



Engineering of NC INC

an affiliate of **The GEL Group** INC

PRELIMINARY SITE ASSESSMENT REPORT

**10069 NC Hwy. 107
James A. Smith and
Wife Helen C. Smith Property, Parcel 078
Tuckasegee, North Carolina
State Project R-4753
WBS Element #39999.1.1
Jackson County**

North Carolina Department of Transportation
Geotechnical Engineering Unit
1589 Mail Service Center
Raleigh, North Carolina 27699-1589

June 26, 2014

PRELIMINARY SITE ASSESSMENT REPORT

**10069 NC Hwy. 107
James A. Smith and Wife Helen C. Smith Property, Parcel 078
Tuckasegee, North Carolina
State Project R-4753, WBS Element #39999.1.1
Jackson County**

TABLE OF CONTENTS

Section	Subject	Page
Signature Page		ii
Executive Summary.....		iii
1.0	Introduction	1
2.0	Background	1
3.0	Local Geology and Surroundings	2
4.0	Subsurface Investigation	3
	4.1 Geophysical Survey	3
	4.1.1 Ground Penetrating Radar Methodology.....	4
	4.1.2 Time Domain Electromagnetic Methodology	5
	4.1.3 Field Procedures	5
	4.2 Subsurface Soil Investigation	6
5.0	Conclusions and Recommendations.....	8

Figures

- 1 Site Location Map
- 2 Designated Investigation Area for Parcel 053
- 3 Site Map Showing Results of Geophysical Investigation
- 4 Site Map Showing Locations of Soil Borings
- 5 Supplemental Legend for Use with Figures 2, 3, and 4

Tables

- 1 Summary of Analytical Results for Collected Soil Samples

Appendices

- I Photographs
- II Soil Boring Lithologic Logs
- III Certificates of Analysis and Chain of Custody Records for Soil Samples

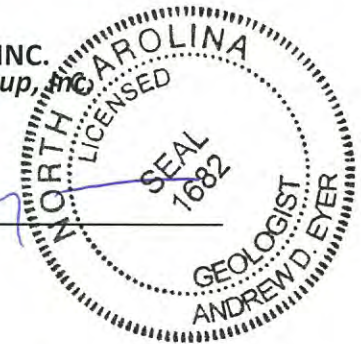
Signature Page

This document, entitled *Preliminary Site Assessment Report*, has been prepared for the James James A. Smith and Wife Helen C. Smith Property (Parcel 078), located at 10069 NC Hwy. 107 in Tuckasegee, North Carolina (State Project R-4753, WBS Element #39999.1.1, Jackson County). It has been prepared by GEL Engineering of NC, Inc. in accordance with the Notice to Proceed provided by the North Carolina Department of Transportation-GeoEnvironmental Section, Geotechnical Engineering Unit for the exclusive use of the North Carolina Department of Transportation. It has been prepared in accordance with accepted quality control practices and has been reviewed by the undersigned.

GEL ENGINEERING OF NC, INC.
an Affiliate of The GEL Group, Inc.



Andrew D. Eyer, L.G.
Senior Project Manager



06-26-14

Date

PRELIMINARY SITE ASSESSMENT REPORT

**10069 NC Hwy. 107
James A. Smith and Wife Helen C. Smith Property, Parcel 078
Tuckasegee, North Carolina
State Project R-4753, WBS Element #39999.1.1
Jackson County**

Executive Summary

The subject site is the James A. Smith and Wife Helen C. Smith property (Parcel 078) located at 10069 NC Hwy. 107 in Tuckasegee, Jackson County, North Carolina. The primary purpose of this investigation was to evaluate the presence or absence of underground storage tanks (USTs) and constituents of concern in soil within the proposed and existing North Carolina Department of Transportation (NCDOT) Rights-of-Way (ROWs) and easements adjacent to Parcel 078 on the east side of NC Hwy. 107 and the north side of Canada Road (NC Hwy. 281), as a result of previous and/or current operations at the subject site.

Parcel 078 is located at the northeast quadrant intersection of NC Hwy. 107 and NC Hwy. 281. A convenience store and a café are located on the property. Four petroleum USTs are located at the site.

The files reviewed at the Asheville Regional Office of the North Carolina Department of Environment and Natural Resources (NCDENR) indicate that the site has been assigned UST Facility ID No. 0-021508 for operation of the four petroleum USTs. NCDENR representatives of the UST Section confirmed that a UST Incident number has ever been assigned to the site. No groundwater monitoring wells were observed at the site.

GEL Engineering of NC, Inc. (GEL) performed a preliminary site assessment within the proposed and existing NCDOT ROWs and easements adjacent to Parcel 078 that included a geophysical investigation, and the collection and analysis of soil samples. Four “Known USTs” were identified within the investigation area and one “Known UST” was identified outside the investigation area. Two ground penetrating radar (GPR) anomalies were identified within the investigation area, but no USTs were encountered when the both areas were penetrated using direct push technology (DPT).

Executive Summary (continued)

Soil samples were collected for analysis from seven borings constructed within the investigation area and analyzed for petroleum hydrocarbon constituents. Diesel range organics (DRO) was not detected in any of the samples. Gasoline range organics (GRO) was detected in two samples, but at levels below the NCDENR action level of 10 milligrams per kilogram (mg/kg) for GRO.

No additional environmental investigation of the soil at the site by NCDOT is recommended at this time.

PRELIMINARY SITE ASSESSMENT REPORT

**10069 NC Hwy. 107
James A. Smith and Wife Helen C. Smith Property, Parcel 078
Tuckasegee, North Carolina
State Project R-4753, WBS Element #39999.1.1
Jackson County**

1.0 Introduction

This document presents the details of a geophysical survey and preliminary site assessment performed within the accessible portions of the existing and proposed North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) and easements on the east side of NC Hwy. 107 and the north side of Canada Road (NC Hwy. 281) at the James A. Smith and Wife Helen C. Smith property (Parcel 078) located at 10069 NC Hwy. 107 in Jackson County, North Carolina.

