable to mission-related Army activities. Constituents of potential ecological concern (COPEC) included metals and PAHs in surface soil and sediment; however, the RI concluded that none of these COPECs presents a threat to terrestrial ecosystems at the site.

A remedial action objective (RAO) for Parcel 94(7) was established to minimize potential risk to human receptors associated with the ingestion of contaminated groundwater. This RAO can be achieved by reducing the potential for groundwater exposure (e.g., using land-use controls) and/or reducing the COC concentrations to specified remediation goal options (RGO) through an active remedial approach (e.g., groundwater extraction). The ultimate objective is to allow the Army to safely release the site for its intended active recreational reuse.

Because groundwater at FTMC could serve as a future source of drinking water, the maximum contaminant levels (MCL) presented in the EPA Safe Drinking Water Act and the Alabama

Primary Drinking Water Standards were selected as the RGOs for Parcel 94(7). As stated previously, the groundwater COCs identified in the RI were trichloroethene and vinyl chloride. Although not identified as a COC in the RI, chlorobenzene was included as a COC in the FFS because its maximum detected concentration in groundwater exceeds its MCL.

The FFS identified and evaluated remedial technologies and associated process options with respect to effectiveness, implementability, and cost. Based on the evaluation, the following remedial alternatives were identified for Parcel 94(7):

- ***Alternative 1 – No Action.*** Leaves the contaminated groundwater in place with no additional measures to prevent human or ecological exposure and serves as a baseline for comparison with the other alternatives.

- ***Alternative 2 – Land-Use Controls and Periodic Monitored Natural Attenuation Evaluation.*** Imposes physical, legal, and/or administrative restrictions on the use of, or limits access to, the property to prevent exposure to contaminants above permissible levels. Alternative 2 would also include groundwater monitoring to ensure that the contaminant plume at Parcel 94(7) does not migrate beyond its current location and periodic evaluation to confirm the occurrence of natural attenuation.

- ***Alternative 3 – Groundwater Extraction, Discharge to a Publicly Owned Treatment Works, and Periodic Monitored Natural Attenuation Evaluation.*** Removes contaminated groundwater using extraction wells, with discharge to the local water treatment facility (Anniston Water Works). Alternative 3 would also include periodic evaluation to confirm the occurrence of natural attenuation.

These three alternatives were evaluated using standard criteria of the Comprehensive Environmental Response, Compensation, and Liability Act to select a recommended remedial alternative. Based on the evaluation, Alternative 2, Land-Use Controls and Periodic Monitored Natural Attenuation Evaluation, was selected as the recommended remedial alternative at Parcel 94(7). This alternative was selected primarily because:

- It is protective of human health by prohibiting groundwater use at the site.

- It satisfies the RAO for Parcel 94(7).

- It is easily implemented with no significant short-term risks to worker health and safety or to the community.

- It costs less than groundwater extraction and discharge.

1.0 Introduction

The U.S. Army has selected Fort McClellan (FTMC), located in Calhoun County, Alabama, for closure by the Base Realignment and Closure (BRAC) Commission under Public Laws 100-526 and 101-510. The 1990 Base Closure Act, Public Law 101-510, established the process by which U.S. Department of Defense (DOD) installations would be closed or realigned. The BRAC Environmental Restoration Program requires investigation and cleanup of federal properties prior to transfer to the public domain. The U.S. Army is conducting environmental studies of the impact of suspected contaminants at parcels at FTMC under the management of the U.S. Army Corps of Engineers (USACE)-Mobile District.

A site investigation (SI) was completed at the Former Chemical Laundry and Motor Pool Area 1500, Parcel 94(7), to determine contaminant concentrations in the soil, groundwater, and surface water/sediment at the site. Sampling for the SI at Parcel 94(7) was performed as specified in the Former Chemical Laundry and Motor Pool Area SI field sampling plan. Based on the analytical results from the SI, additional investigation was deemed necessary; hence, a remedial investigation (RI) was performed at Parcel 94(7). IT Corporation (IT) conducted the RI in two phases over a period of time from November 2000 to July 2001. Phase I field activities began in November 2000 and were completed in May 2001. Phase II field activities were performed in June and July 2001. The results of the SI and RI were reported in the *Draft Remedial Investigation Report, Former Chemical Laundry and Motor Pool Area 1500, Parcel 94(7)* (IT, 2002).

This draft focused feasibility study (FFS) develops and evaluates remedial alternatives for Parcel 94(7) based on information provided in the RI report and provides a basis for a remedy selection consistent with the Army's intent to transfer Parcel 94(7) to the public domain for future active recreation reuse. The USACE contracted IT to complete the FFS for the Former Chemical Laundry and Motor Pool Area 1500, Parcel 94(7), under Contract Number DACA21-96-D-0018, Task Order CK05. The FFS was prepared in accordance with guidance of the U.S. Environmental Protection Agency (EPA) and USACE, including *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA, 1988).

1.1 Purpose

The purpose of an FFS within the framework of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is to identify, develop, evaluate, and screen remedial alternatives that address contamination at a particular site. Cost-effective and

appropriate remedial alternatives may be more apparent for some sites than for others, in which case the EPA allows a more focused approach toward identification and screening of remedial technologies and development of remedial alternatives by means of an FFS. This FFS screens remedial technologies and develops remedial alternatives that may be appropriate for addressing contamination at Parcel 94(7). Completion of this FFS will also support various decisions under the Installation Restoration Program process to facilitate the transfer of Parcel 94(7) to the public domain.

1.2 Site Background

The following site background information for both FTMC and Parcel 94(7) is drawn from the RI report (IT, 2002).

1.2.1 FTMC Site Description and History

FTMC is a U. S. Army facility under the control of the U. S. Army Training and Doctrine Command that was closed under the BRAC program in September 1999. Located in northeast Alabama near the city of Anniston in Calhoun County (Figure 1-1), FTMC consisted of three tracts of land: the Main Post, Choccolocco Corridor, and Pelham Range. The majority of development at FTMC is in the northwest area of the Main Post. The City of Anniston is located to the south and west of the Main Post; adjoining the Main Post installation to the east are the Choccolocco Mountains of the Talladega National Forest.

The Main Post, consisting of 18,929 acres, was purchased by the federal government in March 1917 for the construction of a National Guard camp (Camp McClellan). Pistol and rifle ranges were established north of the camp, automatic rifle and machine gun ranges were established southwest of the camp, and artillery firing ranges were established southeast of the camp toward the Choccolocco Mountains. Camp McClellan expanded throughout the 1920s and 1930s. The advent of World War II in the 1940s brought continued growth for the installation. Most notably, the 22,245 acres of Pelham Range were purchased to the west of the Main Post in early 1940 for artillery, tank, and heavy mortar firing. Approximately 4,488 additional acres to the east of the Main Post (Choccolocco Corridor) were leased from the State of Alabama to connect the Main Post to the Talladega National Forest. Choccolocco Corridor was used for various range training activities. The lease was terminated in May 1998.

The post-war period initially brought a decline in operations at FTMC. A decrease in military spending placed the installation on inactive status. However, in 1950 the installation was reinstated to active status because of the Korean Conflict. The U.S. Army Chemical School was established at FTMC in 1951; the large outdoor training areas allowed specialized chemical training involving

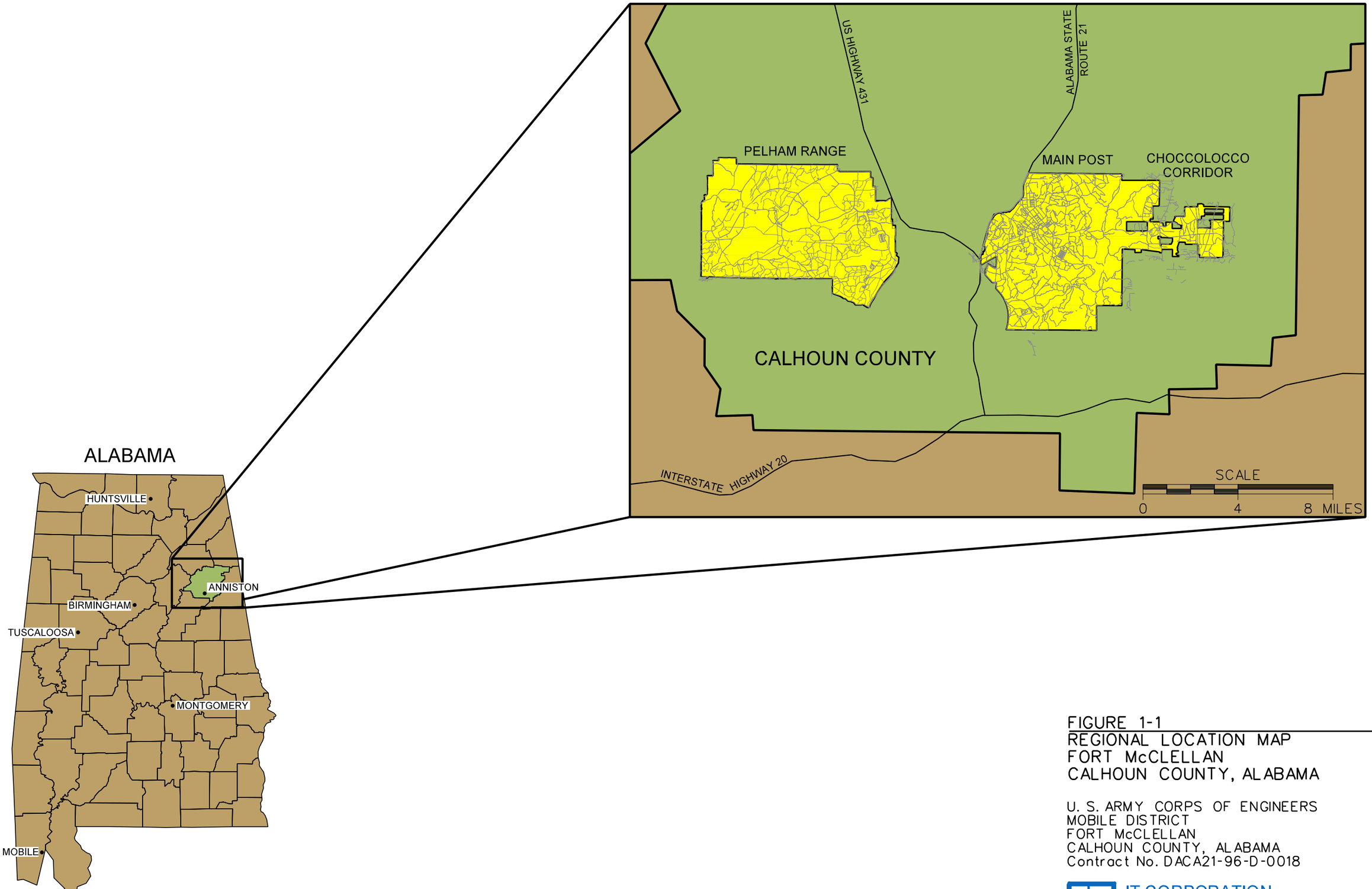

FIGURE 1-1
REGIONAL LOCATION MAP
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

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chemical warfare protection, decontamination procedures, flame throwers, and the operation of smoke generators. The Base hospital was renovated to specialize in chest diseases. The first permanent Women's Army Corps (WAC) training facility was established in 1955, although two previous WAC detachments had been established at the installation during the 1940s. Radiological training was conducted in the mid-1950s at Iron Mountain, Alpha Field, and Bromine Field, all located on the Main Post, as well as at Rideout Field on Pelham Range.

The mission of FTMC was changed in 1966, and it became the U.S. Army School/Training Center. An Advanced Individual Training Infantry Brigade was activated in 1966 to meet requirements for the Vietnam War. The brigade was deactivated in 1970 due to continued force reduction in Vietnam.

In 1973, the Chemical Corps School closed, along with the U.S. Army Combat Developments Command Chemical/Biological Radiological Agency. Five years later, in 1978, the WAC was disbanded and the WAC school closed.

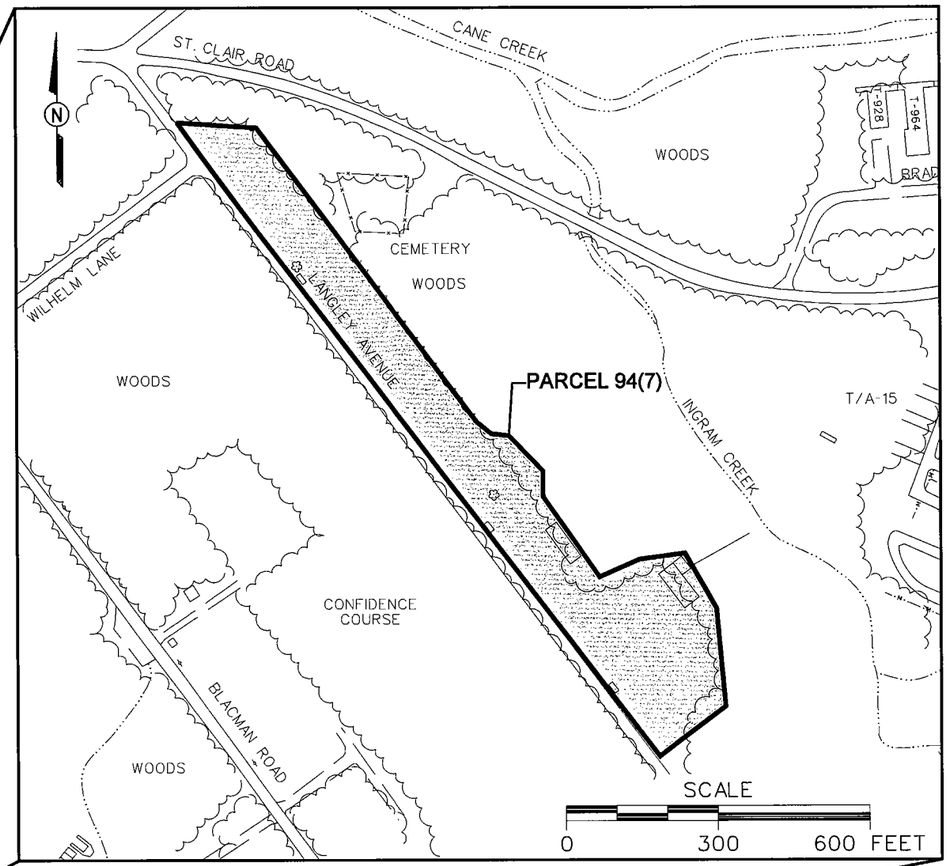
In 1979, the Military Police School was moved to FTMC. In the same year, the U.S. Army Chemical Corps school was re-established, along with a Brigade for Basic Training. U.S. Army Forces Command units, such as D Company, 46th Engineers, were also garrisoned at the post during the 1970s and 1980s.

