

Draft Final

**Proposed Plan
FTG-09, Burial Site No. 3
Fort Gillem
Forest Park, Georgia**

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List of Acronyms

µg/kg	micrograms per kilogram
µg/L	micrograms per liter
amsl	above mean sea level
APTIM	Aptim Federal Services, LLC
ARAR	applicable or relevant and appropriate requirement
BHHRA	baseline human health risk assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	chemical of concern
DCE	dichloroethene
DPE	dual-phase extraction
EPA	U.S. Environmental Protection Agency
ESI	expanded site inspection
FORSCOM	U.S. Army Forces Command
Foster Wheeler	Foster Wheeler Environmental Corporation
FS	feasibility study
GA EPD	Georgia Department of Natural Resources, Environmental Protection Division
GWETS	groundwater extraction and treatment system
HGL	HydroGeoLogic, Inc.
HI	hazard index
IRA	interim remedial action
MCL	maximum contaminant level
MNA	monitored natural attenuation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
North Wind	North Wind Services, LLC
O&M	operation and maintenance
PCB	polychlorinated biphenyl
PP	Proposed Plan
PRG	preliminary remediation goal
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
ROD	Record of Decision
RRS	risk reduction standard
RSL	regional screening level

List of Acronyms *(Continued)*

SEBS	Southeast Burial Sites
Shaw	Shaw Environmental, Inc.
SLERA	screening-level ecological risk assessment
SVOC	semivolatile organic compound
TAL	target analyte list
TCE	trichloroethene
TCL	target compound list
TeCA	1,1,2,2-tetrachloroethane
UAO	Unilateral Administrative Order
URA	Urban Redevelopment Agency
VI	vapor intrusion
VOC	volatile organic compound

1.0 Introduction

The U.S. Army invites the public to review and comment on this Proposed Plan (PP), which documents the Army's selected alternatives to address environmental contamination associated with historical activities at the former Burial Site No. 3 portion of the Southeast Burial Sites (SEBS), FTG-09, at Fort Gillem, Forest Park, Georgia. The PP also summarizes environmental investigations and human health and ecological risk assessments completed to date at FTG-09.

The Army issues this PP as the lead agency under the Comprehensive Environmental Response Compensation, and Liability Act (CERCLA) of 42 U.S. Code §9601 et. seq. for cleanup at FTG-09. The Army is authorized to be the lead agency under Executive Order 12580, as amended. The response is in compliance with the Defense Environmental Restoration Program (10 U.S.C. §2701 et. seq.). The Georgia Department of Natural Resources, Environmental Protection Division (GA EPD) is the support agency and concurs with the preferred alternative. This PP was prepared in accordance with the public participation requirements of the CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan, 40 Code of Federal Regulations (CFR) § 300.430(f)(2) (NCP).

It is the lead agency's current judgment that the Preferred Alternative identified in this PP, or one of the other active measures considered in the PP, is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

Environmental studies and investigations have been conducted since the late 1970s at FTG-09. The most recent remedial investigation (RI) began in 2015 to delineate the extent of soil and groundwater contamination and address remaining data gaps. In September 2014, the U.S. Environmental Protection Agency (EPA) issued a Resource Conservation and Recovery Act (RCRA) §7003 Unilateral Administrative Order (UAO) to the Army to investigate the potential for vapor intrusion (VI) from groundwater contamination underlying the property surrounding Fort Gillem. The Order required the Army to conduct a survey of all water wells and springs, sampling of any water wells and springs identified by the survey, completion of a VI study, mitigation of contamination discovered by these efforts, and public outreach. The Army conducted the VI study in 2014 and 2015 in the mostly residential, off-post buildings around Fort Gillem, including the residential off-post area south of FTG-09. The VI study concluded that there were no complete VI pathways for any of the 308 structures evaluated for the study and that no further action is planned (Geosyntec Consultants, 2016). Based on the summary and conclusions of the recent VI work, an aggressive schedule for remediation of soil and

groundwater was implemented to decrease the potential for further VI concerns. The schedule included continuation of the RI activities to identify potential on-post soil and groundwater source areas that required treatment to reduce on-post and off-post groundwater contamination.

Based on preliminary review of new and existing data, interim remedial actions (IRA) were initiated in 2017 to address unacceptable risk from soil and groundwater concurrently with preparation of the RI report. The objective of the soil interim action was to eliminate soil that posed a potential leaching source to groundwater. The implemented remedy for on-post soil has reduced site contamination in soil below levels that allow for unrestricted use/unrestricted exposure (UU/UE); therefore, institutional controls (IC)/land use controls (LUC) and 5-Year Reviews will not be required for on-post soil. Anticipated future land use at FTG-09 is commercial/industrial and cleanup goals have been achieved.

On-post groundwater interim actions (2019-2021) and the off-post groundwater interim actions (2017 – 2021) were implemented while the RI was being completed. As such, the results of the groundwater remedial action were not incorporated into the RI report or the feasibility study (FS) and the subsequent PP. A PP for FTG-09 was initially prepared based on the existing RI/FS reports (Aptim Federal Services, LLC [APTIM], 2019; 2021). The PP was issued for public review (APTIM, 2020). A public comment period was held from April 9 to May 8, 2020. No comments were received. A public meeting was not held since no comments were received from the public during the public comment period, nor was sufficient interest expressed from the public.

A subsequent RI/FS Addendum was issued that summarized the findings and conclusions of the RI conducted from 2016 to 2019, described the groundwater IRAs implemented from 2017 to 2021 to address on-post and off-post groundwater volatile organic compound (VOC) contamination associated with FTG-09, and described the remedial action alternatives that were evaluated for the FS Addendum (APTIM, 2022). The alternatives evaluation presented in the addendum included the completed remedial actions as a component of the final remedies for FTG-09, where appropriate.

This revised PP, based on the RI/FS Addendum and findings of the IRAs, presents the preferred alternatives for FTG-09 on-post soil and on- and off-post groundwater. After the public comment period, all the comments received will be evaluated. The comments will be summarized along with responses in the “Responsiveness Summary” section of the Record of Decision (ROD). The Army, in consultation with GA EPD, will make the final selection of the response action for the site and incorporate it into a ROD for the site.

Fort Gillem is located in the Atlanta metropolitan area, approximately 10 miles southeast of downtown Atlanta and approximately 3 miles east of Atlanta's Hartsfield-Jackson International Airport. Fort Gillem originally occupied 1,452 acres, and the Army operated the installation under various names from 1941 to 2011. Construction started in 1940 and was mostly completed by December 1942. Fort Gillem initially operated as two installations, the Atlanta Quartermaster Depot and the Atlanta Ordnance Depot. The Army consolidated the installations on April 1, 1948 and renamed them Atlanta Army Depot.

On June 28, 1974, the Atlanta Army Depot was renamed Fort Gillem and Fort McPherson assumed administrative control. The installation was active through numerous military efforts from World War II through Operation Desert Shield/Desert Storm. The installation shared responsibility for providing the Army's needs, such as weapons and equipment, research and development, procurement, production, storage, distribution, inventory management, maintenance, and disposal of surplus and waste materials during peacetime and wartime. As a sub-post of Fort McPherson, Fort Gillem also supported the U.S. Army Forces Command (FORSCOM) readiness missions and was home for many FORSCOM and Fort McPherson activities, including the Army and Air Force Exchange Service and the Federal Emergency Management Agency.

On November 9, 2005, the U.S. Congress approved the Base Realignment and Closure Commission's recommendation to close Fort Gillem, and stand-down began in 2007. Closure of Fort Gillem was completed on September 15, 2011; Army operations ceased, and the base was vacated.

The Army retained 260 acres of the western portion of Fort Gillem that comprises the Fort Gillem Enclave. The remaining acreage, or "excess property," totals approximately 1,170 acres. The Forest Park Urban Redevelopment Agency (URA) purchased the excess property in 2014. To date, approximately 936 acres have been released to the URA and are currently being developed. The remainder of the acreage purchased by URA, including FTG-09, will be released upon completion of environmental restoration activities. Based on current development at Fort Gillem and planned development, the anticipated future land use at FTG-09 is commercial/industrial (non-residential).

2.0 Site Background

FTG-09 occupies 4.56 acres adjacent to the south-central boundary of Fort Gillem (Figure 1). Surrounding land use to the south of the installation boundary residential, with mixed commercial and industrial land use along Forest Parkway (Figure 2). FTG-09 was reportedly

used from 1948 to 1964 for disposal activities, but no written records are available that detail the types of waste disposed at the site.