Parcel 078 is located at the northeast quadrant intersection of NC Hwy. 107 and NC Hwy. 281. A convenience store and a café are located on the property. The convenience store sells petroleum products. Mr. Gary Smith, son of James A. and Helen C. Smith, currently owns and operates the convenience store and café. The site location is shown in Figure 1, an excerpt from the United States Geological Survey (USGS) 7.5-minute quadrangle map of Sylva South and Tuckasegee, North Carolina. The preliminary site assessment (PSA) was conducted by GEL Engineering of NC, Inc. (GEL) in accordance with the Notice to Proceed issued by NCDOT on February 5, 2014.

The primary purpose of this investigation was to evaluate the presence or absence of underground storage tanks (USTs) and/or constituents of concern in soil within accessible portions of the existing and proposed easements and NCDOT ROW fronting Parcel 078 on the east side of NC Hwy. 107 and the north side of NC Hwy. 281 as a result of current and/or former operations.

2.0 Background

NCDOT is planning road improvements to the area in the vicinity of NC Hwy. 107 in Jackson County, North Carolina. NCDOT wanted to assess the area in the existing and proposed ROW and easements on the east side of NC Hwy 107 and north side of NC Hwy. 281 fronting Parcel 078 to evaluate the presence or absence of USTs and soil

GEL Engineering of NC, Inc.
an Affiliate of The GEL Group, Inc.

fc: ncdt01513

contamination related to the current and former on-site operations, and the impact (if any) of these operations on the proposed road improvements. Figures 2 through 4 show the general site layout for Parcel 078.

Parcel 078 is located at the northeast quadrant intersection of NC Hwy. 107 and NC Hwy. 281. A convenience store and a café are located on the property. The convenience store sells petroleum products. Mr. Gary Smith, son of James A. and Helen C. Smith, currently owns and operates the convenience store and café. He stated that there are four operating gasoline USTs located between the pump island and NC Hwy. 107 and one diesel UST located near the southwest corner of the convenience store. Photograph 1 in Appendix I shows the convenience store, café, pump island, and locations of the existing USTs.

The files reviewed at the Asheville Regional Office of the North Carolina Department of Environment and Natural Resources (NCDENR) did not contain any information about Parcel 078. NCDENR representatives of the UST Section confirmed that the site has assigned UST Facility ID No. 0-021508 for operation of the four petroleum USTs. They also confirmed that no UST Incident number has ever been assigned to the site. No groundwater monitoring wells were observed at the site.

3.0 Local Geology and Surroundings

Parcel 078 is located in a sparsely developed area of Jackson County, North Carolina. Surrounding land uses include residential and commercial activities. It is located in an unincorporated area between Cullowhee and Tuckasegee, North Carolina.

This area is located in the Blue Ridge Belt within the Blue Ridge Physiographic of North Carolina. The land surface of the area is characterized by mountainous terrain. The Blue Ridge Belt is typified by a complex of sedimentary, metamorphic, and igneous rocks, including felsic gneiss and granite that are Late Proterozoic in age.

The United States Department of Agriculture's *Web Soil Survey* (2014) (<http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>) maps the native soil in the investigation area as "Statler Loam" (SvB), which is characterized as stream terraces on floodplains and mountainbase consisting of clay loam alluvium. The soils encountered at the site during the preliminary site assessment for Parcel 078 consisted predominantly of red/brown/orange silt with sand and clay, and tan/brown sandy clay.

Groundwater was not encountered in borings constructed as part of the preliminary site assessment. Previous depth to groundwater measurements made in monitoring wells located at sites in the vicinity of Parcel 053 indicate the water table is located at depths of approximately 20 feet below ground surface (bgs). Based on the USGS topographic map presented as Figure 1, the site is located approximately 2150 feet above mean sea level. The topography in Figure 1 indicates that groundwater in the vicinity of Parcel 078 most likely flows in a southwesterly direction towards the Tuckasegee River. Storm water from the site, as well as from adjacent sites surrounding Parcel 053, generally flows in a southwesterly direction to the river.

4.0 Subsurface Investigation

To evaluate the presence or absence of USTs and/or impact to subsurface soil within the accessible portions of the existing and proposed easements and NCDOT ROWs at Parcel 078, GEL performed a limited site assessment within the accessible portions of the highlighted area shown in Figure 2 that consisted of the following tasks:

- Performance of a geophysical investigation to identify the presence or absence of USTs and associated appurtenances within the accessible portions of the existing and proposed easements and ROWs.
- Soil vapor screening of soil samples collected from subsurface soil borings located within the accessible portions of the existing and proposed easements and ROWs to evaluate the potential presence or absence of soil impact from petroleum constituents of concern.
- Collection and laboratory analysis of soil samples from the subsurface borings.

The details of these tasks are discussed in the following sections.

4.1 Geophysical Survey

The geophysical survey included the deployment of ground penetrating radar (GPR) technology and time domain electromagnetic technology (TDEM) to the site. These technologies were used in concert with one another in order to identify subsurface metallic anomalies and, more specifically, to identify the potential presence of USTs within the investigation area. A brief description of each technology is presented in the following paragraphs followed by a discussion of the results of the geophysical investigation.

4.1.1 Ground Penetrating Radar Methodology

A RAMAC digital radar control system configured with a 250 Megahertz (MHz) antenna array was used in this investigation. GPR is an electromagnetic geophysical method that detects interfaces between subsurface materials with differing dielectric constants. The GPR system consists of an antenna that houses the transmitter and receiver, a digital control unit that both generates and digitally records the GPR data, and a color video monitor to view data as they are collected in the field.

The transmitter radiates repetitive short-duration electromagnetic waves (at radar frequencies) into the earth from an antenna moving across the ground surface. These radar waves are reflected back to the receiver from the interface of materials with different dielectric constants. The intensity of the reflected signal is a function of the contrast in the dielectric constant between the materials, the conductivity of the material through which the wave is traveling, and the frequency of the signal. Subsurface features that commonly cause such reflections are: 1) natural geologic conditions, such as changes in sediment composition, bedding, and cementation horizons and voids; or 2) unnatural changes to the subsurface, such as disturbed soils, soil backfill, buried debris, tanks, pipelines, and utilities. The digital control unit processes the signal from the receiver and produces a continuous cross-section of the subsurface interface reflection events.