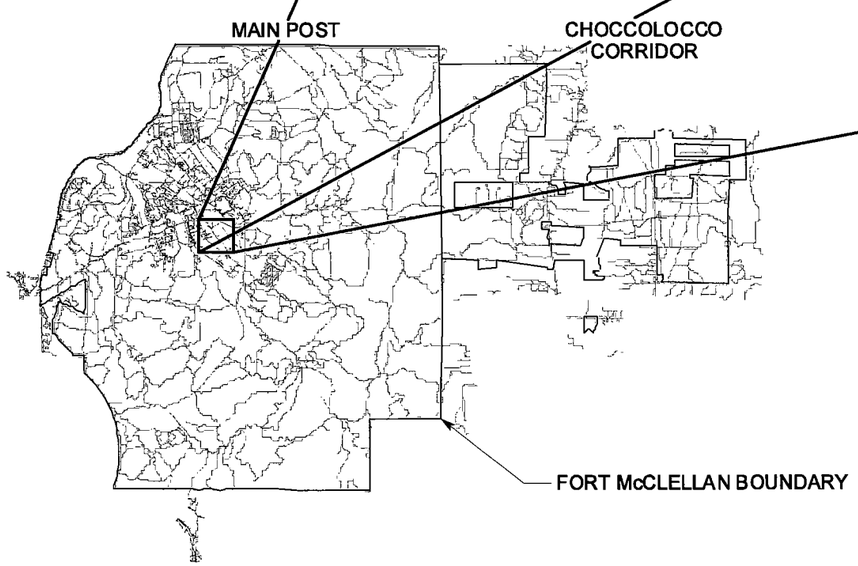
The mid-1980s brought additional operations to Pelham Range, which is located approximately two miles northwest of Anniston. This area was used for maneuver training and a wide range of activities from small-arms training to tank and artillery training. Pelham Range has also been used for chemical decontamination training and radiological training.

FTMC operations were deactivated and missions completed with the installation closure on September 30, 1999.

1.2.2 Parcel 94(7) Site Description and History

The Former Chemical Laundry and Motor Pool Area 1500, Parcel 94(7), is located in the central area of the FTMC Main Post, along Langley Avenue (formerly 5th Avenue) and south of St. Clair Road (formerly 22nd Street) (Figure 1-2). Parcel 94(7) is approximately 5 acres in size. The site was formerly used as a vehicle maintenance facility (or motor pool), which included three gas stations during World War II. The three gas stations included Building 1494 (Parcel 133[7]), Building 1594 (Parcel 132[7]), and Building 1594A (Parcel 134[7]), constructed in 1941 (Figure 1-3). Each building consisted of a 9-by-21-foot cement foundation and a corrugated





LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TREES / TREELINE
- PARCEL BOUNDARY
- CULVERT WITH HEADWALL
- SURFACE DRAINAGE / CREEK
- MANMADE SURFACE DRAINAGE FEATURE
- FENCE
- UTILITY POLE

FIGURE 1-2
SITE LOCATION MAP
FORMER CHEMICAL LAUNDRY
AND MOTOR POOL AREA 1500
PARCEL 94(7)

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

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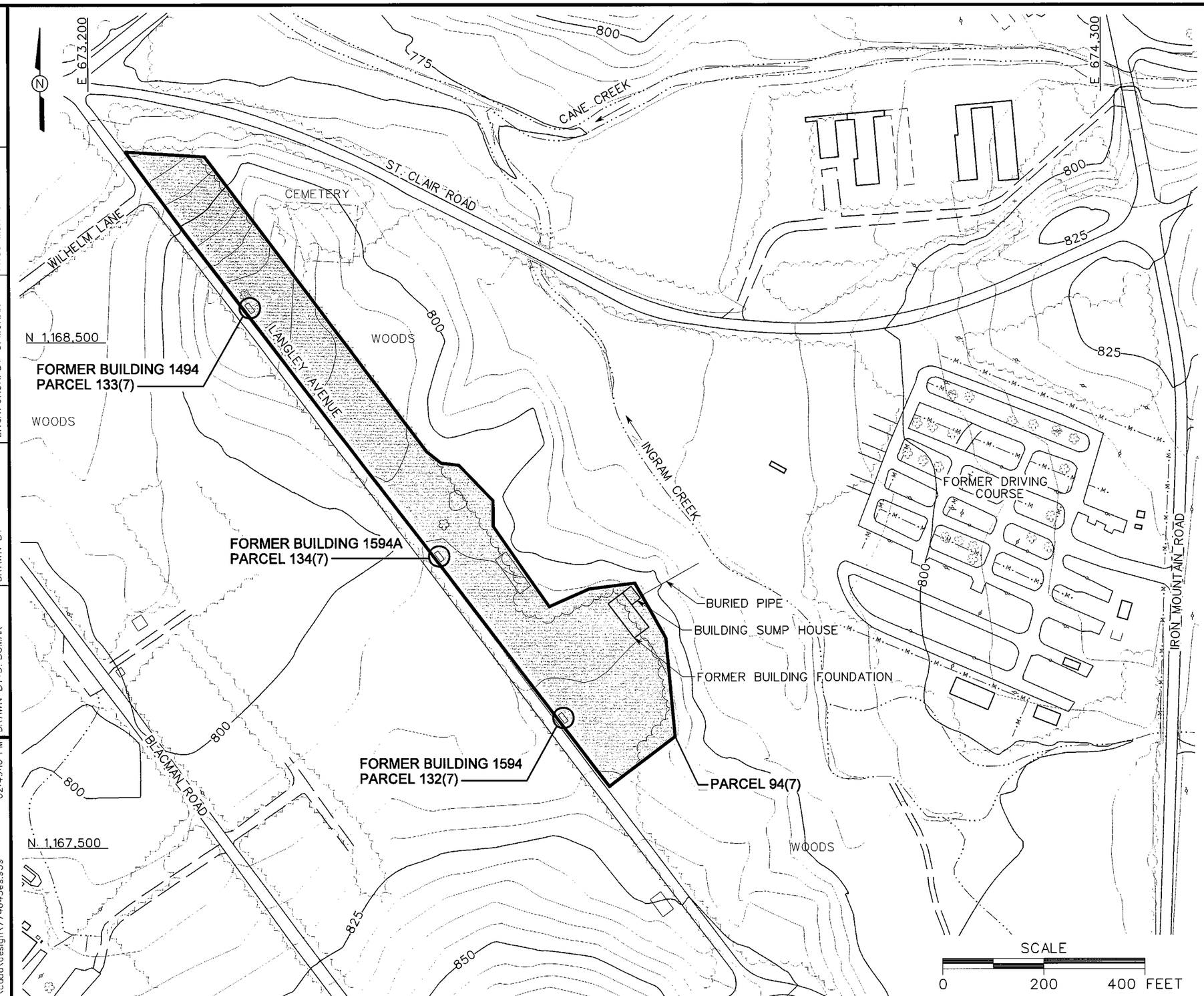

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 5 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- CULVERT WITH HEADWALL
- SURFACE DRAINAGE / CREEK
- MANMADE SURFACE DRAINAGE FEATURE
- FENCE
- UTILITY POLE

FIGURE 1-3
SITE MAP
FORMER CHEMICAL LAUNDRY
AND MOTOR POOL AREA 1500
PARCEL 94(7)

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

IT CORPORATION
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steel wall. Two fuel pumps were reportedly located on an island directly in front of each building, approximately 20 feet away. Reportedly, two 10,000-gallon underground storage tanks (UST), one containing motor vehicle gasoline and one containing diesel, were located at each building. However, Environmental Science and Engineering, Inc. (ESE) did not know the status of the USTs when it conducted the environmental baseline survey (EBS) in 1998. Three structures that correspond to the probable locations of the gas stations are visible on aerial photographs taken in 1944 and 1954. The BRAC Cleanup Team verbally agreed to "No Further Action" at Parcels 132(7), 133(7), and 134(7) during its August 2001 meeting.

Two chemical impregnation plants, the 111th Garment Impregnation Plant and the 317th Garment Impregnation Plant, were reportedly located at this area. The exact dates of operation of these facilities are not known. However, it has been estimated that chemical impregnation activities began with the arrival of the U.S. Army Chemical School at FTMC in 1951 and continued through the mid-1960s, when butyl-rubber protective garments began to be issued.

The garment impregnation facilities were reportedly used to launder and treat military garments used in chemical warfare material (CWM) training exercises to render them impermeable to CWM. Decontaminated garments were chemically treated and re-impregnated with a mixture of wax and chemicals designed to neutralize CWM. Interviews conducted by ESE in 1998 rendered various accounts as to the specific procedures used. Some personnel recalled that the impregnation plants used large volumes of toluene or ethyl alcohol. Although one individual reported use of "B-1 dye," confirmed use of B-1 dye or information about the dye was not obtained during EBS activities. The standard operating procedure for typical impregnation plants describes only the use of water, paraffin wax, and chlorinated oil.

The buildings at the site have been demolished. Two concrete slab foundations corresponding to the former motor pool and chemical laundry facilities remain at the site. In addition, concrete sumps or grease pits are also located at the site. The remainder of the area is covered with asphalt pavement.

The site's topography slopes slightly to the north and east toward Ingram Creek, a tributary of Cane Creek. Elevation at the site ranges from approximately 800 to 815 feet above mean sea level (msl).

1.3 Summary of Parcel 94(7) Environmental Setting

Physical characteristics of the Parcel 94(7) study area are documented in the RI report, which includes descriptions of site-wide geology, hydrology, hydrogeology, and other regional geographic topics. The following sections detail the site-specific environmental setting.

1.3.1 Physiography and Sensitive Environments

Parcel 94(7) is located on a topographic high, approximately 800 to 815 feet above msl (Figure 1-3). To the northeast, the elevation drops off to approximately 780 feet above msl. Ingram Creek is located northeast of the parcel and flows northwest into Cane Creek. Parcel 94(7) is not located within any special interest natural areas, defined as locations where habitat fosters one or more rare, threatened, or endangered species. Parcel 94(7) is not located within a designated wetland area. The closest designated wetlands area is approximately 2,500 feet southeast of the site.

1.3.2 Soils

Soils at Parcel 94(7) are mapped as the Anniston and Allen series and the Philo series. The Anniston and Allen gravelly loams (AcC_2 and AcD_2) consist of strongly acid, deep, well drained, friable soils that have developed from old local alluvium on foot slopes and fans along the bases of the mountains. The soils have developed from weathered sandstone, shale, and quartzite. The surface horizon is mainly a dark brown or grayish brown gravelly loam. The subsoil is typically dark red, sandy clay loam. Sandstone and quartzite gravel and cobbles, as large as 8 inches in diameter, are typically found on the surface and throughout the soil (U.S. Department of Agriculture, 1961).

Along the bank of Ingram Creek, the soils are classified as the Philo and Stendal fine sandy loams (PhA). This mapping unit consists of soils that develop in general alluvium on nearly level first bottoms subject to flooding. The Philo series consists of strongly acid, moderately well drained soils that are developing in local and general alluvium. The parent material washed mainly from sandstone and shale, but some of it originated from limestone. The surface soil is very dark grayish brown to dark brown fine sandy loam, and the subsoil is dark brown, slightly mottled, fine sandy loam (U.S. Department of Agriculture, 1961).

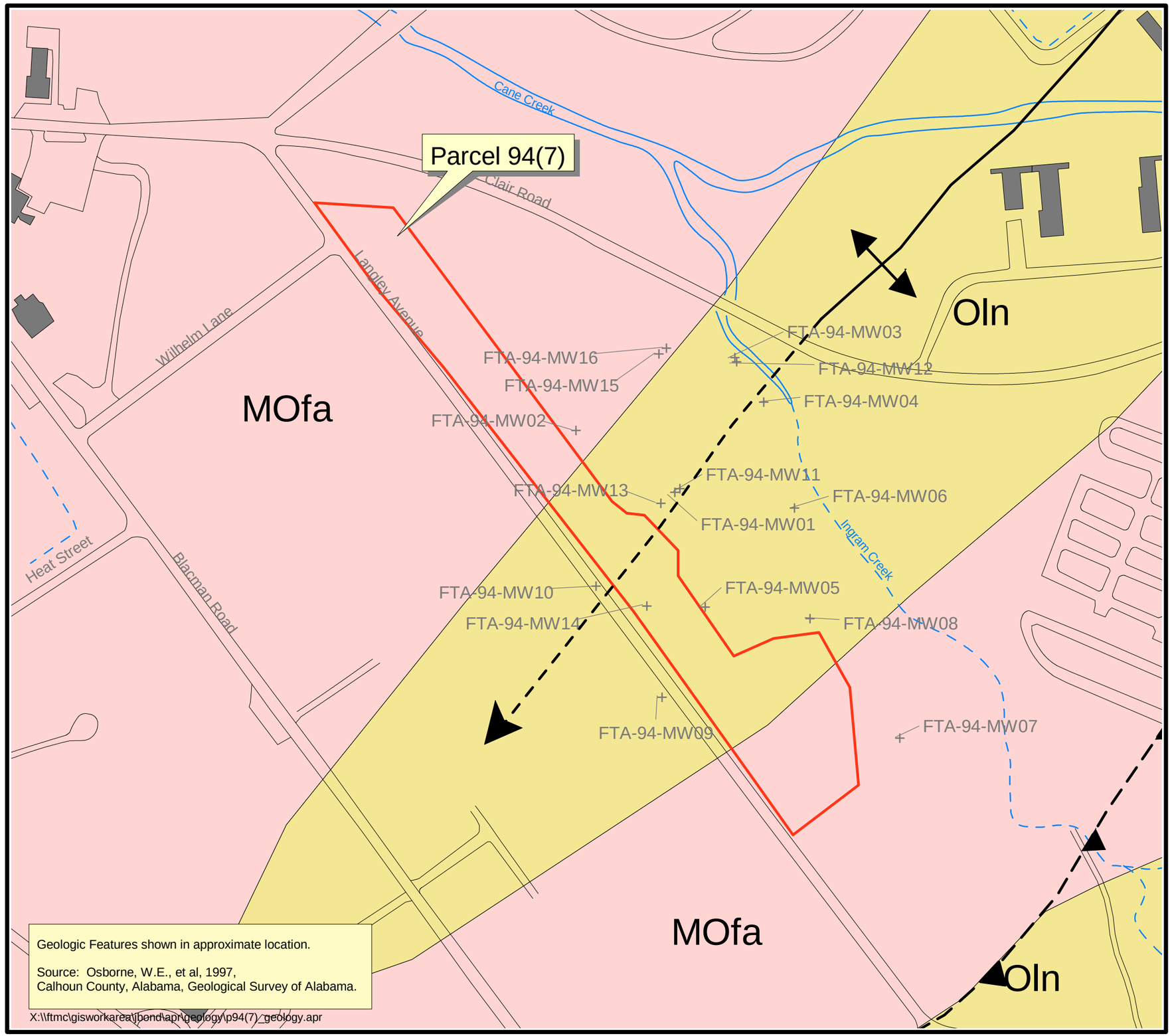
1.3.3 Geology

Bedrock at Parcel 94(7) is mapped as Ordovician-age Little Oak and Newala Limestones, undifferentiated, and Mississippian/Ordovician-age Floyd and Athens Shale, undifferentiated (Figure 1-4). An asymmetric anticlinal fold strikes northeast-southwest across the parcel and plunges to the southwest. The undifferentiated Ordovician Little Oak and Newala Limestones

Figure 1-4

Site Geologic Map

Former Chemical Laundry
and Motor Pool Area 1500,
Parcel 94(7),
Fort McClellan, Alabama



Geologic Features shown in approximate location.

Source: Osborne, W.E., et al, 1997,
Calhoun County, Alabama, Geological Survey of Alabama.

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Legend

- Roads
- Surface Drainage Feature (dashed where intermittent)
- Parcel Boundary
- Buildings
- Permanent Monitoring Well

Geology

- MOfa — Mississippian/Ordovician - Floyd & Athens Shale, Undifferentiated
- Oln — Ordovician - Little Oak and Newala Limestones, Undifferentiated
- Plunging Anticlinal Fold (inferred where dashed)
- Inferred Thrust Fault (barbs on upper plate)

200 0 200 Feet

NAD83 State Plane Coordinates

N

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are mapped at the crest of the anticline, and an outcrop of the unit is exposed in the streambed of Ingram Creek. The Mississippian/Ordovician Floyd and Athens Shale is mapped along the limbs of the anticline to the northwest and southeast. A small, inferred thrust fault is mapped to the southeast of the parcel by Osborne and approximately parallels the fold (Osborne et al., 1997).