FTG-09 consists of a cleared, open field surrounded by trees and undergrowth. The site slopes gently toward the installation boundary. There are no engineered ditches or natural drainage ways originating at the on-post portion of the FTG-09 site. Surface elevations in the FTG-09 on-post portion range from approximately 940 feet above mean sea level (amsl) in the north to 915 feet amsl along the installation boundary. The topography from the installation boundary to the south-southeast through the residential neighborhood to Joy Lake Road (south of Forest Parkway) ranges from approximately 915 to 850 feet amsl (Figure 3).

2.1 Previous Investigations

Environmental investigations at the SEBS began in the late 1970s, and data collected for FTG-09 prior to 2000 were generally part of investigations completed for the entire SEBS. Investigations relevant to FTG-09 include the following:

- **Expanded Site Inspection (Foster Wheeler Environmental Corporation [Foster Wheeler]).** Foster Wheeler performed an expanded site inspection (ESI) of the five burial sites within the SEBS to identify the chemical contaminants present, the hydrogeological characteristics of the area, and the potential contaminant migration pathways. The ESI included geophysical and soil vapor surveys, soil sampling in soil borings and trenches, and permanent and temporary monitoring well installation. Soil, groundwater, surface water, and sediment samples were collected for laboratory analyses. The data were compared to Type 3 GA EPD risk reduction standards (RRS).
- **Remedial Investigation (HydroGeoLogic, Inc. [HGL] and Shaw Environmental, Inc. [Shaw]).** The 2008 FTG-09 RI evaluated soil, groundwater, surface water, and sediment data collected from 1999 to 2004 by IT Corporation, HGL, and Shaw as well as the ESI data collected by Foster Wheeler in 1995. Analytical parameters included VOCs, semivolatile organic compounds (SVOC), pesticides/polychlorinated biphenyls (PCB), and metals. Selected samples were also analyzed for herbicides and cyanide. The VOC analyses for soil, groundwater, and surface water were conducted by a combination of off-site fixed-based laboratories and an on-site laboratory.

Soil and sediment data were compared to the 2004 EPA Region 9 residential preliminary remediation goals (PRG) (the nomenclature for the PRGs was subsequently revised to regional screening levels [RSL]). Groundwater data were compared to the 2004 EPA Region 9 tap water PRGs and the 2006 maximum contaminant levels (MCL). Surface water data were compared to ambient water quality criteria for human health consumption of water and organisms. Metals and pesticide data were also compared to Fort Gillem-specific background values.

- **Revised Remedial Investigation (North Wind Services, LLC [North Wind]).** North Wind collected soil, groundwater, surface water, and sediment samples from 2013 to 2014 to address GA EPD comments regarding the draft final RI report prepared by HGL and Shaw in 2008. Analytical parameters included VOCs, SVOCs, pesticides/PCBs, and target analyte list (TAL) metals. Soil and sediment samples were also analyzed for hexavalent chromium and calculated trivalent chromium.

The soil and sediment data were compared to residential soil RSLs. Groundwater data were compared to MCLs or to tap water RSLs if an MCL had not been established. Surface water data were compared to Georgia Instream Water Quality Standards or National Ambient Water Quality Standards. Metals and pesticide data were also compared to Fort Gillem-specific background values.

- **Vapor Intrusion Study (Geosyntec Consultants).** In September 2014, the EPA issued a RCRA §7003 Unilateral Administrative Order (Order) to the Army to investigate the potential for VI from groundwater contamination underlying the property surrounding Fort Gillem. The Order required the Army to conduct a survey of all water wells and springs, sampling of any water wells and springs identified by the survey, completion of a VI study, mitigation of contamination discovered by these efforts, and public outreach. The Army conducted a VI study in 2014 and 2015 in the mostly residential, off-post buildings around Fort Gillem, including the residential off-post area south of FTG-09. The VI study evaluated 104 structures associated with the SEBS. The VI study concluded that there were no complete VI pathways for any of the 104 structures associated with the SEBS and that no further action is planned (Geosyntec Consultants, 2016).
- **Remedial Investigation (APTIM).** APTIM conducted an RI from 2015 to 2018 to complete the delineation of the nature and extent of contamination at FTG-09. The RI included the collection of soil, groundwater, surface water, and sediment samples. The analytical parameters included target compound list (TCL) VOCs, TCL SVOCs, TCL pesticides/PCBs, and TAL metals.

The soil and sediment data were compared to industrial and residential RSLs. Groundwater data were compared to tap water RSLs. Surface water data were compared to Georgia Instream Water Quality Standards or National Ambient Water Quality Standards. Metals and pesticide data were also compared to Fort Gillem-specific background values.

- **RI/FS Addendum (HGL-Aptim Applied Science and Technology).** As noted above, the FTG-09 RI began in 2015. Based on preliminary review of new and existing data, IRA (further discussed in Section 2.2) was initiated in 2017 (off-post groundwater) and 2019 (on-post soil and groundwater) to address unacceptable risk from soil and groundwater concurrently with preparation of the RI report. As such, the results of the soil and groundwater remedial actions were not incorporated into the RI report or the FS. However, the remedial action was consistent with alternatives proposed in the FS. Therefore, the RI/FS Addendum summarized the findings and conclusions of the RI conducted from 2015 to 2018, described the remedial action

implemented to address VOC contamination in on-post soil and groundwater and off-post groundwater associated with FTG-09, and described the remedial action alternatives that were evaluated for the FS. The alternative evaluations presented in the addendum included the completed IRAs as a component of the final remedy for FTG-09, where appropriate (APTIM, 2022).

2.2 Cleanup Actions Completed to Date

Remedial actions were conducted at the FTG-09 source area in 2002 and 2009 and from 2017 through 2021. The remedial actions conducted at FTG-09 are discussed below in chronological order.

- **Source Soil Excavation.** The 2002 IRA was implemented to define and address the source area at FTG-09, which consisted of a geophysical survey and soil excavation. The geophysical survey identified an anomaly suggestive of a relatively large amount of buried debris. Excavation of the anomaly included the recovery of approximately 50 steel-jacketed carbon filter canisters and several intact and broken 3-gallon glass jars containing white powder. Laboratory analysis of the carbon filters detected elevated concentrations of trichloroethene (TCE) (270,000 micrograms per kilogram [$\mu\text{g}/\text{kg}$]) and other VOC concentrations greater than 1,000 $\mu\text{g}/\text{kg}$. Laboratory analysis of the powder in the glass jars detected elevated concentrations of 1,1,2,2-tetrachloroethane (TeCA) (maximum concentration of 32,000 $\mu\text{g}/\text{kg}$), carbon tetrachloride, and chloroform at concentrations greater than 1,000 $\mu\text{g}/\text{kg}$.

The excavation of contaminated soil was not completed due to the high concentrations of vapors detected during air monitoring; however, geophysical surveys and additional field investigations indicate all large metal objects have been removed from the source area. The steel-jacketed filter canisters were disposed off post as D040 (TCE-containing) characteristic hazardous waste. The white powder was also disposed off post as nonhazardous waste. Shaw (2003) provides additional details regarding the 2002 IRA.

- **FTG-09 Groundwater Extraction and Treatment System and the Dual-Phase Extraction System.** The 2009 IRA included the installation of two remediation systems at the FTG-09 source area in 2009 to mitigate the off-post migration of VOCs in the groundwater plume and address the remaining on-post VOC concentrations in the soil. The remediation systems consisted of (1) a groundwater extraction and treatment system (GWETS) and (2) a dual-phase extraction (DPE) system. The combined systems included a series of DPE and groundwater extraction wells to reduce off-post migration and extract contaminant mass from the groundwater and vadose zone. Operation of the GWETS and DPE system from 2009 to 2017 removed approximately 5,428 pounds of VOCs from the FTG-09 source area (APTIM, 2017). The GWETS and DPE system ceased operation on September 30, 2017.
- **2017-2021 Groundwater Interim Actions.** The FTG-09 RI was interrupted in order to respond to the 2014 RCRA §7003 UAO involving off-post exposure to VI. The CERCLA RI activities were resumed in 2015. Although the UAO work

concluded there were no VI risks associated with VOCs migrating off post, the resumed RI activities identified the need for additional IRA to address soil and groundwater contamination at FTG-09. Interim actions were implemented from 2017-2021 while the RI was being completed. The interim actions consisted of In Situ Chemical Oxidation for on-post soil and groundwater and Enhanced Bioremediation for off-post groundwater. The remedial activities should have been implemented under a time-critical removal action, in accordance with 40 CFR 300.415(b), however they were implemented under a continuation of the RCRA UAO response. APTIM implemented the interim actions to address on-post soil and groundwater contamination and off-post groundwater contamination associated with FTG-09 as follows:

In situ chemical oxidation was implemented in 2019 as an interim measure for on-post soil and groundwater. Approximately 11,319 gallons of chemical oxidant were injected in 30 locations in three separate treatments that reduced TeCA concentrations in soil below RRS values for direct exposure to soil as well as sourcing to groundwater. In addition, approximately 137,502 gallons of chemical oxidant were injected in 55 locations to treat on-post groundwater. Based on performance monitoring, groundwater concentrations of the primary contaminant TeCA were reduced by 73 to 100 percent.