GPR data profiles are collected along transects, which are measured paths along which the GPR antenna is moved. During a survey, marks are placed in the data by the operator at designated points along the GPR transects or with a survey wheel odometer. These marks allow for a correlation between the GPR data and the position of the GPR antenna on the ground.

Depth of investigation of the GPR signal is highly site-specific and is limited by signal attenuation (absorption) in the subsurface materials. Signal attenuation is dependent on the electrical conductivity of the subsurface materials. Signal attenuation is greatest in materials with relatively high electrical conductivities, such as clays, brackish groundwater, or groundwater with a high dissolved solid content from natural or man-made sources. Signal attenuation is lowest in relatively low-conductivity materials, such as dry sand or rock. Depth of investigation is also dependent on the antenna's transmitting frequency. Depth of investigation generally increases as transmitting

frequency decreases; however, the ability to resolve smaller subsurface features is diminished as frequency is decreased.

The GPR antenna used at this site is internally shielded from aboveground interference sources. Accordingly, the GPR response is not affected by overhead power lines, metallic buildings, or nearby objects.

4.1.2 Time Domain Electromagnetic Methodology

The TDEM methods measure the electrical conductivity of subsurface materials. The conductivity is determined by inducing (from a transmitter) a time or frequency-varying magnetic field and measuring (with a receiver) the amplitude and phase shift of an induced secondary magnetic field. The secondary magnetic field is created by subsurface conductive materials behaving as an inductor as the primary magnetic field is passed through them.

The Geonics EM-61 system used in this investigation operates within these principles. However, the EM-61 TDEM system can discriminate between moderately conductive earth materials and very conductive metallic targets. The EM-61 consists of a portable coincident loop time domain transmitter and receiver with a 0.5-meter by 1.0-meter coil system. The EM-61 generates 150 pulses per second and measures the response from the ground after transmission or between pulses. The secondary EM responses from metallic targets are of longer duration than those created by conductive earth materials. By recording the later time EM arrivals, only the response from metallic targets is measured, rather than the field generated by the earth material.

4.1.3 Field Procedures

The GPR and TDEM field investigation was performed on March 5, 2014, within the accessible portions of the existing and proposed easements and ROWs at Parcel 078, as shown in Figure 3. A GPR system time range setting of 90 nanoseconds (ns) was used during the entire investigation. This range was determined after a series of test lines were conducted to evaluate the GPR response in the local geologic section. Interpretation of the GPR data was conducted in the field and any potential anomalies were marked in the field. GPR data processing typically included band pass filtering, background removal, horizontal smoothing, and gain adjustments. TDEM was also used

to scan the project site. Any electromagnetic anomalies indicative of buried metallic objects were marked in the field.

It should be noted that NC 811 underground utility locations had been performed within the investigation area at Parcel 078 prior to the initiation of the preliminary site assessment field activities at the site and were marked with paint.

The TDEM and GPR data, as well as visual evidence, indicated the presence of four "Known USTs" in the subsurface of the investigation area, as shown in Figures 3 and 4, and in Photograph 1 in Appendix 1. Additionally, there was visual evidence of a "Known UST" outside the investigation area, near the southwestern corner of the convenience store, as shown in Photograph 1 and in Figure 4.

As shown in Figure 3 and in Photograph 3 in Appendix I, two GPR anomalies were identified within the investigation area south of the onsite "Known USTs" adjacent to the pump island. The EM-61 data did not indicate the presence of any metallic objects in the subsurface within either anomaly. Both anomaly areas were penetrated to a depth of 5 feet below ground surface (bgs) using direct push technology (DPT), but no USTs were encountered. The owner of the site also indicated that he knew of no operating or abandoned USTs in vicinity of the two identified anomalies.

Much of EM-61 imagery shown in Figure 3 was in response to metallic features associated with storm water drainage at the site, including area drains and manholes. and a subsurface corrugated metal or RCP storm sewer along the eastern edge of NC Hwy. 107. The area where EM-61 imagery is shown in Figure 3 in the southwestern corner of the site, near the intersection of NC Hwy. 107 and NC Hwy. 281 was penetrated with a DPT probe in several locations. Concrete was encountered at a depth of approximately 2 feet bgs at each probe location.

4.2 Subsurface Soil Investigation

To evaluate the presence or absence of impact to subsurface soil by constituents of concern, GEL collected soil samples from seven subsurface soil borings at Parcel 078, S78-1 through S78-7, on March 5, 2014 for analysis of total petroleum hydrocarbon indicator parameters. The soil borings were constructed within accessible portions of the existing and proposed easements and NCDOT ROWs at Parcel 078, as shown in

Figures 2 and 4, and in Photographs 2 through 5 in Appendix I. The northing and easting coordinates for the boring locations are listed in the table below.

**Summary of Location Data and PID Measurements
for Soil Samples Collected for Analysis at Parcel 078**

Soil Boring	Depth Interval of Soil Sample Collected for Analysis (feet bgs)	PID Reading (ppm)	Northing	Easting
S78-1	3-4	4.0	579069.413	769809.017
S78-2	7-8	0.0	579007.144	769804.013
S78-3	7-8	0.0	578979.716	769827.971
S78-4	7-8	0.0	578931.512	769828.397
S78-5	7-8	0.0	578873.063	769838.120
S78-6	7-8	0.0	578841.687	769883.780
S78-7	7-8	0.0	578837.671	769916.713

Notes:

- 1) Northings and Eastings are based on the NC State Plane Coordinate System
- 2) bgs = below ground surface
- 3) PID = photoionization detector
- 4) ppm = parts per million

All borings were advanced to a total depth of 8 feet below ground surface (bgs). Soil samples were collected at depths of 3-4 feet bgs and 7-8 feet bgs from each borehole. All soil samples were inspected for indications of impact by constituents of concern, including petroleum hydrocarbons, such as odors, discoloration, or visible sheen. This sampling was accomplished using DPT provided by Probe Technology, Inc. Soil boring lithologic logs are attached as Appendix II of this document. Groundwater was not encountered in any borings.