Site-specific geologic conditions at Parcel 94(7) were assessed using monitoring well and soil boring lithologic logs prepared by IT during the SI and RI field activities. The locations of geologic cross sections constructed from these data are shown on Figure 1-5, and the cross sections are presented on Figures 1-6 and 1-7. The lithologic sequence encountered at Parcel 94(7) consists of an upper interval of residuum 6 to 50 feet thick overlying fractured, weathered limestone. In general, the residuum at Parcel 94(7) is a clayey silt with little sand and gravel or silty, sandy clay with little gravel. The gravel at the site appears to be quartz-rich sandstone and weathered shale.

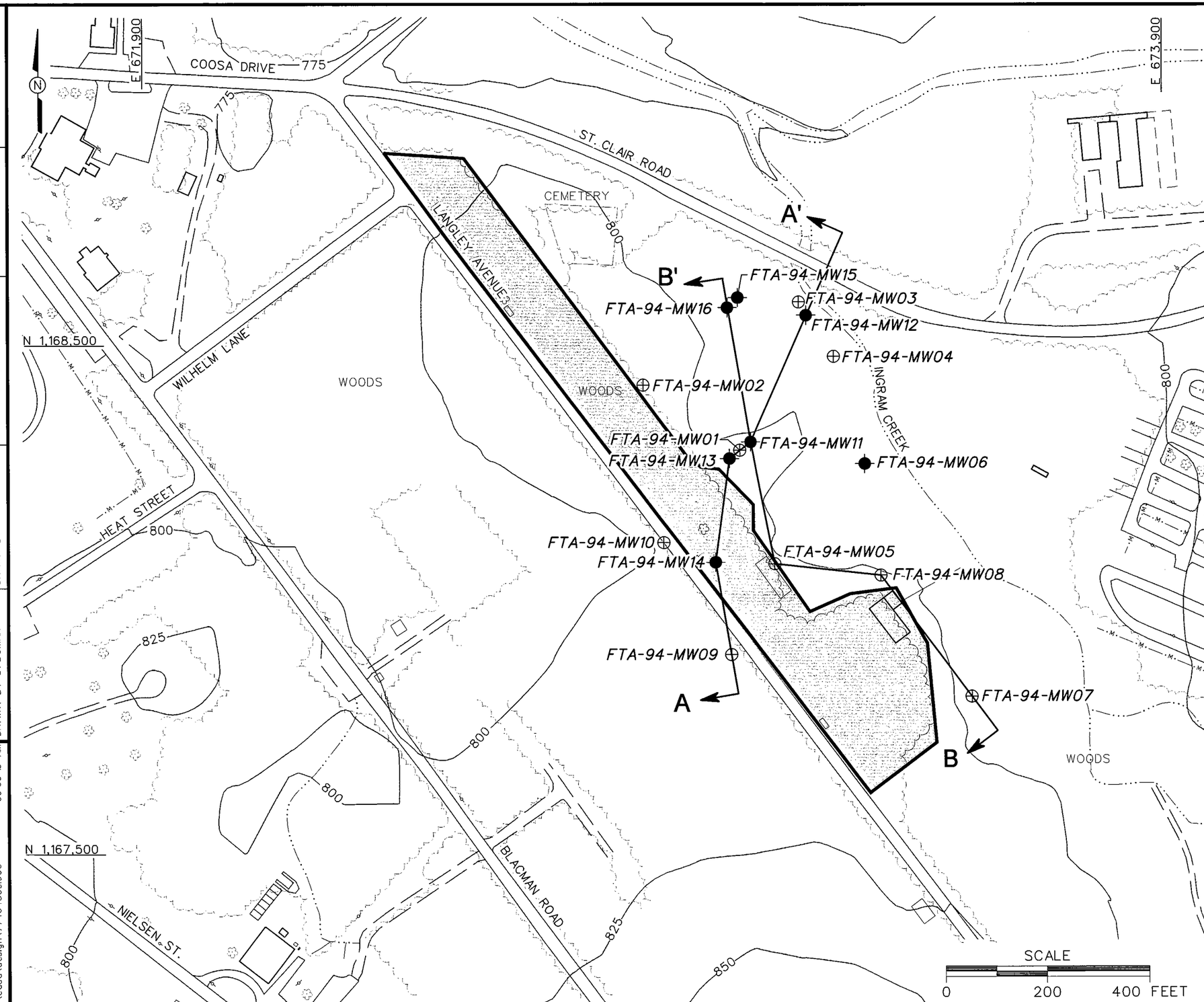
During rock coring activities, bedrock at the site was encountered at depths ranging from approximately 6 feet bgs (at FTA-94-MW06) to 50.5 feet bgs (at FTA-94-MW14). Average depth to bedrock at the site is approximately 30 feet bgs, as shown on Figures 1-6 and 1-7. During drilling of monitoring wells, moderately hard, moderately weathered, microcrystalline limestone with vertical and horizontal fracturing, calcite-filled veins, and interbedded weathered shale typical of the Little Oak and Newala Limestone was encountered underlying the residuum. Mud-filled voids were encountered at depths of approximately 43 to 46 feet bgs in FTA-94-MW11 and at approximately 37 to 72 feet bgs in FTA-94-MW12. These voids do not appear to be horizontally extensive, based on the boring data.

Shale consistent with the Floyd and Athens Shale (undifferentiated) was encountered during bedrock drilling activities at FTA-94-GP02, FTA-94–GP11, and FTA-94-MW02 on the northwest anticlinal limb.

1.3.4 Surface Water Hydrology

Surface water draining from the area of Parcel 94(7) flows northeast into Ingram Creek, a tributary of Cane Creek (Figure 1-3). Ingram Creek is an intermittent stream located approximately 150 to 450 feet northeast of the parcel boundary. The creek channel has been observed to be dry during the summer months. After connecting with Cane Creek, drainage from Ingram Creek ultimately flows to the west into the Coosa River.

A seep survey was conducted by IT in the area of Parcel 94(7) to determine the presence of seeps at the site. The previous measurable precipitation event was 0.13 inches recorded on November



LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- CULVERT WITH HEADWALL
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE
- RESIDUUM MONITORING WELL LOCATION
- BEDROCK MONITORING WELL LOCATION
- A A' CROSS SECTION LOCATION

FIGURE 1-5
CROSS SECTION LOCATION MAP
FORMER CHEMICAL LAUNDRY
AND MOTOR POOL AREA 1500
PARCEL 94(7)

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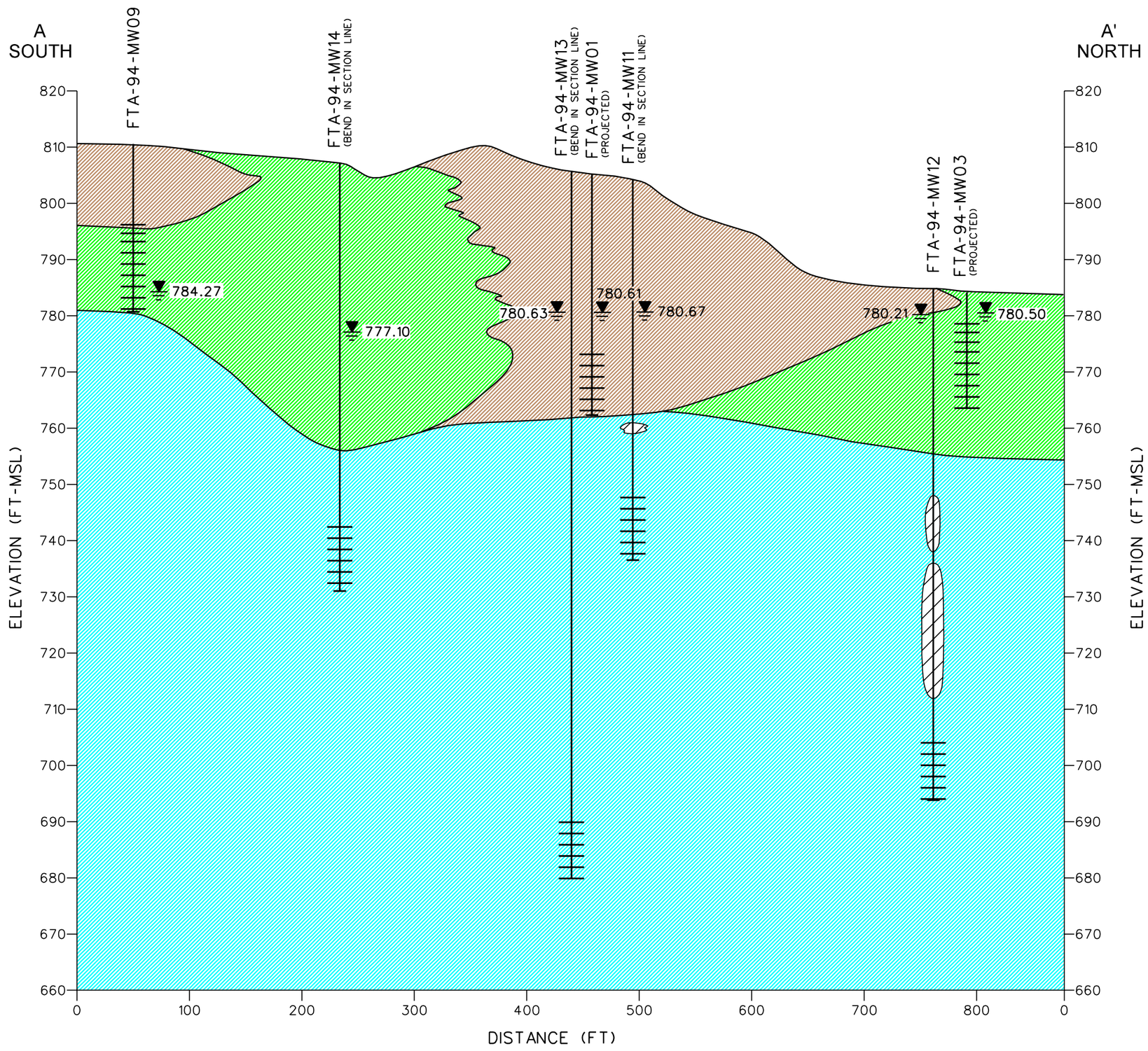

LEGEND

- SCREEN INTERVAL
- WATER TABLE (AUGUST 21, 2001)
- 784.27 GROUNDWATER ELEVATION (FT MSL)
- VOID
- SILT
- CLAY
- LIMESTONE

NOTES:

1. ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.
2. DASHED WHERE INFERRED.

VERTICAL

0 20 40 FEET

HORIZONTAL

0 100 200 FEET

FIGURE 1-6
GEOLOGIC CROSS SECTION A-A'
FORMER CHEMICAL LAUNDRY AND
MOTOR POOL AREA 1500
PARCEL 94(7)

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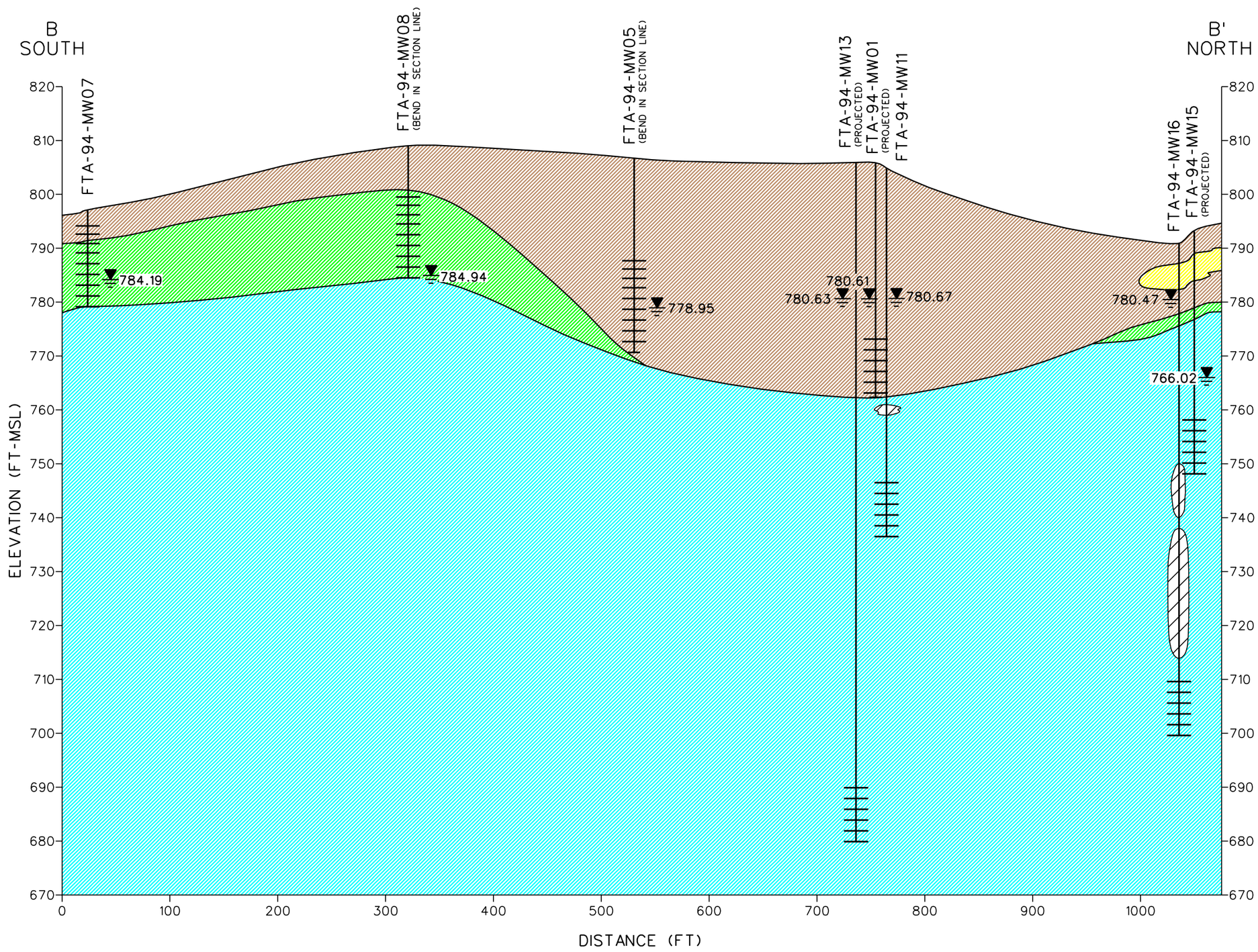

LEGEND

- SCREEN INTERVAL
- WATER TABLE (AUGUST 21, 2001)
- 784.19 GROUNDWATER ELEVATION (FT MSL)
- VOID
- SAND
- SILT
- CLAY
- LIMESTONE

NOTES:

1. ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.
2. DASHED WHERE INFERRED.

VERTICAL

0 20 40 FEET

HORIZONTAL

0 100 200 FEET

FIGURE 1-7
GEOLOGIC CROSS SECTION B-B'
FORMER CHEMICAL LAUNDRY AND
MOTOR POOL AREA 1500
PARCEL 94(7)

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29, 2000; however, 7.21 inches of precipitation were recorded at the Anniston Metropolitan Airport during the entire month of November 2000. Based on observations made during the survey, surface soil at the parcel generally appeared damp to moist. Seeps, springs, or wet areas were not observed in the survey area, nor were there any observable changes in vegetation type, vegetation distribution, odors, or other evidence suggesting that intermittent seeps may exist at the site.