Enhanced bioremediation was implemented in 2017 as an interim measure for off-post groundwater treatment of VOC contamination. Off-post groundwater enhanced bioremediation activities at FTG-09 included injecting approximately 674,842 gallons of amendment solution (emulsified vegetable oil, a dechlorinating microbial culture, and microbial nutrients) into 115 points at 7 biobarriers. The enhanced bioremediation treatment was effective, as shown by the occurrence of active bioremediation via enhanced reductive dechlorination. The results of the most recent post-injection sampling have shown that the treatment has been effective in reducing concentrations of chemicals of concern (COC) in groundwater. Figures 4 and 5 illustrate the overburden and partially weathered rock groundwater plume footprints for pre-and post-interim action, respectively.

3.0 Site Characteristics

Investigations have been conducted at FTG-09 from 1995 to 2018 to define the nature and extent of contamination. The text that follows summarizes the nature and extent of contamination.

Soil. Surface soil has been minimally impacted by previous site activities. Sporadic detections of SVOCs, PCBs, and metals in surface soil exceeded screening criteria, but the concentrations, frequency of exceedance, and spatial distribution were not indicative of a release or spill.

Based on the in situ chemical oxidation completed in 2020, subsurface soil VOCs concentrations have decreased below residential and industrial RSLs. SVOCs and pesticides were detected in subsurface soil at concentrations below screening criteria. PCBs were not detected in subsurface

soil. Several metals were detected above both screening criteria and background values; however, groundwater monitoring data do not suggest that the soil at FTG-09 is sourcing metals to groundwater.

Groundwater. VOC contamination is present in the overburden, partially weathered rock, and bedrock zones at on and off-post monitoring well locations. VOCs are also present at elevated concentrations in bedrock groundwater north of the FTG-09 source area. Previous investigations identified an on-post source area of VOC contamination in soil that generated a continuous plume of groundwater contamination extending off post into the residential neighborhood south and southeast of Fort Gillem. The most recent groundwater sampling indicated that concentrations of site COCs have decreased significantly.

The primary VOCs detected in groundwater at concentrations above screening criteria include TeCA and TCE. Other VOCs present in groundwater at elevated concentrations include 1,1,2-trichloroethane, 1,2-dichloroethene (DCE), cis-1,2-DCE, trans-1,2-DCE, tetrachloroethene, and vinyl chloride. The groundwater plume extends off post to the south and southeast for approximately 3,000 feet, with areas where concentrations remain above screening criteria. The plumes are bounded in the downgradient direction by nondetects or concentrations below screening criteria. Figures 4 and 5 illustrate the extent of TCE in the overburden groundwater for pre-treatment (2017) and post-treatment (2021) data.

SVOCs and pesticides were detected infrequently in groundwater at concentrations below screening criteria. PCBs were not detected in groundwater. Several metals have been detected in groundwater at concentrations above screening criteria. Manganese and iron exhibited the highest frequencies of detection and exceedance. Potential sources of these two naturally occurring metals in groundwater include the indirect effect of VOC contamination and the iron and manganese-rich residual soil (overburden), partially weathered rock, and metamorphic bedrock zones where the groundwater samples were collected.

Surface Water. Surface water has been impacted by TeCA and TCE where contaminated groundwater discharges to an unnamed creek off post. The TeCA and TCE concentrations decrease downstream and downgradient of the groundwater plume boundaries. One SVOC detected in 2013 exceeded screening criteria. SVOCs in surface water samples collected before and after 2013 were either nondetect or below screening criteria. Pesticide concentrations detected in surface water were below screening criteria. PCBs have not been detected in surface water. Sporadic and infrequent detections of arsenic, manganese, and selenium exceeded screening criteria.

Sediment. VOCs were not detected in sediment at concentrations above screening criteria. Pesticides were not detected in sediment. Benzo(a)pyrene and Aroclor 1260 were detected in one sediment sample each at concentrations exceeding screening criteria; the remainder of the SVOC and PCB concentrations in sediment were either nondetect or below screening criteria. Arsenic and manganese were detected infrequently at concentrations above screening criteria.

4.0 Scope and Role of Response Actions

This PP is for the Installation Restoration Program site FTG-09 at the former Fort Gillem and includes both the on-post footprint of the site and the off-post area of the plume. Soil, groundwater, surface water, and sediment samples were collected during investigations conducted at FTG-09 from 1995 to 2018 to define the extent of contamination. Based on VOC concentrations detected in on-post and off-post groundwater above screening criteria, remedial actions were warranted.

5.0 Summary of Site Risks

A risk assessment was conducted for FTG-09 in 2019 that included a baseline human health risk assessment (BHHRA) and a screening-level ecological risk assessment (SLERA).

The BHHRA (40 CFR 300.430[d][4]) concluded that cancer risks for exposure to total soil for the commercial worker and construction worker are below both the GA EPD and EPA screening levels. Cancer risk for exposure to total soil for the hypothetical resident is within the EPA risk management range. Hazard index (HI) estimates from the exposure to total soil for the commercial worker, construction worker, and hypothetical resident do not exceed the threshold level.

Cancer risks for exposure to groundwater for all receptors exceed the GA EPD and EPA screening levels. HI estimates from the exposure to groundwater for all the receptors exceed the threshold level. Cancer risk and HI estimates for the youth recreationist exposed to surface water are below the GA EPD and EPA screening levels.

The results of the SLERA indicated that contaminants of potential ecological concern in surface soil at FTG-09 or potential sediment and surface water contaminants of potential ecological concern in an off-post downgradient stream are unlikely to pose unacceptable risks to ecological receptor communities and/or populations.

6.0 Remedial Action Objectives

Remedial action objectives (RAO) are medium-specific goals for protecting human health and the environment. RAOs provide the basis for the identification, detailed analysis, and selection of remedial alternatives.

The RAOs developed for the protection of human health and the environment consider the following:

- Environmental media to be addressed
- Relevant exposure routes and receptors
- Chemical concentration limits specific to COCs and environmental media, referred to as remedial goals, if any.

The environmental media addressed at FTG-09 included on-post soil and on- and off-post groundwater. The relevant exposure routes were ingestion, inhalation, and dermal contact with contaminated soil and groundwater. Relevant receptors include residential, industrial, and construction receptors. Based on these three criteria, the RAOs for soil and groundwater at FTG-09 included the following:

For human health protection:

- Prevent ingestion, inhalation, and dermal contact groundwater containing COCs above remedial goals (Type 1 residential RRS for off-post groundwater and Type 3 nonresidential RRS for on-post groundwater).

For environmental protection:

- Control migration of the plume in the aquifer.
- Prevent further degradation of the aquifer from contaminated soil.

The COCs for soil and groundwater and their respective Type 1 and Type 3 RRS values were as follows:

Soil

- TeCA - 0.13 milligrams per kilogram. Please note that the Type 1 residential RRS value and the Type 3 nonresidential RRS value for soil are identical.

Groundwater

The COCs for off-post groundwater and their respective Type 1 RRS values were as follows:

- TeCA – 0.8 micrograms per liter (µg/L)
- TCE - 5 µg/L
- cis-1,2-DCE – 70 µg/L
- trans-1,2-DCE – 100 µg/L
- Vinyl chloride – 2 µg/L

The COCs for source area groundwater (on-post) and their respective Type 3 RRS values were as follows:

- TeCA – 3.3 µg/L
- TCE - 5 µg/L
- cis-1,2-DCE – 70 µg/L
- trans-1,2-DCE – 100 µg/L
- Vinyl chloride – 2 µg/L

7.0 Evaluation of Remedial Alternatives

The FTG-09 RI/FS addendum (APTIM, 2022) identified and evaluated potential remedial alternatives for soil and groundwater contamination at the site. Implementation of remedial alternatives was necessary to address detected concentrations of the VOCs in source area (on-post) and on- and off-post groundwater, primarily TeCA and TCE, to protect human health and the environment.

The RI/FS addendum subdivided FTG-09 into three areas for the evaluation of remedial alternatives: Source Area Soil, Source Area Groundwater, and Off-Post Groundwater South of FTG-09. The FS identified potential remedial action technologies for soil and groundwater followed by a screening of the alternatives for detailed analysis. The detailed analysis for each of the three remediation areas included the No Action alternative and two active remedial action alternatives.