The soil samples were screened for the presence of organic vapors using a portable photoionization detector (PID). The PID measures the concentration of organic compounds in the vapor space above a soil sample resulting from volatilization of organic compounds contained in the soil. To screen the soils, each sample was placed in a clean, resealable polyethylene bag. The bag was sealed, and the sample was allowed to equilibrate for approximately 5 minutes, after which time a small opening was made in the bag. The probe of the PID was then inserted into the bag, and the airspace above the soil was screened for organic vapors.

No organic vapor concentrations were measured in any of the soil screening samples collected from the seven borings except the sample collected from the 3 to 4-foot depth interval in boring S78-1, in which a concentration of 4.0 parts per million (ppm) was measured. Therefore, to assess the subsurface soil quality, soil samples collected from the 7 to 8-foot depth interval from borings S78-2 through S78-7 and from the 3 to 4-foot depth interval in boring S78-1 were designated for analysis.

Following completion of the soil sampling activities, all borings were abandoned by filling the boreholes with soil cuttings and hydrated bentonite. The backfilled material in borings S78-1 through S78-4 was topped off with asphalt patch material. Soil samples collected from the borings were submitted to QROS' analytical laboratory in Wilmington, North Carolina for analysis of petroleum hydrocarbon constituents using Ultra-violet Fluorescence Spectrometry. The analytical results are included on the Certificates of Analysis provided in Appendix III, and a summary of the analytical results is presented in Table 1.

The analytical results indicate that diesel range organics (DRO) was not detected in any of the samples, and gasoline range organics (GRO) was detected in samples S78-1 and S78-3 at levels of 2.2 milligrams per kilogram (mg/kg) and 2.7 mg/kg, respectively. The GRO concentrations detected in both samples are below the NCDENR action level for GRO (10 mg/kg).

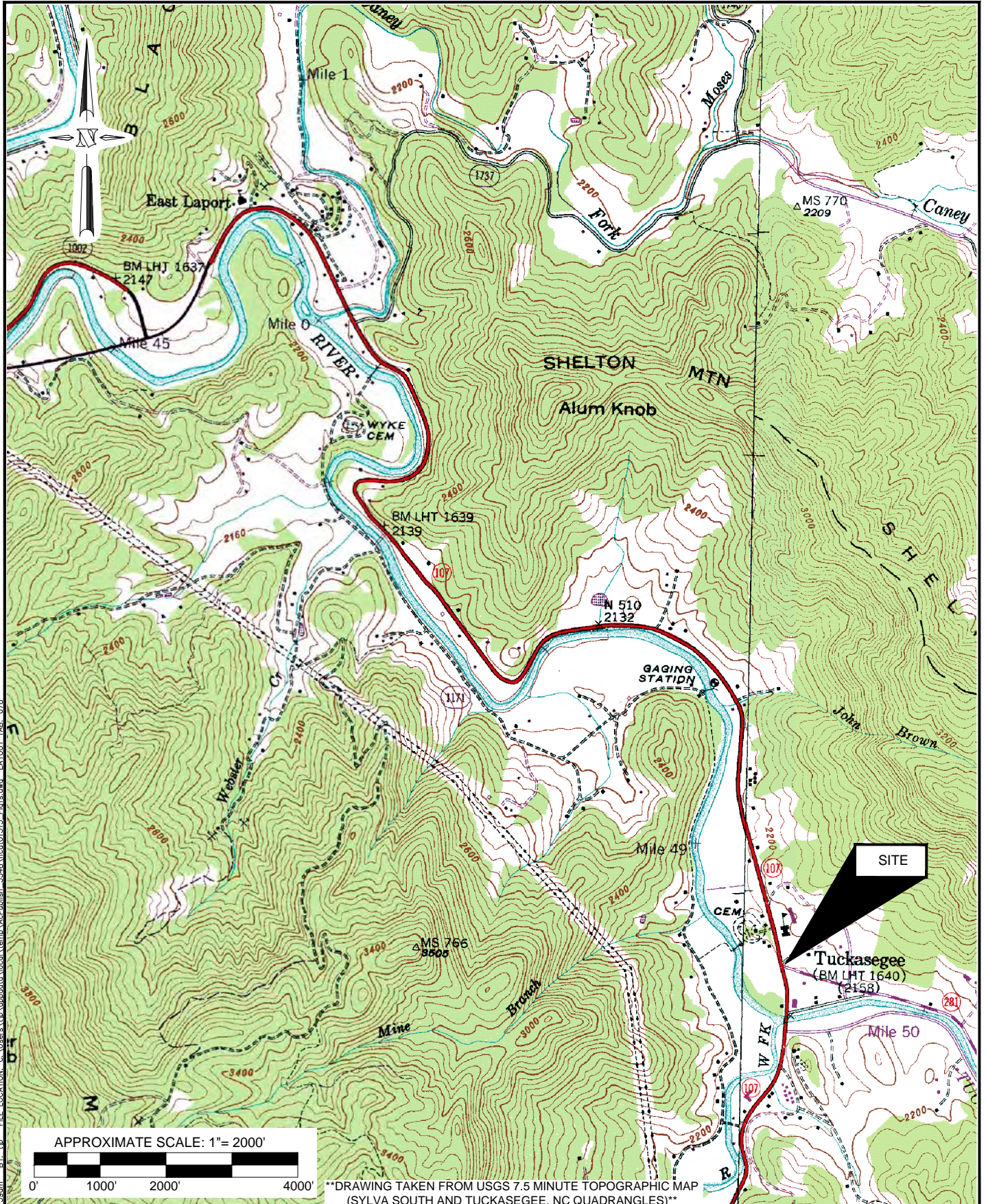
5.0 Conclusions and Recommendations

GEL performed a preliminary site assessment within the accessible portions of the existing and proposed easements and NCDOT ROWs at Parcel 078 that included a geophysical investigation and the collection and analysis of soil samples. Four "Known USTs" were identified within the investigation area and one "Known UST" was identified outside the investigation area. Two GPR anomalies were identified within the investigation area, but no USTs were encountered when the both areas were penetrated using DPT.