1.3.5 Hydrogeology

The following sections describe the results of groundwater elevation data collected and slug testing completed at Parcel 94(7).

1.3.5.1 Groundwater Flow

Static groundwater levels were measured in monitoring wells at the site on August 21, 2001, and November 21, 2001. Groundwater elevation maps constructed for both residuum and bedrock aquifers are provided on Figures 1-8 through 1-11. The two groundwater elevation measuring events were intended to capture data from an above-average period of precipitation (August) and from a below-average period of precipitation (November).

Based upon available groundwater elevations from the shallow monitoring wells, groundwater flow in the residuum generally follows the surface topography and flows predominantly to the northeast towards Ingram Creek, as shown on Figures 1-8 and 1-9. Groundwater flow in the bedrock aquifer is depicted on Figures 1-10 and 1-11. Based on the groundwater elevations, groundwater flow within the bedrock aquifer appears to be structurally controlled. The bedrock aquifer appears to be mounded at the inferred location of the anticlinal fold hinge. Groundwater flow in the bedrock follows the general trend of the underlying limestone and flows to the southwest, west, and northwest, away from the inferred location of the anticlinal hinge and in the direction of plunge.

1.3.5.2 Aquifer Characteristics

The horizontal hydraulic gradient in both the residuum and bedrock aquifers is very low, although the potentiometric head difference across the area was approximately 19 feet. Horizontal hydraulic gradients were calculated from data from both August and November precipitation periods. At the site, average horizontal gradients of 0.0206 feet per foot (ft/ft) for residuum and 0.0278 ft/ft for bedrock were calculated.

Vertical hydraulic gradients for five well clusters were calculated in the RI. The gradients were calculated from hydraulic head differences for groundwater elevations for August and November

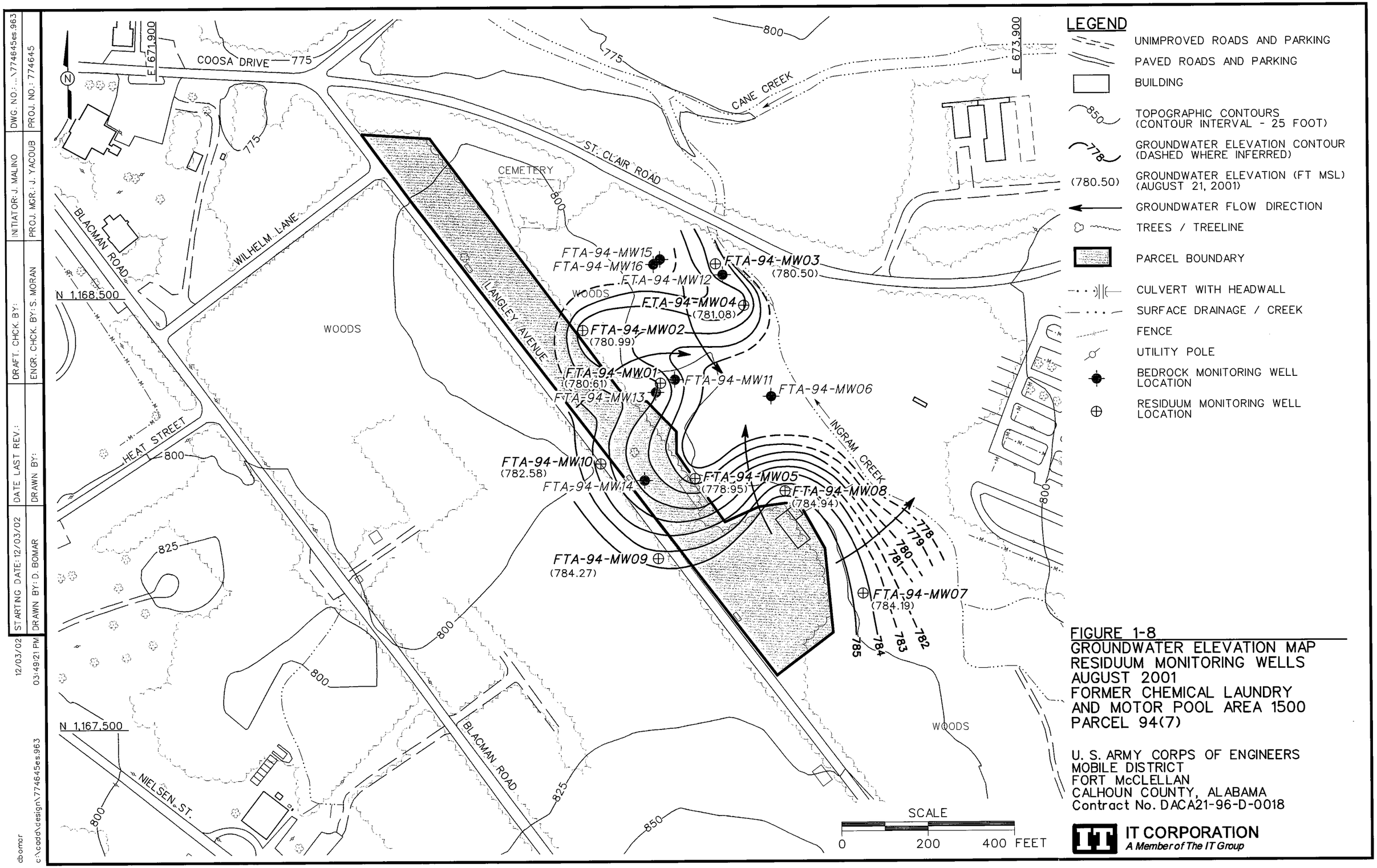

FIGURE 1-8
GROUNDWATER ELEVATION MAP
RESIDUUM MONITORING WELLS
AUGUST 2001
FORMER CHEMICAL LAUNDRY
AND MOTOR POOL AREA 1500
PARCEL 94(7)

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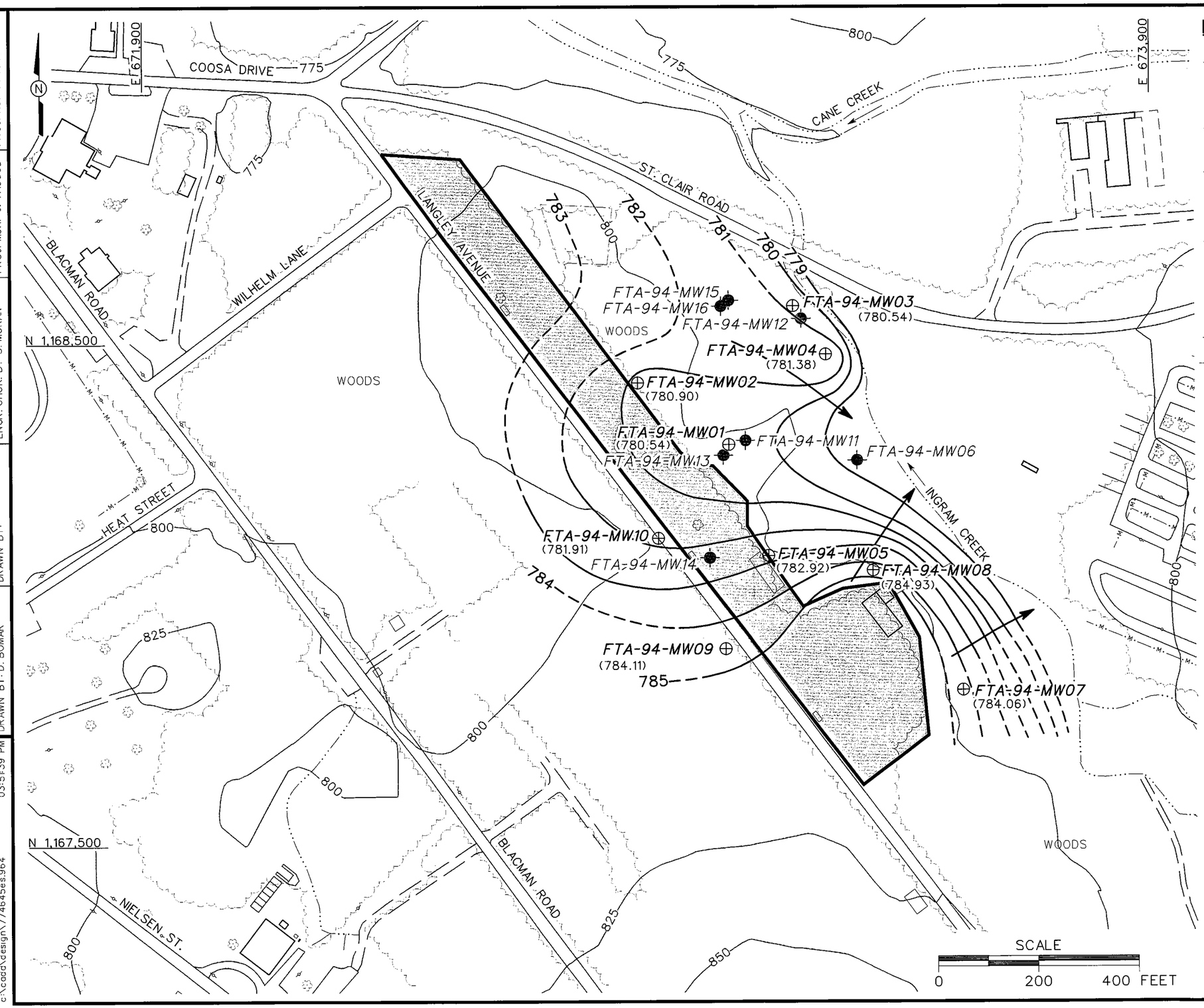

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- 850 — TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- 778 — GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- (780.54) — GROUNDWATER ELEVATION (FT MSL) (NOVEMBER 21, 2001)
- GROUNDWATER FLOW DIRECTION
- TREES / TREELINE
- PARCEL BOUNDARY
- CULVERT WITH HEADWALL
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE
- BEDROCK MONITORING WELL LOCATION
- RESIDUUM MONITORING WELL LOCATION

FIGURE 1-9
GROUNDWATER ELEVATION MAP
RESIDUUM MONITORING WELLS
NOVEMBER 2001
FORMER CHEMICAL LAUNDRY
AND MOTOR POOL AREA 1500
PARCEL 94(7)

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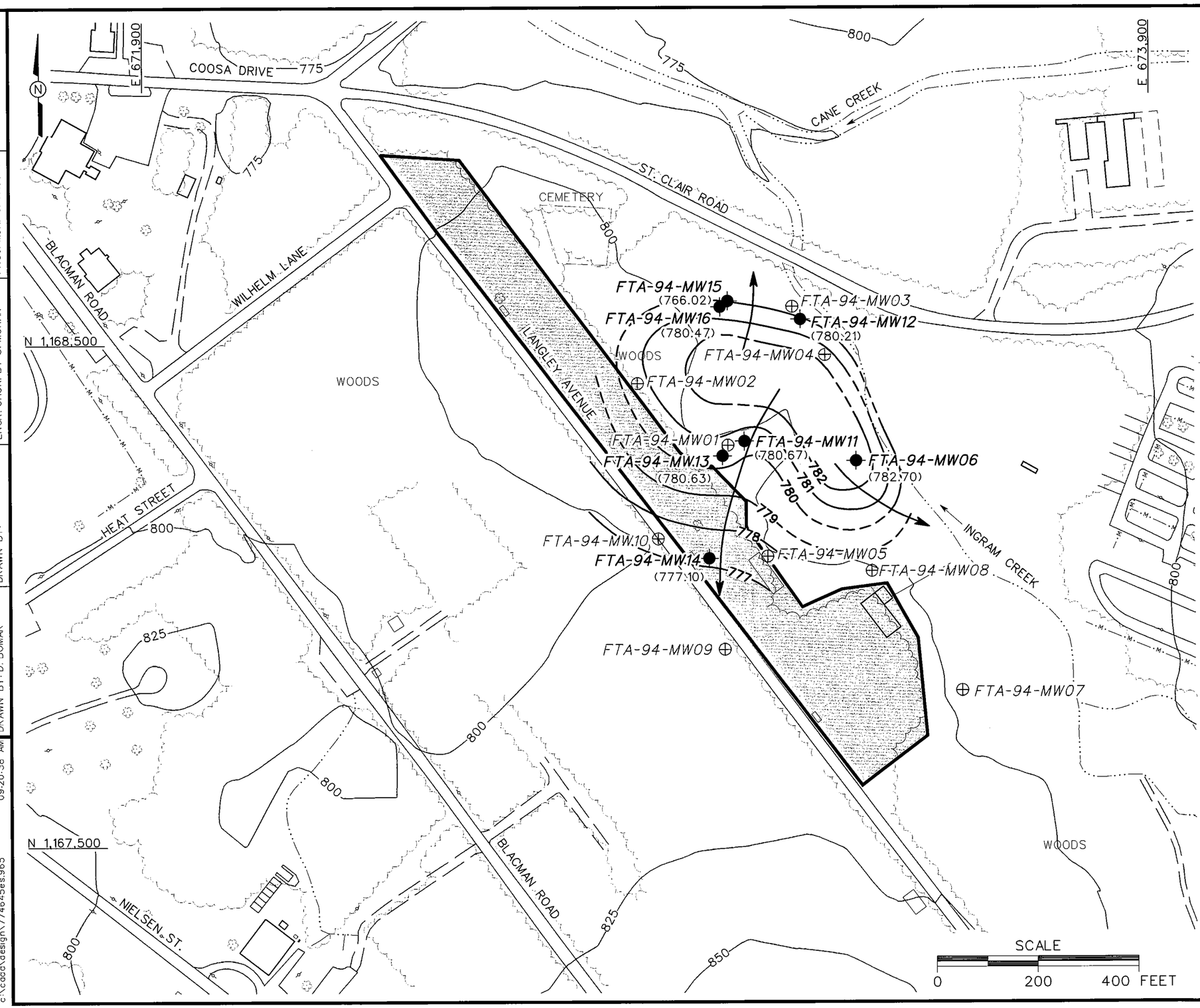

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- (780.21) GROUNDWATER ELEVATION (FT MSL) (AUGUST 21, 2001)
- GROUNDWATER FLOW DIRECTION
- TREES / TREELINE
- PARCEL BOUNDARY
- CULVERT WITH HEADWALL
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE
- BEDROCK MONITORING WELL LOCATION
- RESIDUUM MONITORING WELL LOCATION

NOTE:

1. GROUNDWATER ELEVATION FOR FTA-94-MW15 APPEARS TO BE ANOMALOUS IN RELATION TO ADJACENT WELLS AND IS NOT HONORED.

FIGURE 1-10
GROUNDWATER ELEVATION MAP
BEDROCK MONITORING WELLS
AUGUST 2001
FORMER CHEMICAL LAUNDRY
AND MOTOR POOL AREA 1500
PARCEL 94(7)