The No Action general response action was evaluated for each of the remediation areas as required by the NCP (40 CFR 300.430[e][6]). This alternative provided a comparative baseline against which other alternatives were evaluated. Under this alternative, no additional remedial action is conducted. The contaminants are left in place without implementing any containment, removal, treatment, or other mitigating actions. For the No Action alternative, reductions in groundwater contaminant concentrations is not expected other than those resulting from natural processes. The No Action alternative does not provide for access control actions taken to reduce the potential for contaminant exposure.

The alternatives retained and evaluated in the detailed analysis included:

On-Post (Source Area) Soil

- Alternative 1: No Action – Required by the NCP to be carried forward as a baseline for detailed comparison.
- Alternative 2: Dual-Phase Extraction and Treatment – A process that uses fluid extraction wells to remove liquid and vapor from the soil for treatment by granular activated carbon. The alternative consists of the restart, optimization, and operation of the existing but inactive DPE system and the GWETS.
- Alternative 3: Chemical Oxidation – A process that entails injecting chemical oxidants under pressure into the subsurface to actively destroy contaminants by converting them to innocuous breakdown products. The chemical oxidation injections occurred during the IRAs under the RCRA UAO continuation response. The implemented remedy for on-post soil has reduced the site VOC contamination in soil below levels that allow for UU/UE; therefore, ICs/LUCs and 5-Year Reviews will not be required for on-post soil. This alternative does not consider additional injections.

On-Post (Source Area) Groundwater

- Alternative 1: No Action – Required by the NCP to be carried forward as a baseline for detailed comparison.
- Alternative 2: Groundwater Extraction and Treatment with Monitored Natural Attenuation (MNA) and ICs – A process that uses extraction wells to remove groundwater for treatment by granulated activated carbon. This alternative consists of operation of the existing source area DPE wells and the groundwater extraction wells located south of the source area to mitigate off-post migration of groundwater plume from the source area would be treated by the GWETS.

MNA consists of the implementation of a monitoring program to track natural attenuation processes and their effectiveness in achieving RAOs for a site. Natural attenuation is defined as a variety of physical, chemical, and biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater.

On-post ICs include municipal water supply, deed covenants restricting groundwater use for property transferred from Army control, and groundwater monitoring. On-post groundwater receptors have been provided with municipal water to eliminate potential exposure to contaminated groundwater. Use of groundwater is prohibited on Army-controlled property overlying groundwater with concentrations exceeding federal MCLs through deed covenants at the time of property transfer until RAOs are met. On-post groundwater monitoring will be conducted until RAOs are met. As such, groundwater use restrictions will be described in a post-ROD Remedial Design/Remedial Action Land-Use Control Implementation Plan and finalized prior to transferring property. The Army is responsible for implementing, maintaining, monitoring, and enforcing the ICs, unless the Army transfers these responsibilities to

another party by contract, property transfer agreement, deed, or other legal means. However, the Army shall retain ultimate responsibility for remedy implementation and protectiveness. Thus, the on-post exposure pathway is already mitigated, and the Army will include assessment of this pathway through 5-Year Reviews. The Army will continue to conduct on-post groundwater monitoring until RAOs are met.

- Alternative 3: Chemical Oxidation with MNA and ICs – A process that entails injecting chemical oxidants under pressure into the subsurface to actively destroy contaminants by converting them to innocuous breakdown products. The chemical oxidation injections occurred during the IRAs under the RCRA UAO continuation response. This alternative does not consider additional injections.

Sufficient data from the on-post groundwater performance monitoring have shown that the in situ chemical oxidation injections have decreased contaminant mass and it is anticipated that COC concentrations will continue to decline over time. At one of the three performance monitoring wells, there is a 100 percent reduction of all COCs and a 73 to 100 percent reduction of the primary COC TeCA in all three wells. However, the most recent concentrations of TeCA (980 µg/L) detected in on-post groundwater suggest that it is highly unlikely that groundwater cleanup objectives (reduction of VOC concentrations to meet Type 3 RRS) could be achieved in a reasonable time frame by MNA as a stand-alone remedial alternative.

MNA consists of the implementation of a monitoring program to track natural attenuation processes and their effectiveness in achieving RAOs for a site. Natural attenuation is defined as a variety of physical, chemical, and biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater.

ICs applicable to on-post groundwater use include municipal water supply, deed covenants restricting groundwater use when the Army-controlled property is transferred, and groundwater monitoring to achieve protection of human health and the environment and compliance with all legal requirements. ICs will remain in place until UU/UE conditions are met.

On-post groundwater receptors have been provided with municipal water to eliminate potential exposure to contaminated groundwater. Use of groundwater is prohibited on Army-controlled property overlying groundwater with concentrations exceeding federal MCLs through deed covenants at the time of property transfer until RAOs are met. On-post groundwater monitoring will be conducted until RAOs are met. As such, restrictions prohibiting on-post residential use and groundwater use will be described in a post-ROD Remedial Design/Remedial Action Land-Use Control Implementation Plan and finalized prior to transferring property. The Army is responsible for implementing, maintaining, monitoring, and enforcing the ICs, unless the Army transfers these responsibilities to another party by contract, property transfer agreement, deed, or other legal means. However, the Army shall retain ultimate responsibility for remedy implementation and protectiveness. Thus, the on-post exposure pathway is already mitigated, and the Army will include assessment of

this pathway through 5-Year Reviews. The Army will continue to conduct on-post groundwater monitoring until RAOs are met.

Off-Post Groundwater South of FTG-09

- Alternative 1: No Action – Required by the NCP to be carried forward as a baseline for detailed comparison.
- Alternative 2: MNA and ICs – Implementation of a monitoring program to track natural attenuation processes and their effectiveness in achieving RAOs for a site. Natural attenuation is defined as a variety of physical, chemical, and biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater.

ICs applicable to off-post groundwater downgradient of FTG-09 include verification of the municipal water supply, public education outreach, periodic well surveys, and groundwater monitoring until groundwater concentrations meet federal MCLs. ICs will remain in place until UU/UE conditions are met.

Off-post groundwater receptors have been provided with municipal water to eliminate potential exposure to contaminated groundwater. Public education outreach conducted by the Army has included fact sheets, newspaper advertisements, public meetings, and social media. In addition, the Army has conducted off-post well surveys to assure that there are no off-post withdrawals or use of potentially contaminated groundwater. Thus, the off-post exposure pathway is already mitigated, and the Army will include assessment of this pathway through 5-Year Reviews, community notifications, and periodic consultation with the County Health Department. The Army will continue to conduct off-post groundwater monitoring until RAOs are met.

- Alternative 3: Enhanced Bioremediation with MNA and ICs – A process that accelerates the natural biodegradation process of contaminants by providing amendments, including nutrients, carbon that provides metabolic and hydrogen sources, and contaminant degrading microorganisms that may otherwise be limiting factors in the conversion of organic contaminants to innocuous end products. Amendments are injected into groundwater, often as a series of permeable biobarriers oriented perpendicular to groundwater flow direction. Typical carbon sources injected into the aquifer are commercially available hydrogen release compounds, molasses, sodium lactate, and emulsified vegetable oil. The enhanced bioremediation injections occurred during the IRAs under the RCRA UAO continuation response. This alternative does not consider additional injections.

MNA consists of the implementation of a monitoring program to track natural attenuation processes and their effectiveness in achieving RAOs for a site. Natural attenuation is defined as a variety of physical, chemical, and biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in groundwater.

Sufficient data have been collected to determine that off-post aquifer conditions downgradient of FTG-09 are favorable for MNA, based upon the presence of TeCA and TCE daughter products (cis-1,2-DCE, VC and nontoxic end product ethene) that indicate natural degradation is occurring. However, the most recent concentrations of TeCA (970 µg/L) and TCE (5,200 µg/L) detected in off-post groundwater suggest that it is highly unlikely that groundwater cleanup objectives (reduction of VOC concentrations to meet Type 1 RRS) could be achieved in a reasonable time frame by MNA as a stand-alone remedial alternative.

ICs applicable to off-post groundwater downgradient of FTG-09 included verification of the municipal water supply, public education outreach, periodic well surveys, and groundwater monitoring until groundwater concentrations meet federal MCLs. ICs will remain in place until UU/UE conditions are met.

Off-post groundwater receptors have been provided with municipal water to eliminate potential exposure to contaminated groundwater. Public education outreach conducted by the Army has included fact sheets, newspaper advertisements, public meetings, and social media. In addition, the Army has conducted off-post well surveys to assure that there are no off-post withdrawals or use of potentially contaminated groundwater. Thus, the off-post exposure pathway is already mitigated, and the Army will include assessment of this pathway through 5-Year Reviews, community notifications, and periodic consultation with the County Health Department. The Army will continue to conduct off-post groundwater monitoring until RAOs are met.