Soil samples were collected for analysis from seven borings constructed within the investigation area and analyzed for petroleum hydrocarbon constituents. DRO was not detected in any of the samples. GRO was detected in two samples, but at levels below the NCDENR action level of 10 mg/kg for GRO.

No additional environmental investigation of the soil at the site by NCDOT is recommended at this time.

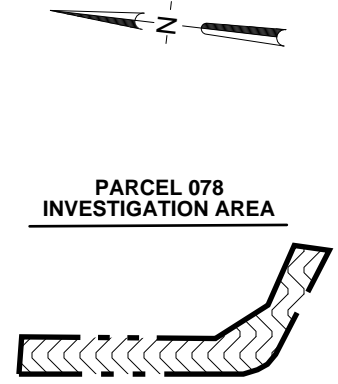
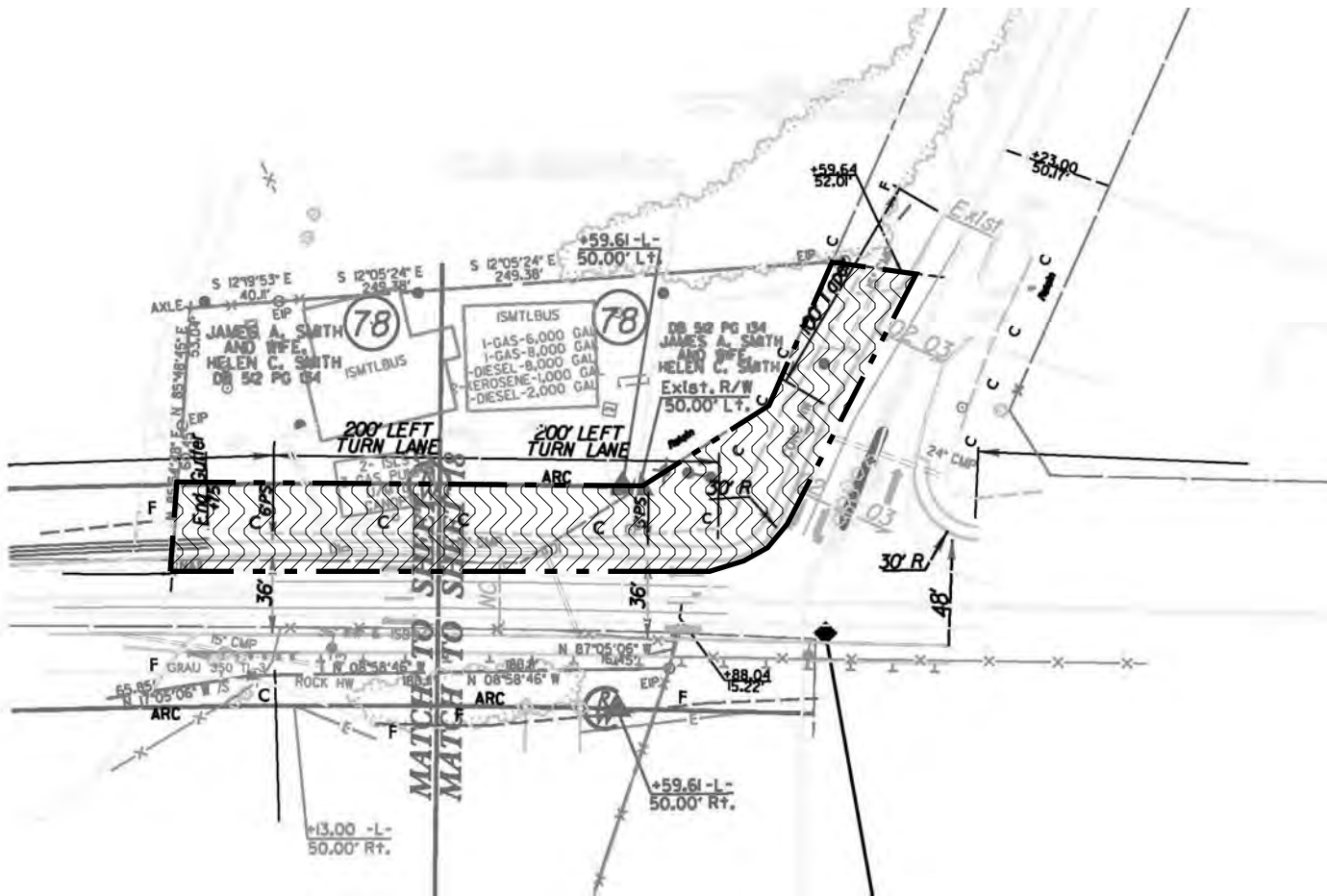
FIGURES



PLOTTED: May 29, 2014 -- 9:59am BY: lrp FILE LOCATION: C:\Users\lhp\AppData\Local\Temp\AcPublish_3548\ncd01513_Fig1.dwg LAYOUT TAB: 078

DRAWING TAKEN FROM USGS 7.5 MINUTE TOPOGRAPHIC MAP (SYLVA SOUTH AND TUCKASEGEE, NC QUADRANGLES)

GEL Engineering of NC Inc. an affiliate of THE GEL GROUP INC ENVIRONMENTAL • ENGINEERING • SURVEYING Post Office Box 14262 Research Triangle Park, NC 27709 P 919.544.1100 F 919.237.9177 www.gel.com	PROJECT: ncd01513	SITE LOCATION MAP	FIGURE 1
	PRELIMINARY SITE ASSESSMENT PARCEL 078 JACKSON COUNTY, NORTH CAROLINA TIP NO. R-4753, WBS ELEMENT NO. 39999.1.1		
problem solved		DRAWN BY: TJP	APPRV. BY: ADE