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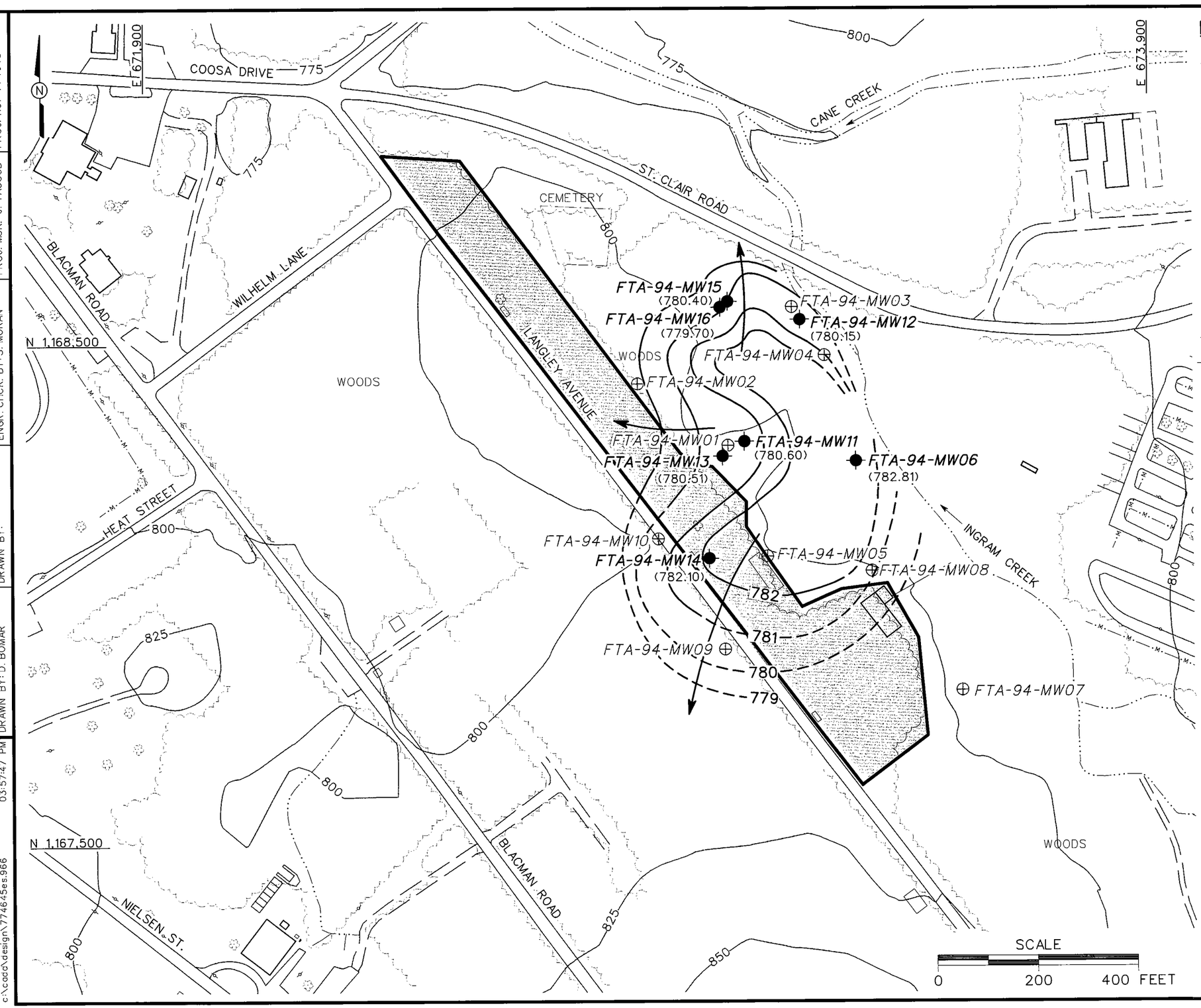

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- (780.15) GROUNDWATER ELEVATION (FT MSL) (NOVEMBER 21, 2001)
- GROUNDWATER FLOW DIRECTION
- TREES / TREELINE
- PARCEL BOUNDARY
- CULVERT WITH HEADWALL
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE
- BEDROCK MONITORING WELL LOCATION
- RESIDUUM MONITORING WELL LOCATION

FIGURE 1-11
GROUNDWATER ELEVATION MAP
BEDROCK MONITORING WELLS
NOVEMBER 2001
FORMER CHEMICAL LAUNDRY
AND MOTOR POOL AREA 1500
PARCEL 94(7)

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2001. Three well clusters compared gradients between the residuum and bedrock wells. The other two well clusters compared gradients between wells that are both screened in limestone bedrock. Vertical gradients between residuum and bedrock, in general, exhibit either weak upward flow (- values) or downward flow (+ values). The calculation for the cluster at FTA-94-MW15/FTA-94-MW16 for August 2001, however, shows a relatively strong upward gradient. However, this gradient reflects an anomalously low water level elevation in FTA-94-MW15. The low elevation is attributed to the presence of a large solution cavity penetrated by the well and indicates that communication exists between the two wells. The cavity may serve as a localized groundwater sink during times of limited summer rainfall.

Hydraulic conductivity values were calculated from both rising and falling head slug tests conducted on five wells at the site. Hydraulic conductivity values for residuum wells ranged from 1.02 feet per day (ft/day) (rising test) to 9.78 ft/day (falling test), with a geometric mean of 4.12 ft/day. For the bedrock wells, conductivity values ranged from 0.00644 ft/day (rising test) to 2.91 ft/day (falling test) with a geometric mean of 0.144 ft/day.

The average linear velocity was calculated for groundwater flow in the residuum and bedrock. Effective porosities were estimated at 30 percent in the residuum and 15 percent in the bedrock. Based on these parameters, groundwater flow velocities of 0.283 ft/day for residuum and 0.027 ft/day for bedrock were calculated.

1.4 Summary of Previous Investigations

Three investigations have been completed at Parcel 94(7). An EBS was conducted to document current environmental conditions of all FTMC property (ESE, 1998). SI activities conducted by IT at Parcel 94(7) included a geophysical survey, installation of monitoring wells, and collection and analysis of soil, groundwater, and surface water/sediment samples. The SI determined that contamination was present at Parcel 94(7); therefore, an RI was conducted to determine the nature and extent of contamination and to identify chemicals that pose an unacceptable risk to human health and the environment. A brief summary of the results of the EBS and SI/RI is provided in the following sections.

1.4.1 Environmental Baseline Survey

An EBS was completed to document current environmental conditions of all FTMC property. The study identified sites that, based on available information, do not have a history of contamination and comply with DOD guidelines for fast-track cleanup at closing installations. The EBS also provided a baseline picture of FTMC properties by identifying and categorizing the properties by seven criteria.

1. Areas where no storage, release, or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas).

2. Areas where only release or disposal of petroleum products has occurred.

3. Areas where release, disposal, and/or migration of hazardous substances has occurred, but at concentrations that do not require a removal or remedial response.

4. Areas where release, disposal, and/or migration of hazardous substances has occurred, and all removal or remedial actions to protect human health and the environment have been taken.

5. Areas where release, disposal, and/or migration of hazardous substances has occurred, and removal or remedial actions are underway, but all required remedial actions have not yet been taken.

6. Areas where release, disposal, and/or migration of hazardous substances has occurred, but required actions have not yet been implemented.

7. Areas that are not evaluated or require additional evaluation.

The EBS was conducted in accordance with protocols of the Community Environmental Response Facilitation Act (Public Law 102-426) and DOD policy regarding contamination assessment. Record searches and reviews were performed on all reasonably available documents from FTMC, the Alabama Department of Environmental Management (ADEM), EPA Region 4, and Calhoun County, as well as a database search of CERCLA-regulated substances, petroleum products, and facilities regulated under the Resource Conservation and Recovery Act. Available historical maps, documents, and aerial photographs were reviewed to document historical land uses. Personal and telephone interviews of past and present FTMC employees and military personnel were conducted. In addition, visual site inspections were conducted to verify conditions of specific property parcels.

In October 1997, Science Applications International Corporation installed a background monitoring well (MW-BK-G11) at the site. Soils encountered during well installation activities included clayey silt interbedded with fine to very coarse sand from 3.6 to 23.5 feet bgs and sandy clay with medium to coarse sand from 23.5 to 42.5 feet bgs. Groundwater was encountered at 22.5 feet bgs. The well was sampled for target analyte list metals and common anions, including sulfate, bicarbonate, chloride, bromide, fluoride, carbonate, nitrate, and phosphate.

1.4.2 Site Investigation and Remedial Investigation

In accordance with Contract Number DACA21-96-D-0018, Task Orders CK05 and CK10, IT completed SI and RI activities at Parcel 94(7). The SI determined that contamination was present at Parcel 94(7); therefore, the RI was conducted to evaluate the nature and extent of the contamination and to assess future risks to human health and the environment.

The SI at the Former Chemical Laundry and Motor Pool Area 1500, Parcel 94(7), consisted of a geophysical survey and the collection and analysis of soil, groundwater, and surface water/sediment samples. In July 2000, IT investigated three anomalies representing potential USTs that were identified during the geophysical survey. However, no USTs were found using exploratory trenching and excavation. The analytical results from the SI indicated that contamination was present in various site media at Parcel 94(7) and that additional investigation was warranted. The contamination was believed to be associated with the use of chlorinated solvents and other chlorinated materials (e.g., oil, wax) to launder and treat military garments to render them impermeable to CWM. Other potential sources of contamination include previously removed USTs (possible source of benzene detections in groundwater) and the existing asphalt at Parcel 94(7) (possible source of polynuclear aromatic hydrocarbon [PAH] detections in soils).

The RI at Parcel 94(7) consisted of the collection and analysis of surface soil, depositional soil, subsurface soil, and groundwater samples at the site and surface water and sediment samples from Ingram Creek. A total of eighteen groundwater monitoring wells, including one temporary well, ten permanent residuum wells, and seven permanent bedrock wells, were installed at the site to facilitate groundwater sample collection and to provide site-specific geological and hydrogeological characterization. Target analyses for the samples included volatile organic compounds (VOC), semivolatile organic compounds (SVOC), metals, and/or polychlorinated biphenyls (PCB).

Based on the results of the RI, further sampling of the groundwater for VOCs and natural attenuation parameters at Parcel 94(7) was recommended. An FFS was also recommended to screen remedial technologies and process options for groundwater remedial alternatives (IT, 2002).

1.4.2.1 Nature and Extent of Contamination in Soil

Sixteen surface soil samples, four depositional soil samples, and fifteen subsurface soil samples were collected for chemical analyses. To determine whether the metals concentrations pose a threat to human health or the environment, the analytical results were compared to human health site-specific screening levels (SSSL), ecological screening values (ESV), and background values.

The SSSLs and ESVs were developed by IT as part of the human health and ecological risk evaluations associated with Sis being performed under the BRAC Environmental Restoration Program at FTMC. The SSSLs, ESVs, and PAH background screening values are presented in the *Final Human Health and Ecological Screening Values and PAH Background Summary Report* (IT, 2000).

Metals were detected at concentrations exceeding residential SSSLs, ESVs, and/or background values in surface and depositional soil samples. Three metals also exceeded SSSLs and background values in subsurface soils. However, a statistical and geochemical evaluation concluded that the elevated concentrations most likely result from the preferential enrichment of samples with clays, iron, or manganese oxides that naturally concentrate specific trace elements. All of the metals, except for lead in one subsurface soil sample, were determined to be naturally occurring. The lead result, however, was well below its SSSL and only marginally exceeded its background concentration.

VOCs were detected in surface and subsurface soils; however, the concentrations were all below SSSLs and ESVs. Several SVOCs, all of which were PAH compounds, were detected at concentrations exceeding SSSLs, ESVs, and PAH background values in a limited number of surface and depositional soil samples. The source of the PAHs is likely the degradation of the asphalt pavement at Parcel 94(7). PAHs were not detected in groundwater, and leaching of these compounds to the groundwater is considered unlikely. SVOCs, predominantly PAH compounds, were also detected in subsurface soils. With the exception of a common laboratory contaminant, the SVOCs were detected in only one subsurface soil sample. Of the SVOCs detected in subsurface soils, only one PAH compound, benzo(a)pyrene, exceeded its SSSL; however, its concentration was qualified as an estimated concentration. Two PCB Aroclors were detected in one subsurface soil sample at concentrations below their respective SSSLs.

1.4.2.2 Nature and Extent of Contamination in Groundwater

Twenty-one groundwater samples were collected from 19 monitoring wells for chemical analysis. Metals were detected in groundwater samples, some of which exceeded their respective SSSLs and background concentrations. However, an integrated geochemical and statistical evaluation concluded that the metals detected were naturally occurring.

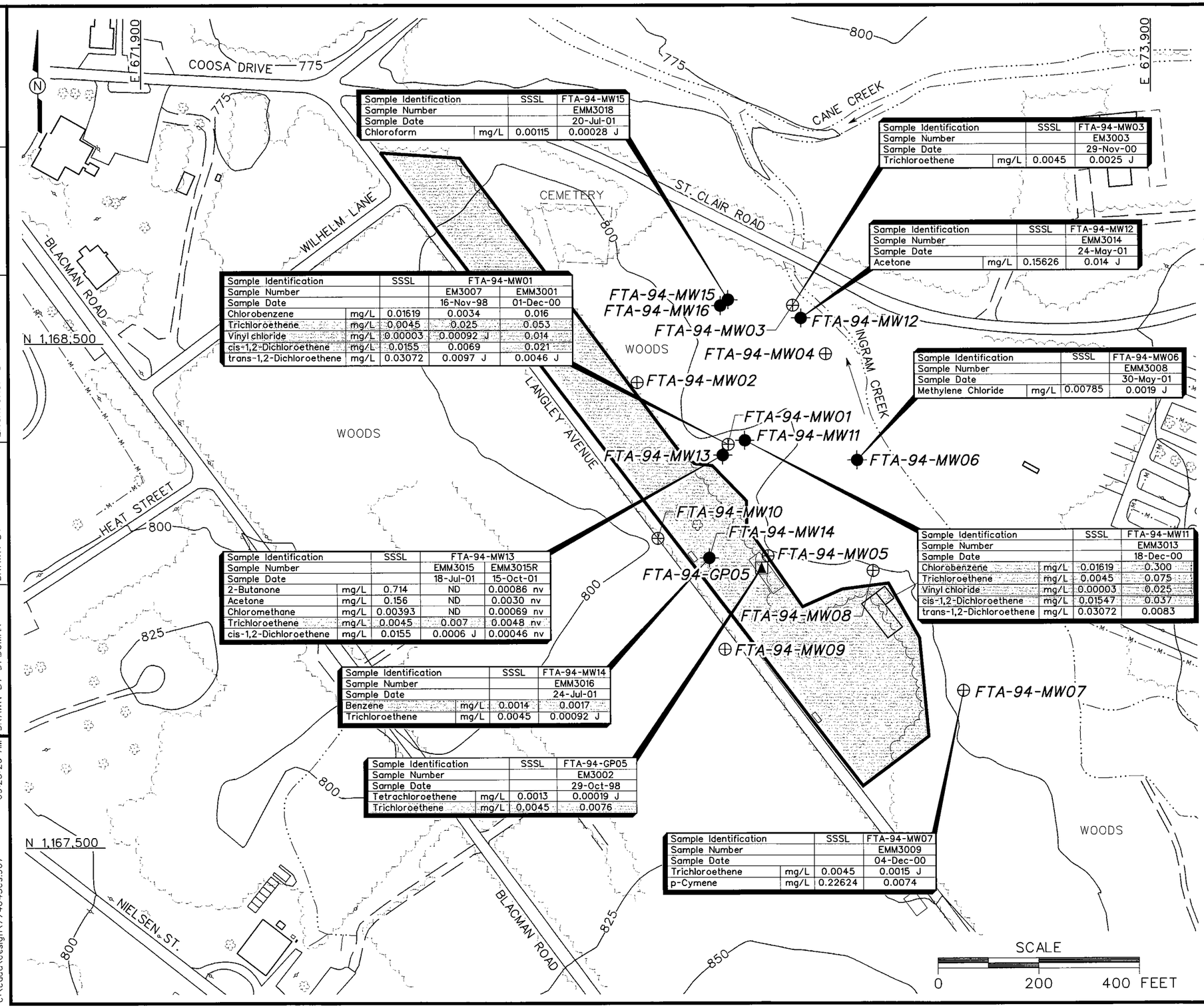
Two SVOCs were detected in groundwater but at concentrations below SSSLs. PCBs were not detected in groundwater.