The detailed analysis of each of the retained remedial action alternatives was conducted in accordance with *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA, 1988) and the NCP (40 CFR 300.430[e][9]). The detailed analysis phase includes the evaluation of remedial action alternatives against nine criteria. The evaluation criteria are divided into three categories: threshold criteria, primary balancing criteria, and modifying criteria. Threshold criteria (overall protection of human health and compliance with applicable or relevant and appropriate requirements [ARAR]) must be met for an alternative to be viable for selection in the ROD. Primary balancing criteria (long-term effectiveness and permanence; short-term effectiveness; reduction of toxicity, mobility, or volume through treatment; implementability; and cost, including capital, operation and maintenance [O&M], and present value costs) form the basis for comparing alternatives to site-specific conditions. Modifying criteria (state acceptance and community acceptance) will be addressed in the ROD after this PP is completed by incorporating state support agency (GA EPD) review comments and community feedback from the 30-day public comment period.

Table 1 presents the evaluated alternatives for each remediation area, estimated costs, and a summary of the evaluation.

The alternatives selected for each remediation area based on the detailed analysis are as follows:

FTG-09 Remediation Area	Selected Alternative
Source Area Soil	No Action
Source Area Groundwater	Chemical Oxidation with MNA and ICs
Off-Post Groundwater South of FTG-09	Enhanced Bioremediation with MNA and ICs

In conformance with the NCP (40 CFR 300.430(e)(9)(iii)(A)-(I)), seven of the following nine evaluation criteria were used during the detailed analysis. The following text discusses the seven evaluation criteria for the selected alternatives by remediation area.

1. Overall Protection of Human Health and the Environment

- **Source Area Soil:** Three IRAs have been completed to remove and/or treat contaminated soil at FTG-09. Chemical oxidation was implemented and reduced the current and future risk posed to human health and the environments through elimination and reduction of contaminated soil. No further action is required for source area soil. Subsequent soil sampling has demonstrated that no additional contamination above residential cleanup criteria is present in soil at FTG-09; therefore, the No Action alternative is protective of human health and the environment.
- **Source Area Groundwater:** Chemical oxidation reduced current and future risk posed to human health and the environment through elimination and reduction of contaminants in groundwater. Performance monitoring will be implemented to track the progress of the chemical oxidation alternative.
- **Off-Post Groundwater South of FTG-09:** Enhanced bioremediation reduced current and future risk posed to human health and the environments through elimination and reduction of contaminants in groundwater. In addition, it continues to mitigate the potential for further downgradient migration of contaminated groundwater by reducing contaminant volumes and concentrations. Performance monitoring will be implemented to track the progress of the enhanced bioremediation.

2. Compliance with ARARs

- **Source Area Soil:** This criterion is not applicable to the No Action alternative.
- **Source Area Groundwater:** Relevant ARARs will be met under this remedial alternative, as the contaminated groundwater in the target treatment area will be treated and monitored in the short term. Remediation of contaminated groundwater by this alternative will mitigate the potential migration of the plume.
- **Off-Post Groundwater South of FTG-09:** Relevant ARARs will be met under this remedial alternative, as the contaminated groundwater in target treatment areas will

be treated and monitored in the short term. Remediation of contaminated groundwater by this alternative will mitigate the potential migration of the plume.

3. Long-Term Effectiveness and Permanence

- **Source Area Soil:** Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time. This criterion includes the consideration of residual risk that will remain onsite following remediation and the adequacy and reliability of controls. The No Action decision is considered to maintain reliable protection of human health over time because there are no current residual risks that are considered to be unacceptable for the reasonably anticipated uses of the site.
- **Source Area Groundwater:** Chemical oxidation is reliable and effective in protecting human health and the environment in the long term because the oxidative treatment is irreversible. A significant mass of VOCs in groundwater is already remediated and the natural attenuation processes will follow.
- **Off-Post Groundwater South of FTG-09:** Enhanced bioremediation is reliable and effective in protecting human health and the environment in the long term because the biologically mediated treatment also destroys the contaminants and is irreversible. A significant mass of VOCs in groundwater would be remediated and followed by natural attenuation processes.

4. Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community and the environment during construction and operation of the remedy until cleanup levels are achieved.

- **Source Area Soil:** Chemical oxidant injections have already occurred, and therefore there are no limitations for short-term effectiveness. No significant short-term environmental impacts or potential disruption of ecosystems were observed.
- **Source Area Groundwater:** Chemical oxidant injections have already occurred, and therefore there are no limitations for short-term effectiveness. No significant short-term environmental impacts or potential disruption of ecosystems were observed.
- **Off-Post Groundwater South of FTG-09:** The enhanced bioremediation injections have already occurred, and therefore there are no limitations for short-term effectiveness. No significant short-term environmental impacts or potential disruption of ecosystems were observed.

5. Reduction in Toxicity, Mobility, and Volume Through Treatment

- **Source Area Soil:** FTG-09 source area has no remaining contamination in soil that presents an unacceptable risk to human health or the environment for the reasonably anticipated uses of the site or the environment.

- **Source Area Groundwater:** Chemical oxidation has reduced the toxicity, mobility, and volume of contaminated groundwater because the oxidative treatment of VOCs is irreversible, resulting in their destruction.
- **Off-Post Groundwater South of FTG-09:** Enhanced bioremediation has reduced the toxicity, mobility, and volume of contaminated groundwater because biologically mediated treatment of VOCs is irreversible, resulting in their destruction.

6. Implementability

- **Source Area Soil:** The injection portion of chemical oxidation has already been implemented. No significant issues were observed during implementation.
- **Source Area Groundwater:** The injection portion of chemical oxidation has already been implemented. The remainder of this alternative is the MNA and easily implemented.
- **Off-Post Groundwater South of FTG-09:** The injection portion of enhanced bioremediation has already been implemented. The remainder of this alternative is the MNA and easily implemented.

7. Cost, Including Capital, O&M, and Present Value Costs

- **Source Area Soil:** No cost is associated with the No Action alternative.
- **Source Area Groundwater:** The estimated cost of chemical oxidation is \$1,002,000, which is less than a third of cost of Groundwater Extraction and Treatment. Chemical oxidation will destroy the VOCs and reduce the toxicity, mobility, and volume of contaminated groundwater followed by post-treatment monitoring data to track progress. In contrast, the other remedial alternative is estimated to require 10 years of implementation or greater to achieve RAOs.
- **Off-Post Groundwater South of FTG-09:** The estimated cost of enhanced bioremediation is \$1,755,000, which is approximately two-thirds the cost of MNA. It is estimated that implementation of enhanced bioremediation will reach RAOs in approximately 15 years, whereas MNA is estimated to require 30 years or more to achieve RAOs.

The comparative analysis in the RI/FS Addendum used the results of the detailed analysis to select the best overall remedial action alternative for each of the three remediation areas at FTG-09. The selection of the best alternatives depended on effectiveness, time frame to achieve RAOs, and cost.

8.0 Preferred Alternative

The Army's proposed decision includes the following remedial action alternatives for the FTG-09 site:

- Source Area Soil: No Action
- Source Area Groundwater: Chemical Oxidation with MNA and ICs
- Off-Post Groundwater South of FTG-09: Enhanced Bioremediation with MNA and ICs.

Source Area Soil. The Army's proposed decision is No Action for the source area soil. This proposed decision is based on the reasonably anticipated reuse of the site for commercial/industrial purposes. The implemented remedy for on-post soil has reduced site VOC contamination in soil below levels that allow for UU/UE; therefore, ICs/ LUCs and 5-Year Reviews will not be required for on-post soil. The Preferred Alternative can change in response to public comments or new information.

Source Area Groundwater. Chemical oxidation for source area groundwater consisted of three components: first, the injection of chemical oxidants into the aquifer to destroy VOCs in groundwater; second, implementation of a groundwater performance monitoring program in the source area for two years to evaluate the effectiveness of the remedy; and third, monitoring to track post-treatment natural attenuation of VOCs in groundwater outside the treatment area. The injections took place during the initial RI period and are complete.

The injections were completed by using a combination of existing DPE wells, newly installed injection wells, and direct-push technology injection points. The performance monitoring component of the alternative evaluates the effectiveness of the remedy after implementation of amendment injection. The MNA component of the alternative provides five years of data to track post-treatment natural attenuation of VOCs in groundwater. ICs will remain in place until RAOs are achieved and UU/UE conditions are met. ICs for on-post Army-controlled property include municipal water supply, restricting groundwater use through deed covenants, and groundwater monitoring.