NO SCALE

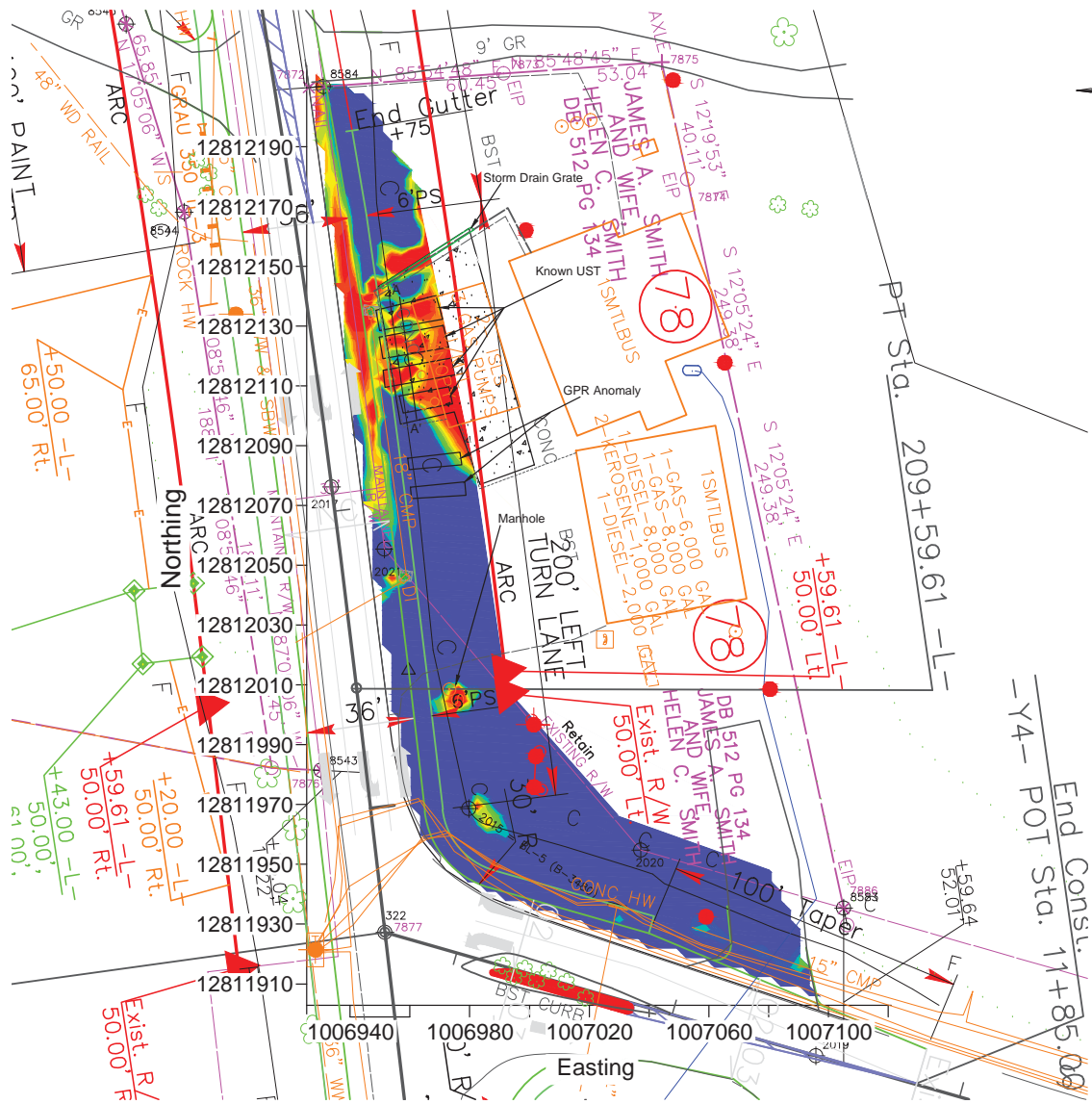
SEE FIGURE 5 FOR
SUPPLEMENTAL LEGEND
FOR USE WITH FIGURE 2

GEL ENGINEERING of NC, Inc.
an Affiliate of THE GEL GROUP, Inc.

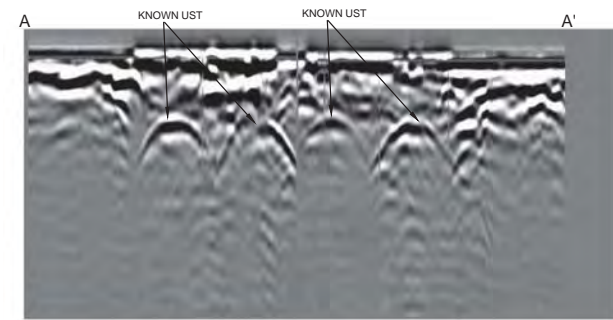


Post Office Box 14262
Research Triangle Park, NC 27709
(919) 544-1100

PROJECT: ncd01513			
PRELIMINARY SITE ASSESSMENTS			
PARCEL 078 JACKSON COUNTY, NORTH CAROLINA TIP NO. R-4753, WBS ELEMENT NO. 39999.1.1	DESIGNATED INVESTIGATION AREA FOR PARCEL 078		FIGURE 2
DATE: May 5, 2014	DRAWN BY: ADE		



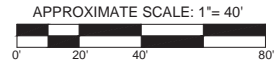
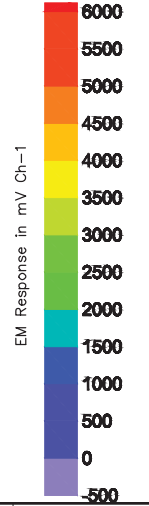
SEE FIGURE 5 FOR SUPPLEMENTAL LEGEND FOR USE WITH FIGURE 3



GPR Data Parcel 78

NOTES:

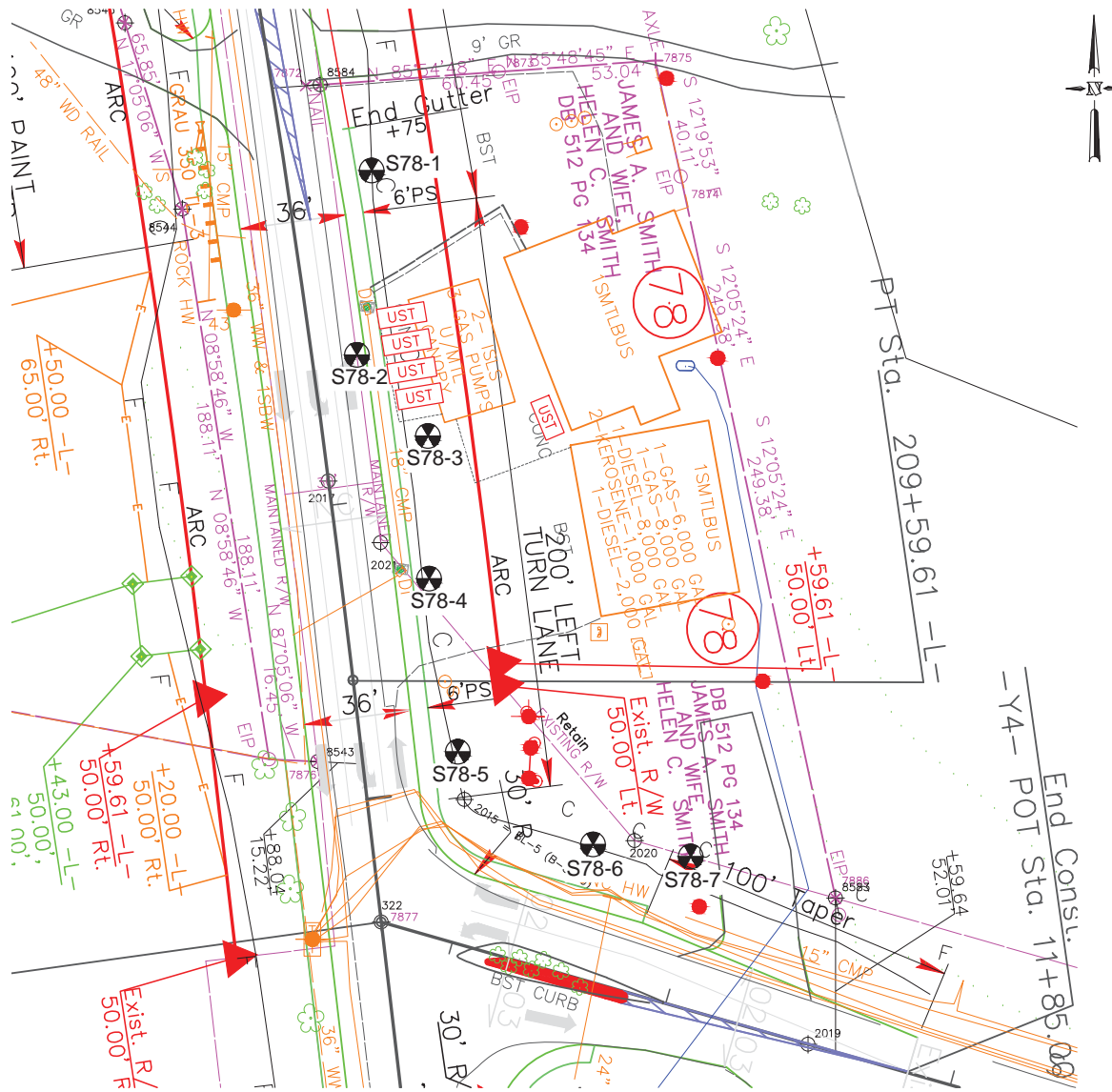
1. UNDERGROUND FEATURES WERE LOCATED USING VISUAL EVIDENCE, GROUND PENETRATING RADAR (GPR), AND TIME DOMAIN ELECTROMAGNETIC (TDEM) METHODS. OTHER BURIED UTILITIES AND STRUCTURES MAY EXIST BUT WERE NOT DETECTED DUE TO LIMITATIONS OF THE GEOPHYSICAL METHODS, SITE ACCESS, AND/OR HIGH TARGET CONGESTION. THEREFORE, DUE CAUTION SHOULD BE USED WHEN PERFORMING SUBSURFACE EXCAVATION ACTIVITIES WHERE POTENTIAL CONFLICTS EXIST. GEL ENGINEERING OF NC, INC. IS NOT RESPONSIBLE FOR DAMAGES THAT MAY OCCUR. IDENTIFYING THE LOCATION OF SOME UTILITIES MAY ONLY BE POSSIBLE WITH VACUUM OR OTHER EXCAVATION METHODS.
2. FIELD SURVEY CONDUCTED ON 3.3.2014 - 3.6.2014.
3. DATA FROM GEONICS, LTD. EM-61 MKII AND MALA GEOSCIENCE GROUND PENETRATING RADAR.
4. BASE MAP PROVIDED BY NCDOT. GEL ENGINEERING OF NC IS NOT LIABLE FOR ACCURACY.



C:\GTECH\Jul_26_2014 - 8:45am - BP - 1p - FILE LOCATION: G:\P\N\ncdot\107101513\ncdot107101513.dwg LAYOUT: Fig. 78-3

GEL Engineering of NC Inc. an Affiliate of THE GEL GROUP INC ENVIRONMENTAL ■ ENGINEERING ■ SURVEYING problem solved	Post Office Box 14262 Research Triangle Park, NC 27709 P 919-544-1100 F 919-406-1807 www.gel.com	PROJECT: ncdt01513	SITE MAP SHOWING RESULTS OF GEOPHYSICAL INVESTIGATION	FIGURE 3
		PRELIMINARY SITE ASSESSMENT PARCEL 078 JACKSON COUNTY, NORTH CAROLINA TIP NO. R-4753, WBS ELEMENT NO. 39999.1.1		

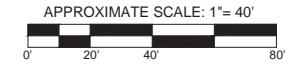
SEE FIGURE 5 FOR SUPPLEMENTAL LEGEND FOR USE WITH FIGURE 4