All of the groundwater samples collected at the site were analyzed for VOCs. A total of thirteen VOCs were detected in the samples. VOCs were not detected in eight of the samples; and acetone or methylene chloride, both of which are common laboratory contaminants, were the only detected VOCs in three additional samples. VOC concentrations in the groundwater samples ranged from 0.00019 to 0.3 milligrams per liter (mg/L). The concentrations of the following five VOCs exceeded their respective SSSLs:

- Benzene (0.0017 mg/L) in one well (FTA-94-MW14)
- Chlorobenzene (0.3 mg/L) in one well (FTA-94-MW11)
- cis-1,2-Dichloroethene (DCE) (0.021 and 0.037 mg/L) in two wells (FTA-94-MW01 and FTA-94-MW11)
- Trichloroethene (TCE) (0.0048 to 0.075 mg/L) in four wells
- Vinyl chloride (VC) (0.00092 and 0.025 mg/L) in two wells (FTA-94-MW01 and FTA-94-MW11).

VOC concentrations in groundwater are presented on Figure 1-12. Isopleth maps (Figures 1-13 through 1-16) were constructed to illustrate the lateral extent of VOCs in groundwater at the site. Figures 1-13 and 1-14 show the concentrations of VC and TCE, respectively, in residuum groundwater; Figures 1-15 and 1-16 show the distribution of VC and TCE in the bedrock aquifer. Contamination in the groundwater appears to be primarily centered in the area around monitoring well FTA-94-MW01 for the residuum and FTA-94-MW11 for the bedrock. The occurrence of VC and cis-1,2-DCE, both degradation products of TCE, is restricted to these two wells (Figure 1-12). Isopleth maps showing total VOCs in residuum groundwater (Figure 1-17) and bedrock groundwater (Figure 1-18) include relatively low detections of "J"-qualified data for chloroform (FTA-94-MW15), methylene chloride (FTA-94-MW06), and TCE (FTA-94-MW03) and extend the area of apparent contamination to the north and east. Figures 1-19 and 1-20 present cross-sectional views of the distribution of total chlorinated VOCs in relation to the subsurface geology.

Based on the distribution of contaminants and the direction of groundwater flow, the initial transport in residuum appears to be from an area near FTA-94-MW01 towards the east-northeast. Because of the high specific gravity of the primary constituent (TCE), density stratification within the plume could occur, especially if the constituents are in a separate phase or at concentrations approaching their solubility limit. The distribution shown by isopleth and groundwater flow data would suggest that, once the contaminant plume descends to bedrock, a



Sample Identification		SSSL	FTA-94-MW15
Sample Number			EMM3018
Sample Date			20-Jul-01
Chloroform	mg/L	0.00115	0.00028 J

Sample Identification		SSSL	FTA-94-MW03
Sample Number			EM3003
Sample Date			29-Nov-00
Trichloroethene	mg/L	0.0045	0.0025 J

Sample Identification		SSSL	FTA-94-MW12
Sample Number			EMM3014
Sample Date			24-May-01
Acetone	mg/L	0.15626	0.014 J

Sample Identification		SSSL	FTA-94-MW01	
Sample Number			EM3007	EMM3001
Sample Date			16-Nov-98	01-Dec-00
Chlorobenzene	mg/L	0.01619	0.0034	0.016
Trichloroethene	mg/L	0.0045	0.025	0.053
Vinyl chloride	mg/L	0.00003	0.00092 J	0.014
cis-1,2-Dichloroethene	mg/L	0.0155	0.0069	0.021
trans-1,2-Dichloroethene	mg/L	0.03072	0.0097 J	0.0046 J

Sample Identification		SSSL	FTA-94-MW06
Sample Number			EMM3008
Sample Date			30-May-01
Methylene Chloride	mg/L	0.00785	0.0019 J

Sample Identification		SSSL	FTA-94-MW13	
Sample Number			EMM3015	EMM3015R
Sample Date			18-Jul-01	15-Oct-01
2-Butanone	mg/L	0.714	ND	0.00086 nv
Acetone	mg/L	0.156	ND	0.0030 nv
Chloromethane	mg/L	0.00393	ND	0.00069 nv
Trichloroethene	mg/L	0.0045	0.007	0.0048 nv
cis-1,2-Dichloroethene	mg/L	0.0155	0.0006 J	0.00046 nv

Sample Identification		SSSL	FTA-94-MW11
Sample Number			EMM3013
Sample Date			18-Dec-00
Chlorobenzene	mg/L	0.01619	0.300
Trichloroethene	mg/L	0.0045	0.075
Vinyl chloride	mg/L	0.00003	0.025
cis-1,2-Dichloroethene	mg/L	0.01547	0.037
trans-1,2-Dichloroethene	mg/L	0.03072	0.0083

Sample Identification		SSSL	FTA-94-MW14
Sample Number			EMM3016
Sample Date			24-Jul-01
Benzene	mg/L	0.0014	0.0017
Trichloroethene	mg/L	0.0045	0.00092 J

Sample Identification		SSSL	FTA-94-GP05
Sample Number			EM3002
Sample Date			29-Oct-98
Tetrachloroethene	mg/L	0.0013	0.00019 J
Trichloroethene	mg/L	0.0045	0.0076

Sample Identification		SSSL	FTA-94-MW07
Sample Number			EMM3009
Sample Date			04-Dec-00
Trichloroethene	mg/L	0.0045	0.0015 J
p-Cymene	mg/L	0.22624	0.0074

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- CULVERT WITH HEADWALL
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE
- BEDROCK MONITORING WELL LOCATION
- RESIDUUM MONITORING WELL LOCATION
- GROUNDWATER, SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- J ESTIMATED CONCENTRATION
- SSSL SITE-SPECIFIC SCREENING LEVEL
- VOC VOLATILE ORGANIC COMPOUND
- mg/L MILLIGRAMS PER LITER
- nv NOT VALIDATED
- CONCENTRATION EXCEEDS SSSL

NOTE:

1. "B"-FLAGGED DATA NOT SHOWN.

FIGURE 1-12
VOC CONCENTRATIONS IN GROUNDWATER
FORMER CHEMICAL LAUNDRY AND MOTOR POOL AREA 1500
PARCEL 94(7)

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CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

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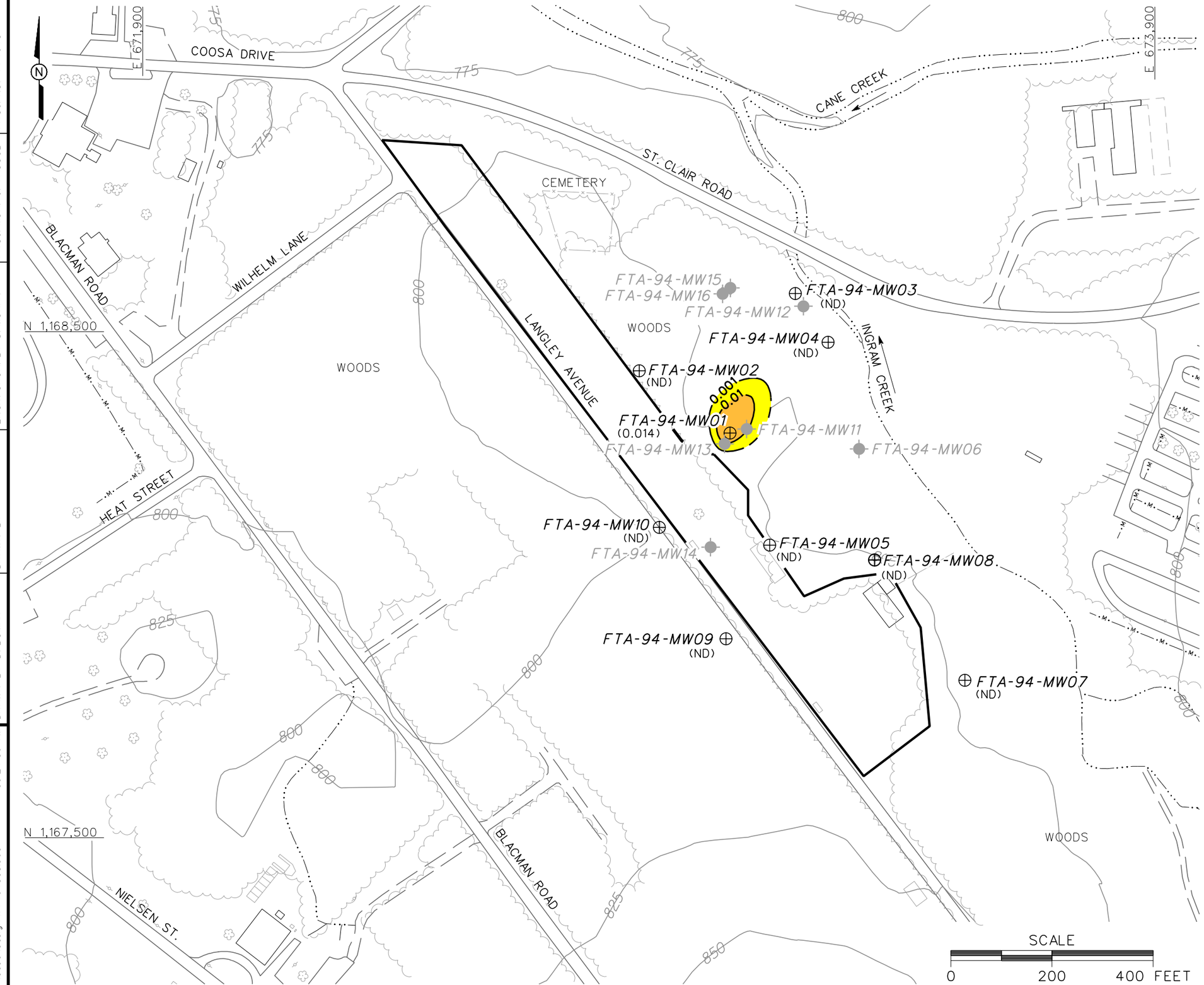

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- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- CULVERT WITH HEADWALL
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE
- BEDROCK MONITORING WELL LOCATION
- RESIDUUM MONITORING WELL LOCATION
- 0.01 — VINYL CHLORIDE CONCENTRATION (mg/L) (DASHED WHERE INFERRED)
- (0.014) — CONCENTRATION IN MILLIGRAMS PER LITER (mg/L)
- (ND) — NOT DETECTED

FIGURE 1-13
VINYL CHLORIDE ISOPLETH MAP
RESIDUUM MONITORING WELLS
FORMER CHEMICAL LAUNDRY
AND MOTOR POOL AREA 1500
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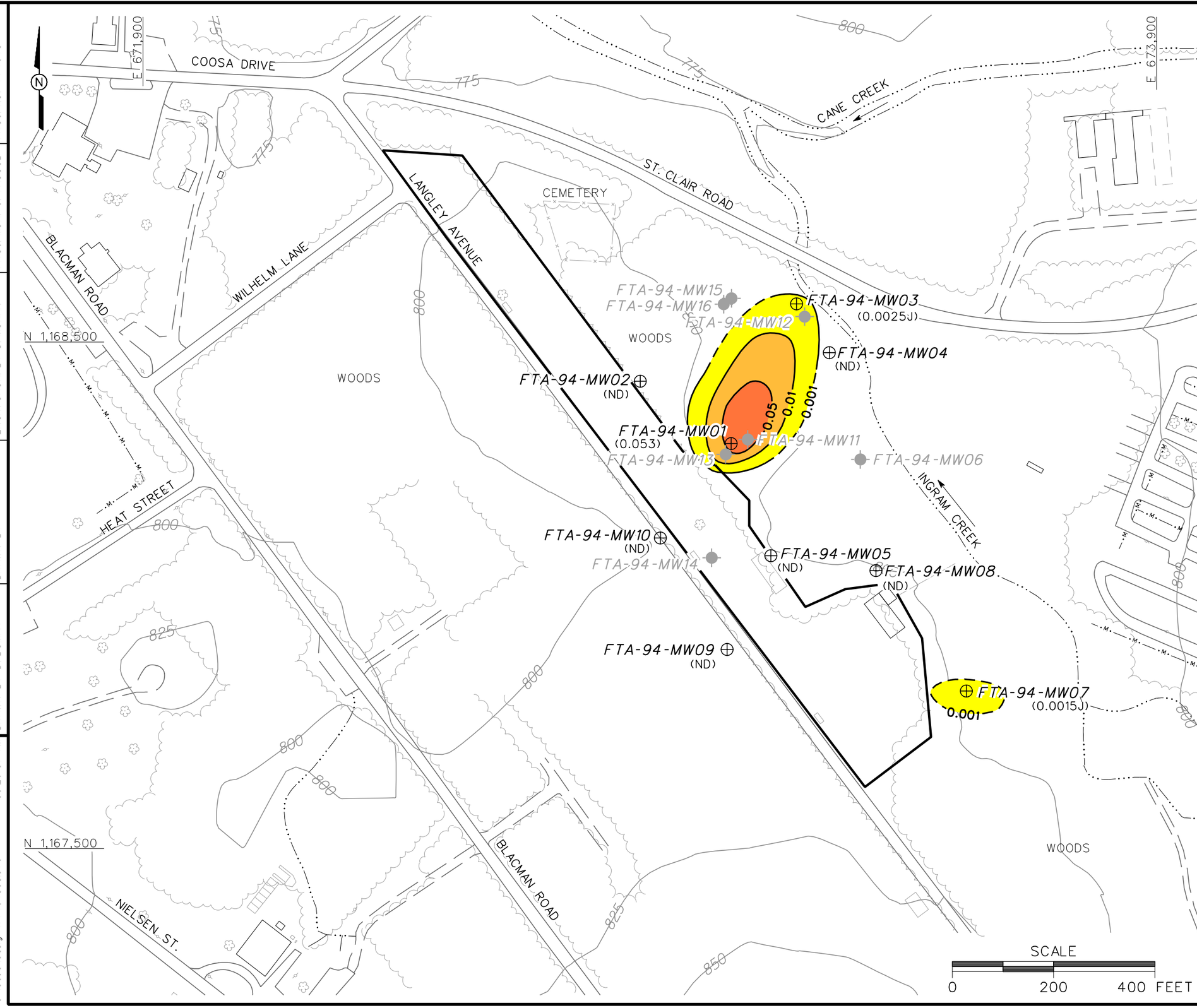

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- CULVERT WITH HEADWALL
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE
- BEDROCK MONITORING WELL LOCATION
- RESIDUUM MONITORING WELL LOCATION
- 0.05 — TRICHLOROETHENE CONCENTRATION (mg/L) (DASHED WHERE INFERRED)
- (0.053) — CONCENTRATION IN MILLIGRAMS PER LITER (mg/L)
- (ND) — NOT DETECTED
- J — ESTIMATED CONCENTRATION