As previously noted, an interim action consisting of chemical oxidation was implemented to address VOC groundwater contamination associated with FTG-09 on-post groundwater. This interim action is consistent with the Army's Preferred Alternative. The post-injection performance monitoring conducted from 2018 to 2021 has demonstrated that this approach is effective at reducing groundwater VOC concentrations.

Based on information currently available, the lead agency believes the Preferred Alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The Army expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA §121(b): (1) be protective of human health and the environment, (2) comply with ARARs, (3) be cost-effective, (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable, and (5) satisfy the preference for treatment as a principal element. Because chemicals in groundwater remain at the site above concentrations that allow for UU/UE, a CERCLA § 121(c) review will be conducted every five years until the site contamination reaches concentrations that are safe for UU/UE. The Preferred Remedial Alternative can change in response to public comments or new information.

Off-Post Groundwater South of FTG-09

The enhanced bioremediation alternative consisted of the injection of amendments, including emulsified vegetable oil, a dechlorinating microbial culture, buffer, and microbial nutrients into the aquifer to enhance the biodegradation of VOCs in groundwater. Amendments were injected by direct-push technology creating a series of biobarriers perpendicular to the direction of groundwater flow. The injections took place during the initial RI period and are complete.

The performance monitoring component of the alternative evaluates the effectiveness of the remedy after implementation of amendment injection. The MNA component of the alternative provides five years of data to track post-treatment natural attenuation of VOCs in groundwater. ICs will remain in place until RAOs are achieved and UU/UE conditions are met. ICs for on-post Army-controlled property include municipal water supply, restricting groundwater use through deed covenants and groundwater monitoring. ICs for off-post receptors include verification that municipal water supplies are in place, public education outreach, periodic well surveys to document there are no unauthorized groundwater withdrawals, and groundwater monitoring. Based on an evaluation of FTG-09 groundwater data and field-demonstrated biodegradation rates, it is expected that RAOs will be reached in approximately 15 years.

As previously noted, an interim action consisting of enhanced bioremediation was implemented to address VOC groundwater contamination associated with FTG-09. This interim action is consistent with the Army's Preferred Alternative. The post-injection performance monitoring conducted from 2018 to 2021 has demonstrated that this approach is effective at reducing groundwater VOC concentrations.

Based on information currently available, the lead agency believes the Preferred Alternative meets the threshold criteria and provides the best balance of tradeoffs among the other

alternatives with respect to the balancing and modifying criteria. The Army expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA §121(b): (1) be protective of human health and the environment, (2) comply with ARARs, (3) be cost-effective, (4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable, and (5) satisfy the preference for treatment as a principal element. Because chemicals in groundwater remain at the site above concentrations that allow for UU/UE, a CERCLA § 121(c) review will be conducted every five years until the site contamination reaches concentrations that are safe for UU/UE. The Preferred Remedial Alternative can change in response to public comments or new information.

9.0 Support Agency Comments

The GA EPD has reviewed the results of the historical studies, the RIs, and the FS reports for FTG-09. GA EPD has consulted with the Army concerning the referred Remedial Alternatives selected for the three remediation areas at FTG-09. It is anticipated that GA EPD will concur with the selected Preferred Remedial Alternatives for FTG-09.

10.0 Community Participation

Public participation is an important part of selecting the final remedy. The public is encouraged to submit written comments to the Army within the 30-day public comment period or submit written or oral comments to the Army during the scheduled public meeting. The Army will review all written and oral comments prior to finalizing the remedy selection in the ROD for FTG-09. All public comments and associated responses will be included in the Responsiveness Summary Section of the ROD.

10.1 Administrative Record

This PP for FTG-09 is part of the Fort Gillem administrative record and available for public review on the USACE Savannah's Web site link that will be provided in the *Atlanta Journal-Constitution* prior to the public comment period.

10.2 Public Meeting

The Army will schedule a public meeting, should the public express interest. The public will be notified of the date, time, and location through a notice in the *Atlanta Journal-Constitution*.

10.3 Public Comment Period

The public comment period for the FTG-09 PP will run from February 22, 2023 to March 23, 2023.

Please submit all written comments to Dr. Tom Lineer via e-mail at thomas.a.lineer.civ@army.mil.

Comments received at the public meeting (if scheduled) and during the comment period will be considered in the selection of the final remedy. These comments will be addressed in the responsiveness summary section of the ROD for FTG-09. If the GA EPD concurs with Preferred Remedial Alternatives selected in the FTG-09 PP, the FTG-09 ROD will document the permanent site remedies for FTG-09 on-post soil and on- and off-post groundwater.

Contact for More Information

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Kim.Hembree@dnr.ga.gov

11.0 References

Aptim Federal Services, LLC (APTIM), 2017, *Third Quarter Operations and Maintenance and Discharge Monitoring Report FTG-09 Dual-Phase Extraction and Groundwater Extraction and Treatment System, Fort Gillem, Georgia*, December.

Aptim Federal Services, LLC (APTIM), 2022, *Final Remedial Investigation and Feasibility Study Addendum, FTG-09, Burial Site No. 3, Fort Gillem, Forest Park, Georgia*, September.

Aptim Federal Services, LLC (APTIM), 2021, *Final Feasibility Study Report, FTG-09, Burial Site No. 3, Fort Gillem, Forest Park, Georgia*, March.

Aptim Federal Services, LLC (APTIM), 2020, *Final Proposed Plan, FTG-09, Burial Site No. 3, Fort Gillem, Forest Park, Georgia*, June.

Aptim Federal Services, LLC (APTIM), 2019, *Final Remedial Investigation Report, FTG-09, Burial Site No. 3, Fort Gillem, Forest Park, Georgia*, November.

Geosyntec Consultants, 2016, *Volume I Vapor Intrusion Investigation for the Southeast Burial Sites (SEBS), United States Army Corps of Engineers, Savannah District (USACE), Fort Gillem, Forest Park, Georgia*, March.

Shaw Environmental, Inc. (Shaw), 2003, *Interim Removal Action Progress Report Debris Removal (Geophysical Anomaly A-1), FTG-09, Southeast Burial Sites, Fort Gillem, Clayton County, Georgia*, March.

U.S. Environmental Protection Agency (EPA), 1988, *Guidance for Conduction Remedial Investigations and Feasibility Studies Under CERCLA*, Interim Final, Office of Solid Waste and Emergency Response, Washington, D.C., EPA/540/G-89/004, OSWER Directive 9355.01, October.

TABLE

Table 1

Rationale for Recommended Remedial Action Alternatives
 FTG-09 Remediation Areas
 Fort Gillem, Forest Park, Georgia

FTG-09 Remediation Area	Evaluated Alternatives	Total Capital and Present Worth Costs	Evaluation Summary
Source Area Soil	No Action	\$0	Alternative is not protective of human health and the environment. Contaminant sourcing to groundwater would continue.
	Dual-Phase Extraction and Treatment	\$1,706,000	Alternative would remove contaminants extracted from soil, soil vapor, and groundwater. The time frame to reach RAOs is estimated to be approximately five years.
	Chemical Oxidation	\$833,000	Alternative would permanently destroy TeCA in source area soil in an estimated time frame of one year.
Source Area Groundwater	No Action	\$0	Alternative is not be protective of human health and the environment and does not provide a mechanism to reduce contaminant concentrations in groundwater.
	Groundwater Extraction and Treatment with MNA and ICs	\$3,345,000	Based upon the most recent maximum concentrations of TeCA (14,000 µg/L) and TCE (300 µg/L) in source area groundwater, the alternative is estimated to require 10 years or more to reduce VOC concentrations to meet RAOs.
	Chemical Oxidation with MNA and ICs	\$1,002,000	Alternative would permanently destroy VOCs in groundwater in the source area, eliminating further contribution to off-post contamination, in an estimated time frame of one year.
Off-Post Groundwater South of FTG-09	No Action	\$0	Alternative is not protective of human health and the environment and does not provide a mechanism to reduce contaminant concentrations in groundwater.
	Monitored Natural Attenuation	\$2,751,000	Monitored natural attenuation as a stand-alone remedy is unlikely to achieve RAOs in a reasonable time frame. Estimated time frame to achieve RAOs is 30 years or more.
	Enhanced Bioremediation with MNA and ICs	\$1,755,000	Destruction of VOCs in off-post groundwater by enhanced bioremediation will reduce contaminant concentrations to be protective of human health and the environment. The alternative will also include Institutional Controls until RAOs are achieved. Estimated time frame to achieve RAOs is 15 years, based on an evaluation of FTG-09 groundwater data and field demonstrated biodegradation rates.