FIGURE 1-14
TRICHLOROETHENE ISOPLETH MAP
RESIDUUM MONITORING WELLS
FORMER CHEMICAL LAUNDRY
AND MOTOR POOL AREA 1500
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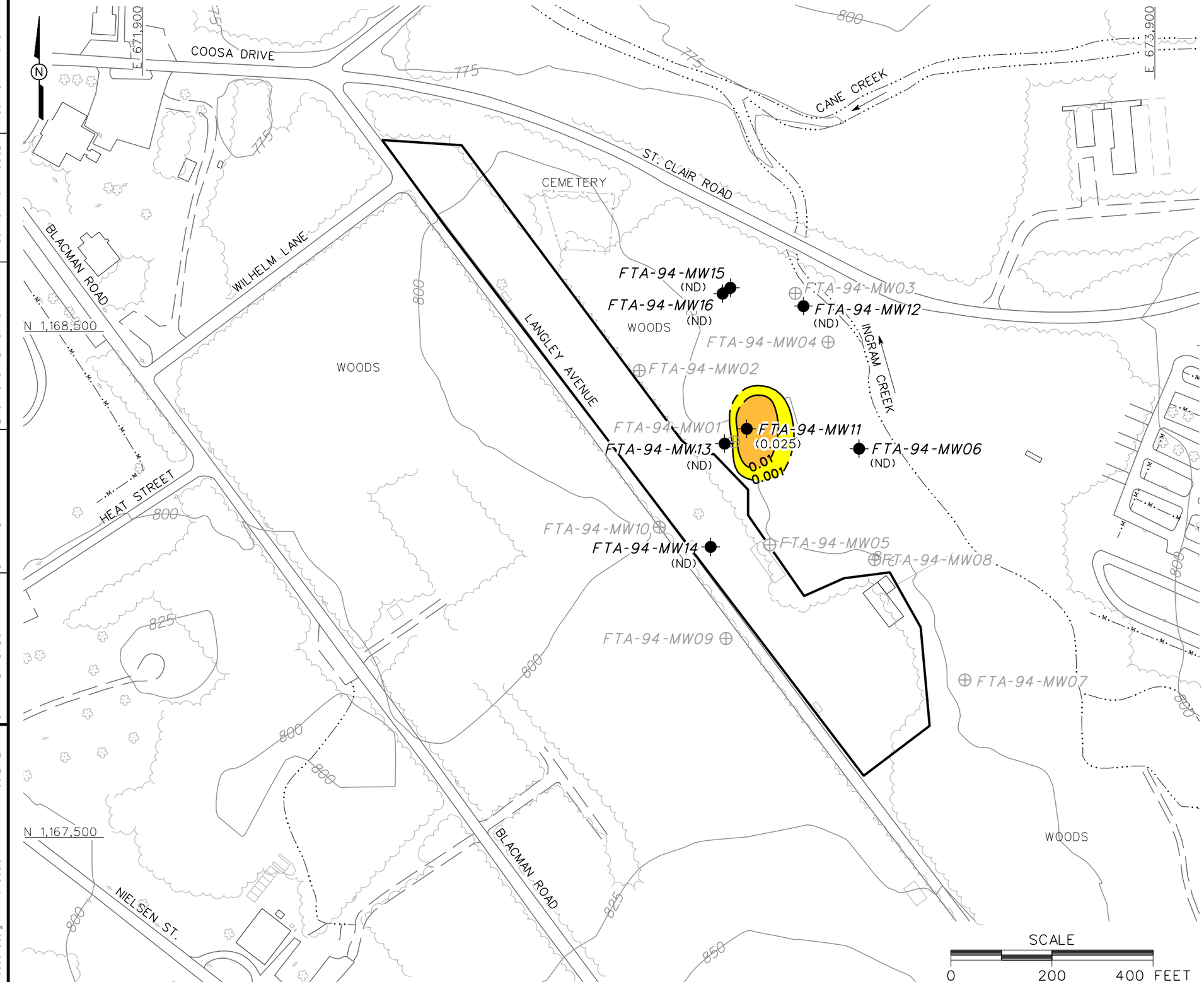

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- CULVERT WITH HEADWALL
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE
- BEDROCK MONITORING WELL LOCATION
- RESIDUUM MONITORING WELL LOCATION
- 0.1 — VINYL CHLORIDE CONCENTRATION (mg/L) (DASHED WHERE INFERRED)
- (0.025) — CONCENTRATION IN MILLIGRAMS PER LITER (mg/L)
- (ND) — NOT DETECTED

FIGURE 1-15
VINYL CHLORIDE ISOPLETH MAP
BEDROCK MONITORING WELLS
FORMER CHEMICAL LAUNDRY
AND MOTOR POOL AREA 1500
PARCEL 94(7)

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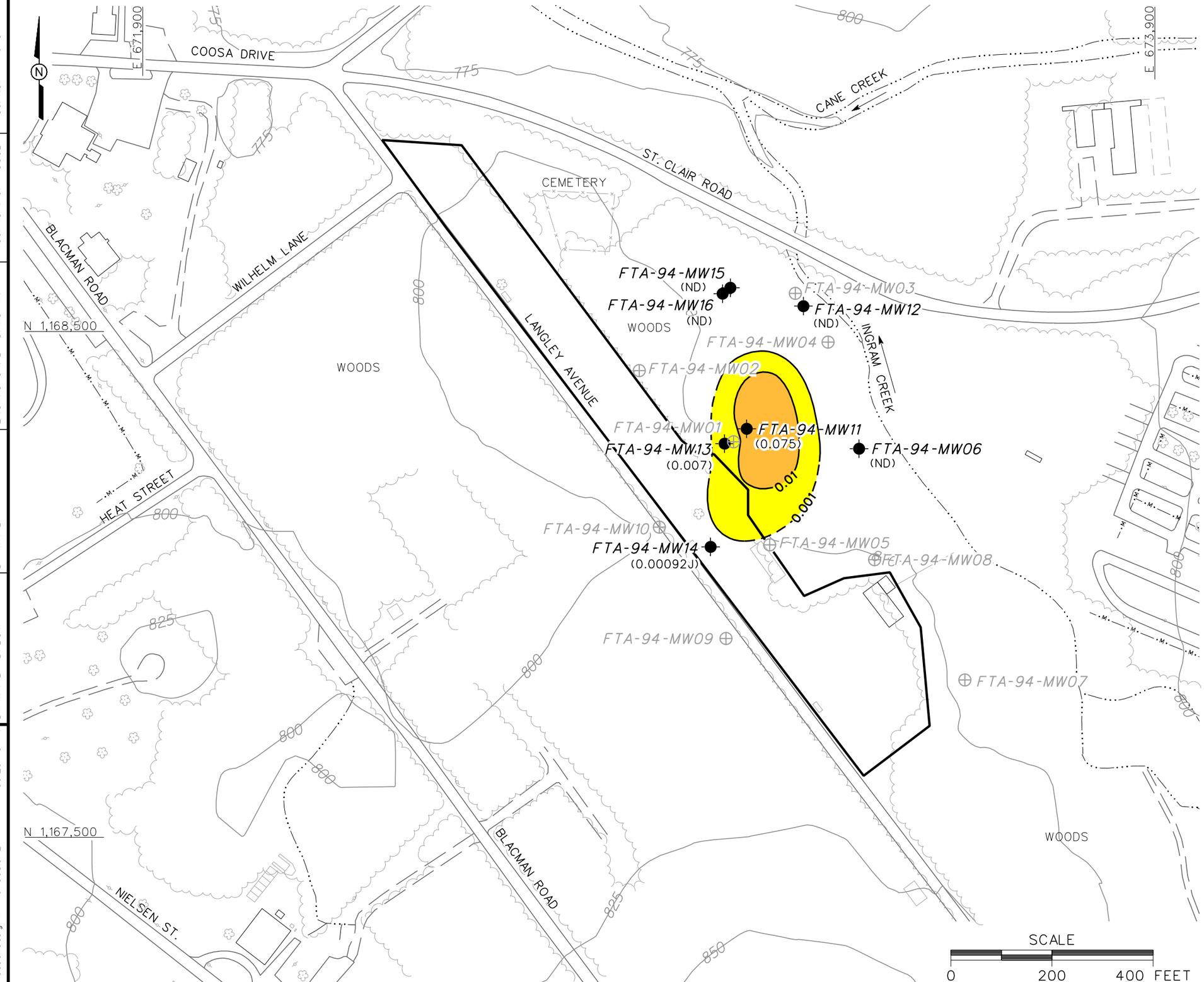

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- CULVERT WITH HEADWALL
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE
- BEDROCK MONITORING WELL LOCATION
- RESIDUUM MONITORING WELL LOCATION
- 0.01 — TRICHLOROETHENE CONCENTRATION (mg/L) (DASHED WHERE INFERRED)
- (0.075) — CONCENTRATION IN MILLIGRAMS PER LITER (mg/L)
- (ND) — NOT DETECTED
- J — ESTIMATED CONCENTRATION

FIGURE 1-16
TRICHLOROETHENE ISOPLETH MAP
BEDROCK MONITORING WELLS
FORMER CHEMICAL LAUNDRY
AND MOTOR POOL AREA 1500
PARCEL 94(7)

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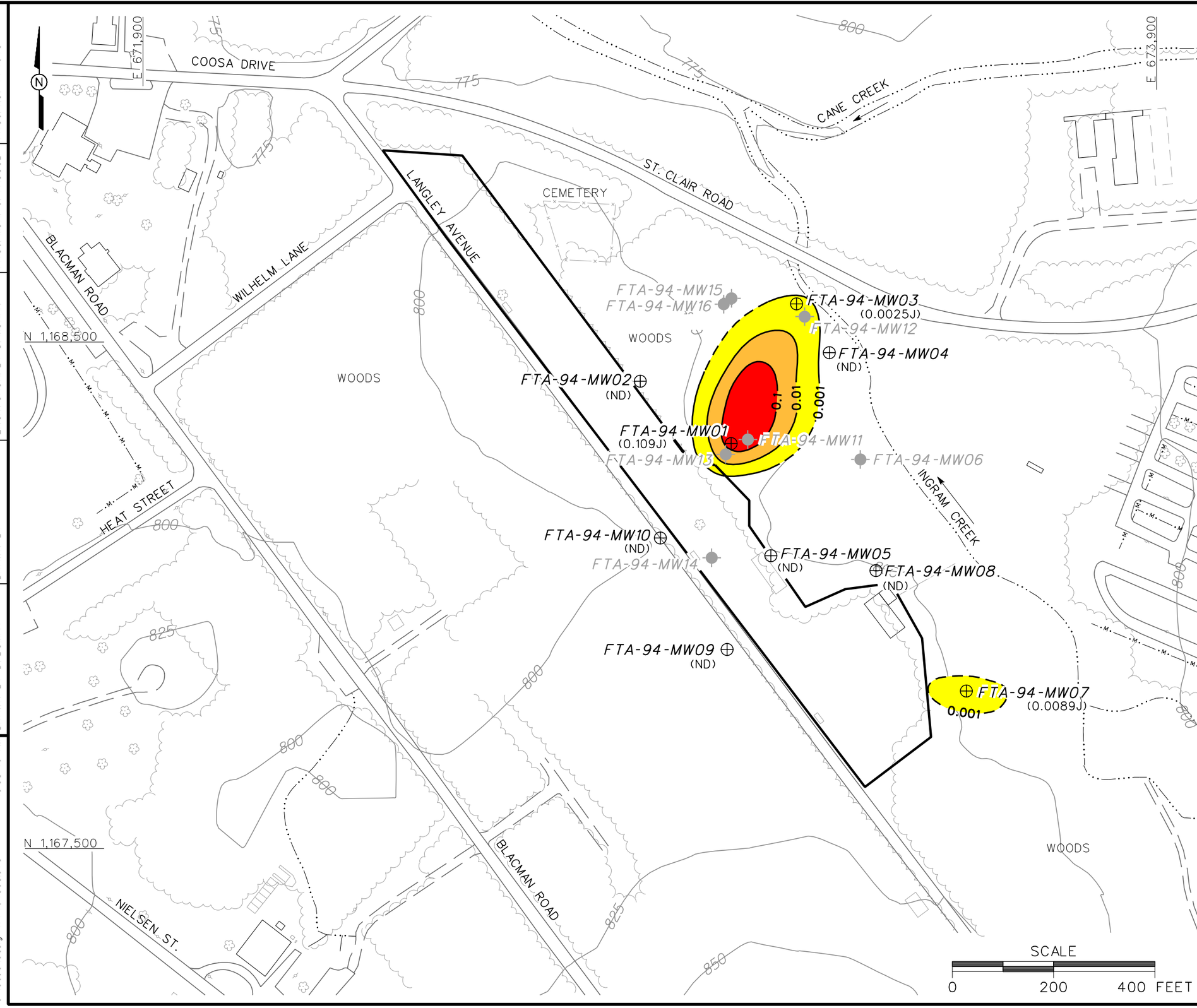

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- CULVERT WITH HEADWALL
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE
- BEDROCK MONITORING WELL LOCATION
- RESIDUUM MONITORING WELL LOCATION
- 0.1 — TOTAL VOC CONCENTRATION (mg/L) (DASHED WHERE INFERRED)
- (0.109) — CONCENTRATION IN MILLIGRAMS PER LITER (mg/L)
- (ND) — NOT DETECTED
- J — ESTIMATED CONCENTRATION

FIGURE 1-17
TOTAL VOCs ISOPLETH MAP
RESIDUUM MONITORING WELLS
FORMER CHEMICAL LAUNDRY
AND MOTOR POOL AREA 1500
PARCEL 94(7)

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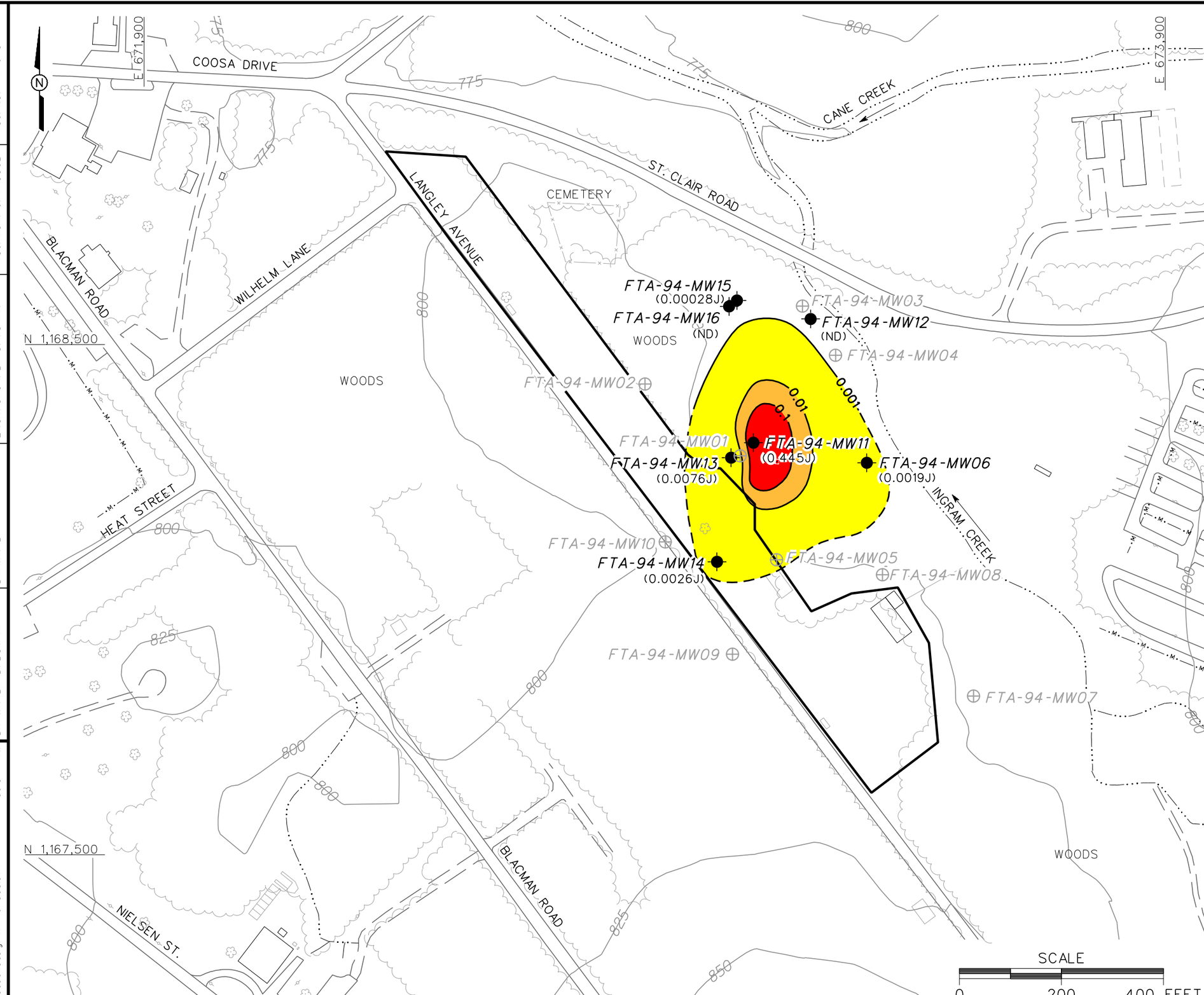