Bolding indicates the recommended remedial action alternative.

- µg/L - Micrograms per liter.
- RAO - Remedial action objective.
- TCE - Trichloroethene.
- TeCA - 1,1,2,2-Tetrachloroethane.
- VOC - Volatile organic compound.

FIGURES

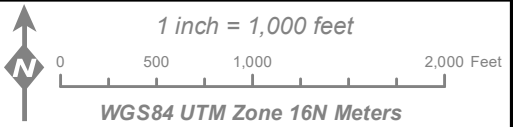


Legend

- Stream
- FTG-09
- Other Environmental Sites
- Economic Development Parcels
- Gillem Enclave
- Fort Gillem Boundary

Figure 1

**FTG-09
Site Location Map**
Fort Gillem
Forest Park, Georgia



HGL **APTIM**
 Joint Venture
ONE TEAM – ONE VISION

Source: Esri, Maxar, Earthstar, GeoEye, IGN, GeoEye, and the USGS

2018 Aerial Photo

FTG-09

S Boundary Rd

Joy Lake

1st St

2nd St

3rd St

4th St

3rd Ave

5th St

4th Ave

5th Ave

Forest Pkwy

6th Ave

Cook Rd

Upton Creek

Carrie Dr

Miranda Dr

Driveway

Victory Blvd

Lacey Ave

Joy Lake Rd

Washington Way

Attucks Blvd

Neal Ave

Bryant

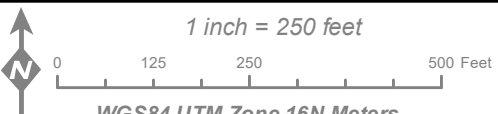
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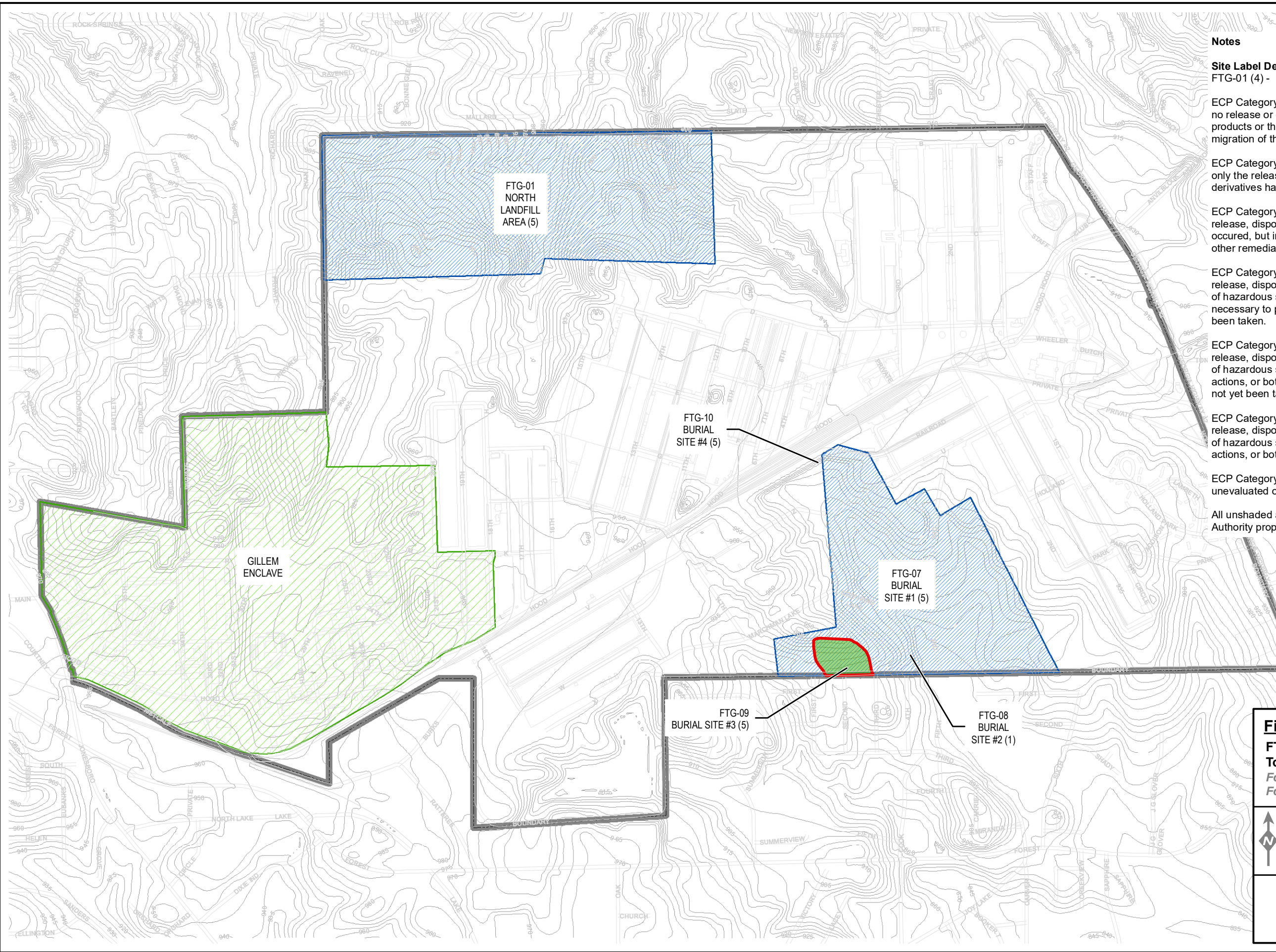
- Surface Water Feature
- Environmental Site Boundary
- Fort Gillem Boundary

Figure 2

FTG-09 Site Map

Fort Gillem Forest Park, Georgia





Notes

Site Label Definition

FTG-01 (4) - Number in parentheses = ECP Category

ECP Category 1 - An area or parcel of real property where no release or disposal of hazardous substances or petroleum products or their derivatives has occurred (including no migration of these substances from adjacent properties).

ECP Category 2 - An area or parcel of real property where only the release or disposal of petroleum products or their derivatives has occurred.

ECP Category 3 - An area or parcel of real property where release, disposal, or migration of hazardous substances has occurred, but in concentrations that do not require removal or other remedial response.

ECP Category 4 - An area or parcel of real property where release, disposal, or migration, or some combination thereof, of hazardous substances has occurred, and all remedial actions necessary to protect human health and the environment have been taken.

ECP Category 5 - An area or parcel of real property where release, disposal, or migration, or some combination thereof, of hazardous substances has occurred and removal or remedial actions, or both, are under way, but all required actions have not yet been taken.

ECP Category 6 - An area or parcel of real property where release, disposal, or migration, or some combination thereof, of hazardous substances has occurred and removal or remedial actions, or both, have not been implemented.

ECP Category 7 - An area or parcel of real property that is unevaluated or requires additional evaluation.

All unshaded area is considered Urban Redevelopment Authority property and is not controlled by the Army.

Legend






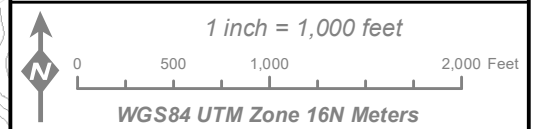
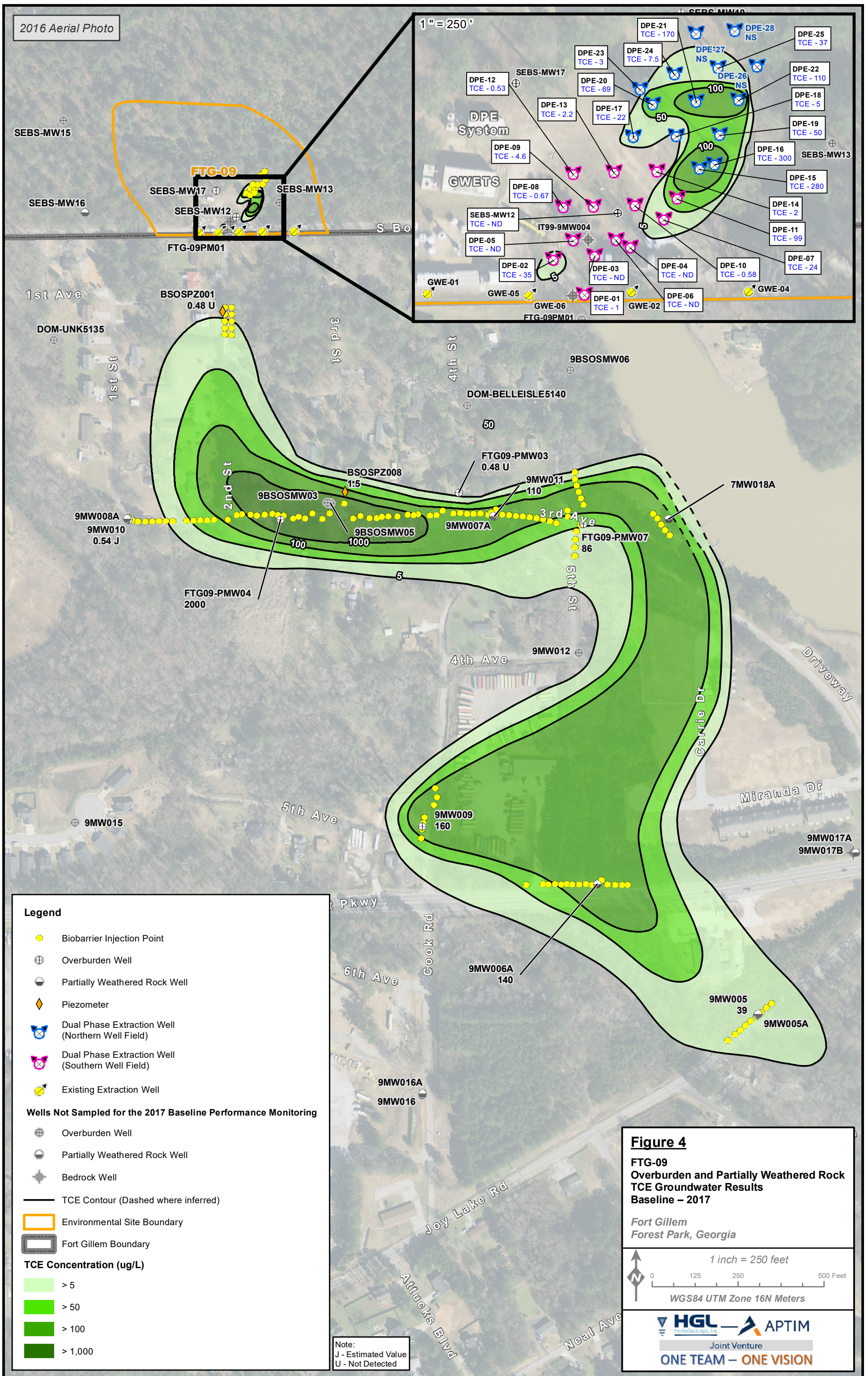
-  FTG-09
-  Elevation Contour (in feet above mean sea level)
-  Gillem Enclave
-  Army-Retained IRP/MMRP Sites
-  Fort Gillem Boundary

Figure 3

**FTG-09
Topographic Map
Fort Gillem
Forest Park, Georgia**





2016 Aerial Photo

1" = 250'

Legend

- Biobarrier Injection Point
- ⊕ Overburden Well
- ⊖ Partially Weathered Rock Well
- ◆ Piezometer
- ⊗ Dual Phase Extraction Well (Northern Well Field)
- ⊗ Dual Phase Extraction Well (Southern Well Field)
- ⊗ Existing Extraction Well

Wells Not Sampled for the 2017 Baseline Performance Monitoring

- ⊕ Overburden Well
- ⊖ Partially Weathered Rock Well
- ⊗ Bedrock Well

— TCE Contour (Dashed where inferred)

▭ Environmental Site Boundary

▭ Fort Gillem Boundary

TCE Concentration (ug/L)

- > 5
- > 50
- > 100
- > 1,000

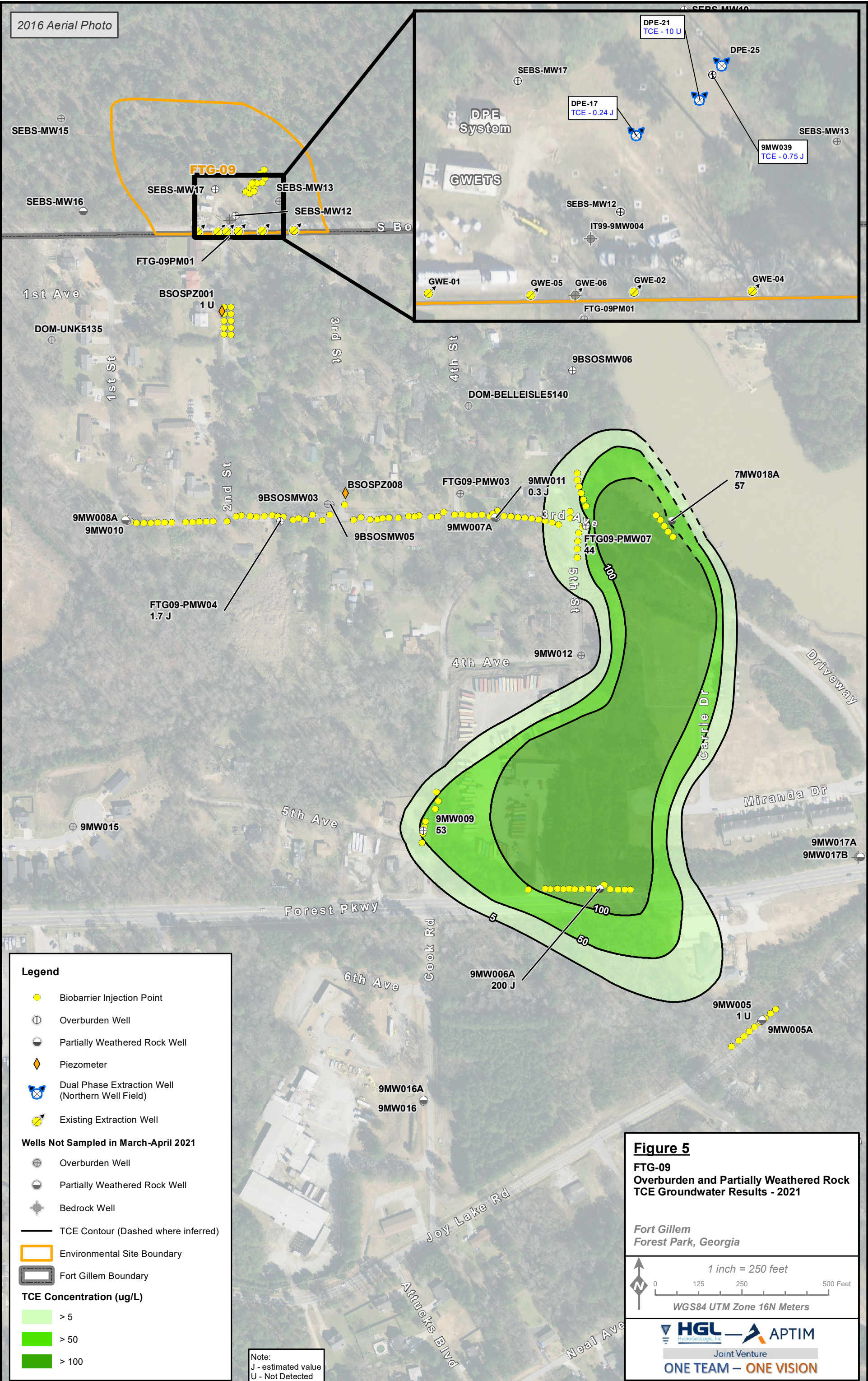
Note:
J - Estimated Value
U - Not Detected

Figure 4

**FTG-09
Overburden and Partially Weathered Rock
TCE Groundwater Results
Baseline - 2017**

Fort Gillem
Forest Park, Georgia





2016 Aerial Photo

Legend

- Biobarrier Injection Point
- ⊕ Overburden Well
- ⊖ Partially Weathered Rock Well
- ◆ Piezometer
- ⊗ Dual Phase Extraction Well (Northern Well Field)
- ⊗ Existing Extraction Well

Wells Not Sampled in March-April 2021

- ⊕ Overburden Well
- ⊖ Partially Weathered Rock Well
- ⊗ Bedrock Well

- TCE Contour (Dashed where inferred)
- Environmental Site Boundary
- Fort Gillem Boundary

TCE Concentration (ug/L)

- > 5
- > 50
- > 100

Note:
J - estimated value
U - Not Detected

Figure 5
FTG-09
Overburden and Partially Weathered Rock
TCE Groundwater Results - 2021

Fort Gillem
 Forest Park, Georgia

1 inch = 250 feet
 0 125 250 500 Feet
 WGS84 UTM Zone 16N Meters

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 HydroGeoLogic, Inc. — Joint Venture
ONE TEAM — ONE VISION