LEGEND

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- CULVERT WITH HEADWALL
- SURFACE DRAINAGE / CREEK
- FENCE
- UTILITY POLE
- BEDROCK MONITORING WELL LOCATION
- RESIDUUM MONITORING WELL LOCATION
- 0.1 — TOTAL VOC CONCENTRATION (mg/L) (DASHED WHERE INFERRED)
- (0.445) — CONCENTRATION IN MILLIGRAMS PER LITER (mg/L)
- (ND) — NOT DETECTED
- J — ESTIMATED CONCENTRATION

NOTE:

1. TOTAL VOC CONCENTRATION EXCLUDES COMMON LABORATORY CONTAMINANT ACETONE.

FIGURE 1-18
TOTAL VOCs ISOPLETH MAP
BEDROCK MONITORING WELLS
FORMER CHEMICAL LAUNDRY
AND MOTOR POOL AREA 1500
PARCEL 94(7)

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Contract No. DACA21-96-D-0018

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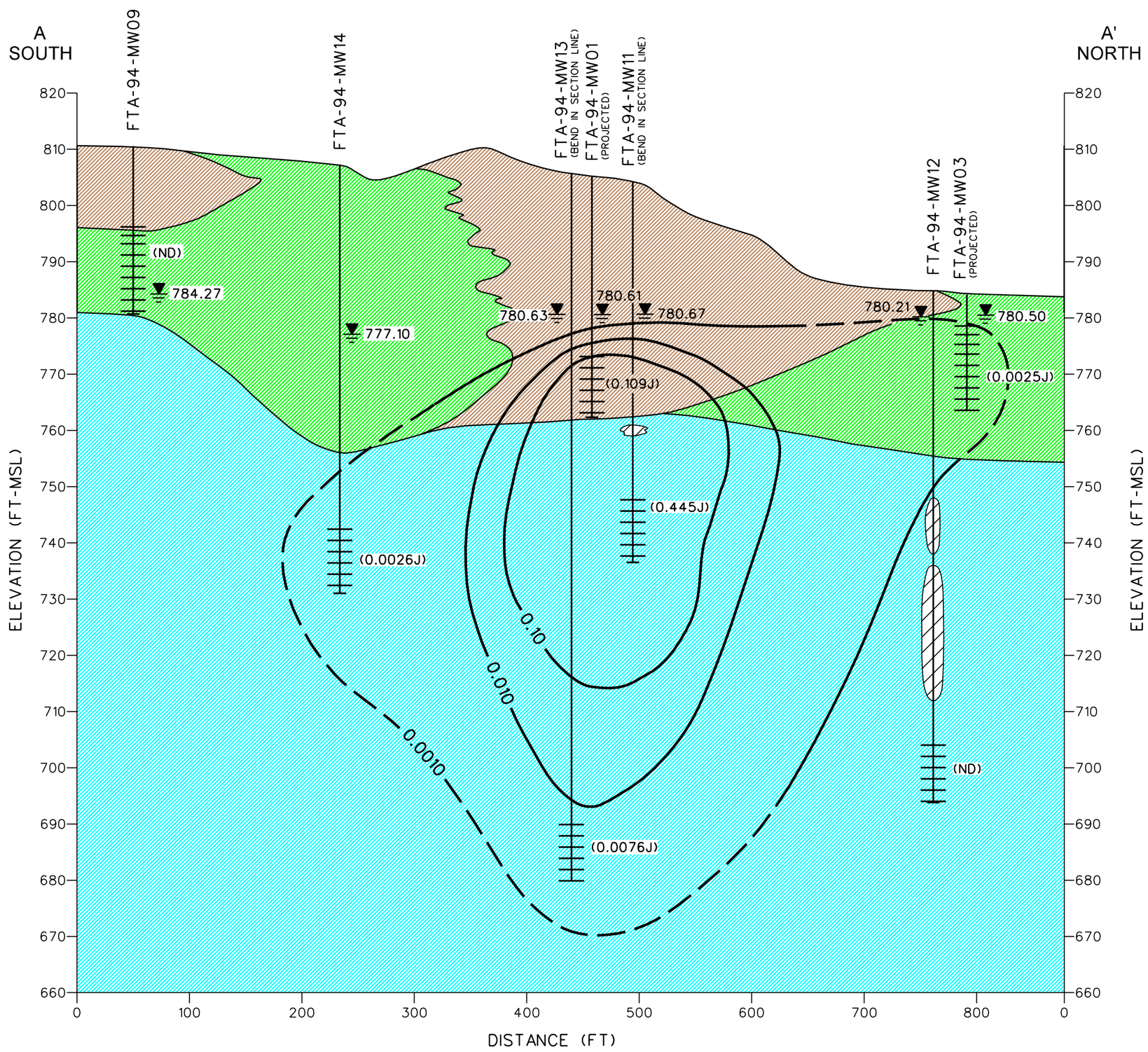

LEGEND

	SCREEN INTERVAL
	WATER TABLE (AUGUST 21, 2001)
784.27	GROUNDWATER ELEVATION (FT MSL)
	VOID
0.10	TOTAL VOC CONCENTRATION (mg/L) (DASHED WHERE INFERRED)
(ND)	NOT DETECTED
(0.109)	CONCENTRATION IN MILLIGRAMS PER LITER (mg/L)
J	ESTIMATED CONCENTRATION
	SILT
	CLAY
	LIMESTONE

NOTES:

1. ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.
2. DASHED WHERE INFERRED.
3. TOTAL VOC CONCENTRATION EXCLUDES COMMON LABORATORY CONTAMINANT ACETONE.

VERTICAL

0 20 40 FEET

HORIZONTAL

0 100 200 FEET

FIGURE 1-19
TOTAL VOCs CROSS SECTION A-A'
FORMER CHEMICAL LAUNDRY AND MOTOR POOL AREA 1500
PARCEL 94(7)

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

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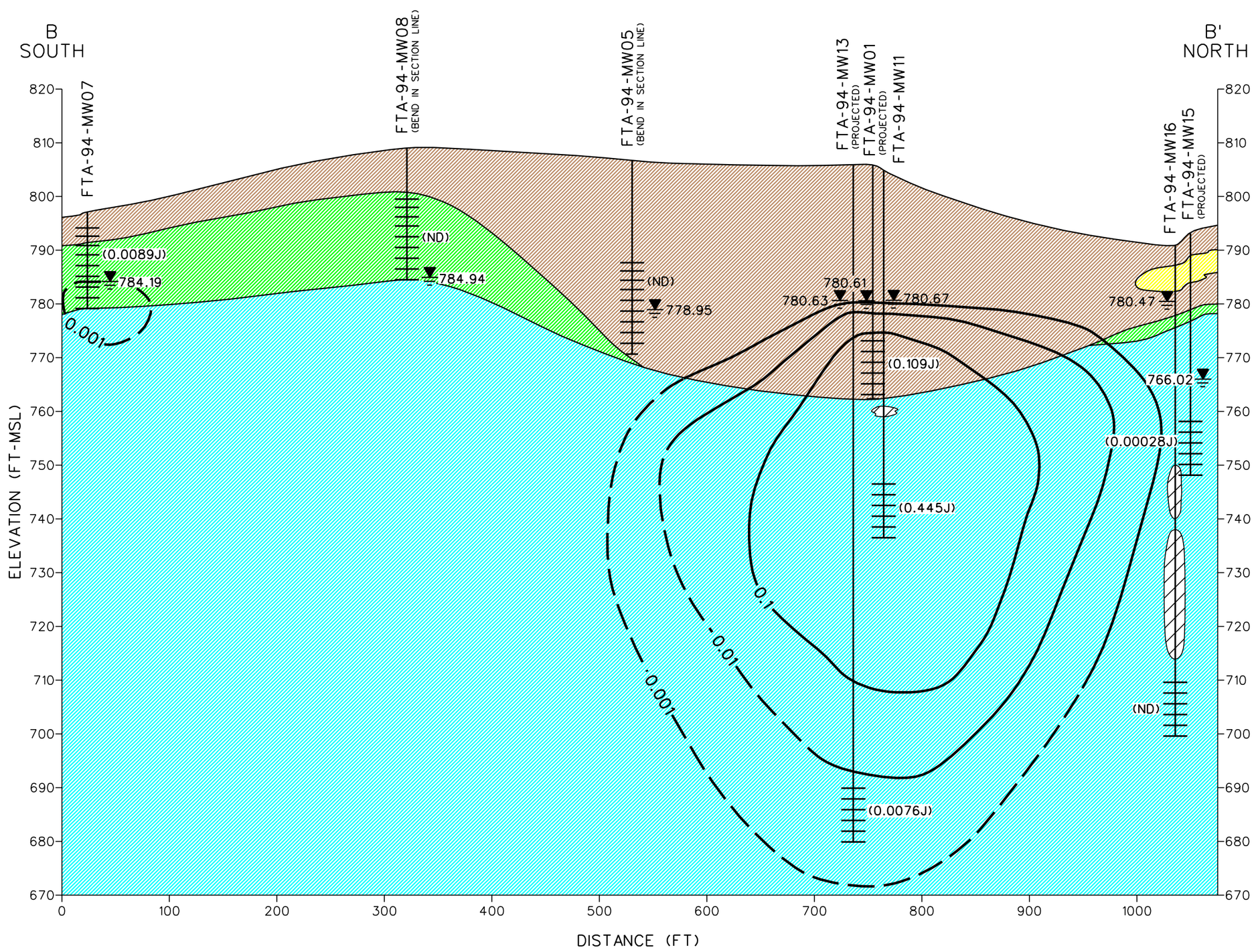

LEGEND

- SCREEN INTERVAL
- WATER TABLE (AUGUST 21, 2001)
- 784.27 — GROUNDWATER ELEVATION (FT MSL)
- VOID
- 0.10 — TOTAL VOC CONCENTRATION (mg/L) (DASHED WHERE INFERRED)
- (ND) — NOT DETECTED
- (0.445) — CONCENTRATION IN MILLIGRAMS PER LITER (mg/L)
- J — ESTIMATED CONCENTRATION
- SAND
- SILT
- CLAY
- LIMESTONE

NOTES:

1. ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988.
2. DASHED WHERE INFERRED.
3. TOTAL VOC CONCENTRATION EXCLUDES COMMON LABORATORY CONTAMINANT ACETONE.

VERTICAL
0 20 40 FEET

HORIZONTAL
0 100 200 FEET

FIGURE 1-20
TOTAL VOCs CROSS SECTION B-B'
FORMER CHEMICAL LAUNDRY AND MOTOR POOL AREA 1500
PARCEL 94(7)

U. S. ARMY CORPS OF ENGINEERS
MOBILE DISTRICT
FORT McCLELLAN
CALHOUN COUNTY, ALABAMA
Contract No. DACA21-96-D-0018

IT CORPORATION
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radial to semiradial flow to the west and south in the bedrock will dominate. The degree of influence of fracture flow within the limestone bedrock cannot be assessed from the present data.

An estimation of the rate and distance of contaminant migration was calculated for both residuum and bedrock. Solute transport rate in residuum ranged from 16.51 feet per year (ft/yr) for chlorobenzene to 71.39 ft/yr for VC. In bedrock, contaminant velocity ranged from 0.24 ft/yr for chlorobenzene to 2.22 ft/yr for VC. The minimum and maximum contaminant transport rates calculated for bedrock suggest that, over a 50-year period, contaminants, if not naturally attenuated, would have migrated downgradient towards FTA-94-MW14 but would not yet have reached it. In residuum, the transport rates and migration distances indicate that contaminants would have reached Ingram Creek, if the contaminants and flow did not descend vertically.

1.5 Human Health/Ecological Risks

A streamlined human health risk assessment (SRA) was performed to determine the potential threat to human health from exposure to environmental media at Parcel 94(7). Four receptor scenarios were evaluated in the SRA: groundskeeper, construction worker, recreational site user, and resident. The SRA concluded that exposure to environmental media at Parcel 94(7) does not pose an unacceptable cancer risk or noncancer hazard for the recreational site user, construction worker, or groundskeeper. For the resident, the SRA identified VC and TCE in groundwater and four PAHs in soil as chemicals of concern (COC) in site media. However, the PAHs probably reflect the presence of asphalt at the site rather than any activity or inadvertent release attributable to mission-related Army activities.

A screening-level ecological risk assessment (SLERA) was performed to determine the potential for ecological risks posed by site-related chemicals at Parcel 94(7). Chemicals of potential ecological concern (COPEC) identified in the SLERA included metals and PAHs in surface soils and in one sediment sample. No COPECs were identified for surface water from Ingram Creek. An integrated statistical and geochemical evaluation concluded that the metals detected above ESVs in surface soil are associated with iron oxides and are naturally occurring. The metals in the sediment sample were determined to be insignificant because their concentrations only slightly exceeded ESVs and/or background threshold values. The PAHs in surface soils and sediments at the site are most likely related to asphalt pavement in and around Parcel 94(7) and are probably not related to mission-related Army operations conducted at the site. Therefore, the SLERA concluded that none of the COPECs presents a risk to the terrestrial or aquatic ecosystems.

1.6 Report Organization

This FFS report is organized as follows:

- ***Chapter 1.0 – Introduction.*** This chapter states the purpose of the FFS, describes site background, summarizes previous investigations, and details human health/ecological risks.

- ***Chapter 2.0 – Identification of the Remedial Action Objective and Remedial Goal Options.*** This chapter defines the remedial action objective and describes applicable or relevant and appropriate requirements and remedial goal options.

- ***Chapter 3.0 – Identification and Screening of Remedial Technologies.*** This chapter identifies areas requiring remedial action and discusses potential remedial technologies and process options with respect to effectiveness, implementability, and cost.

- ***Chapter 4.0 – Development and Detailed Analysis of Remedial Alternatives.*** This chapter combines process options to form remedial alternatives and evaluates these alternatives against seven CERCLA criteria.

- ***Chapter 5.0 – Comparative Analysis of Alternatives.*** This chapter evaluates the relative performance of each remedial alternative with respect to the seven CERCLA criteria.

- ***Chapter 6.0 – Recommended Remedial Alternative.*** This chapter provides the rationale for selecting a remedial alternative.

- ***Chapter 7.0 – References.*** This chapter lists the references cited in this FFS report.