LEGEND

S78-1 SOIL BORING LOCATION

KNOWN UST



C:\GISTEES_04_23_2014 - 11:10am BH: 14 - FILE LOCATION: G:\NCP\NCP\ncdt01513\ncdt01513.dwg LAYOUT TAB: 78-4

GEL Engineering of NC Inc.

an Affiliate of THE GEL GROUP INC
 ENVIRONMENTAL ■ ENGINEERING ■ SURVEYING

problem solved

Post Office Box 14262
 Research Triangle Park, NC 27709
 P 919-544-1100
 F 919-406-1807
 www.gel.com

PROJECT: ncdt01513	PRELIMINARY SITE ASSESSMENT PARCEL 078 JACKSON COUNTY, NORTH CAROLINA TIP NO. R-4753, WBS ELEMENT NO. 39999.1.1	SITE MAP SHOWING LOCATIONS OF SOIL BORINGS	FIGURE 4
DATE: Jun 16, 2014			

Note: Not to Scale

*S.U.E. = Subsurface Utility Engineering

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL PLAN SHEET SYMBOLS

BOUNDARIES AND PROPERTY:

State Line	—————
County Line	—————
Township Line	—————
City Line	—————
Reservation Line	—————
Property Line	—————
Existing Iron Pin	⊙
Property Corner	⊙
Property Monument	⊙
Parcel/Sequence Number	⊙
Existing Fence Line	—x—x—x—x—
Proposed Woven Wire Fence	—o—o—o—o—
Proposed Chain Link Fence	—o—o—o—o—
Proposed Barbed Wire Fence	—o—o—o—o—
Existing Wetland Boundary	—w—w—w—w—
Proposed Wetland Boundary	—w—w—w—w—
Existing Endangered Animal Boundary	—a—
Existing Endangered Plant Boundary	—p—
Known Soil Contamination: Area or Site	—s—
Potential Soil Contamination: Area or Site	—s—

BUILDINGS AND OTHER CULTURE:

Gas Pump Vent or UG Tank Cap	⊙
Sign	⊙
Well	⊙
Small Mine	⊙
Foundation	⊙
Area Outline	⊙
Cemetery	⊙
Building	⊙
School	⊙
Church	⊙
Dam	⊙

HYDROLOGY:

Stream or Body of Water	—w—w—w—w—
Hydro, Pool or Reservoir	—w—w—w—w—
Jurisdictional Stream	—w—w—w—w—
Buffer Zone 1	—w—w—w—w—
Buffer Zone 2	—w—w—w—w—
Flow Arrow	—w—w—w—w—
Disappearing Stream	—w—w—w—w—
Spring	—w—w—w—w—
Wetland	—w—w—w—w—
Proposed Lateral, Tail, Head Ditch	—w—w—w—w—
False Sump	—w—w—w—w—

RAILROADS:

Standard Gauge	—————
RR Signal Milepost	⊙
Switch	⊙
RR Abandoned	—————
RR Dismantled	—————

RIGHT OF WAY:

Baseline Control Point	⊙
Existing Right of Way Marker	⊙
Existing Right of Way Line	—————
Proposed Right of Way Line	—————
Proposed Right of Way Line with Iron Pin and Cap Marker	⊙
Proposed Right of Way Line with Concrete or Granite RW Marker	⊙
Proposed Control of Access Line with Concrete CA Marker	⊙
Existing Control of Access	⊙
Proposed Control of Access	⊙
Existing Easement Line	—————
Proposed Temporary Construction Easement	—————
Proposed Temporary Drainage Easement	—————
Proposed Permanent Drainage Easement	—————
Proposed Permanent Drainage / Utility Easement	—————
Proposed Permanent Utility Easement	—————
Proposed Temporary Utility Easement	—————
Proposed Aerial Utility Easement	—————
Proposed Permanent Easement with Iron Pin and Cap Marker	⊙

ROADS AND RELATED FEATURES:

Existing Edge of Pavement	—————
Existing Curb	—————
Proposed Slope Stakes Cut	—————
Proposed Slope Stakes Fill	—————
Proposed Curb Ramp	—————
Existing Metal Guardrail	—————
Proposed Guardrail	—————
Existing Cable Guiderail	—————
Proposed Cable Guiderail	—————
Equality Symbol	⊙
Pavement Removal	—————

VEGETATION:

Single Tree	⊙
Single Shrub	⊙
Hedge	—————
Woods Line	—————

Orchard	⊙
Vineyard	⊙

EXISTING STRUCTURES:

MAJOR: Bridge, Tunnel or Box Culvert	—————
Bridge Wing Wall, Head Wall and End Wall	—————
MINOR: Head and End Wall	—————
Pipe Culvert	—————
Footbridge	—————
Drainage Box: Catch Basin, DI or JB	⊙
Paved Ditch Gutter	—————
Storm Sewer Manhole	⊙
Storm Sewer	—————

UTILITIES:

POWER: Existing Power Pole	⊙
Proposed Power Pole	⊙
Existing Joint Use Pole	⊙
Proposed Joint Use Pole	⊙
Power Manhole	⊙
Power Line Tower	⊙
Power Transformer	⊙
UG Power Cable Hand Hole	⊙
H-Frame Pole	⊙
Recorded UG Power Line	—————
Designated UG Power Line (S.U.E.*)	—————

TELEPHONE:

Existing Telephone Pole	⊙
Proposed Telephone Pole	⊙
Telephone Manhole	⊙
Telephone Booth	⊙
Telephone Pedestal	⊙
Telephone Cell Tower	⊙
UG Telephone Cable Hand Hole	⊙
Recorded UG Telephone Cable	—————
Designated UG Telephone Cable (S.U.E.*)	—————
Recorded UG Telephone Conduit	—————
Designated UG Telephone Conduit (S.U.E.*)	—————
Recorded UG Fiber Optics Cable	—————
Designated UG Fiber Optics Cable (S.U.E.*)	—————

WATER:

Water Manhole	⊙
Water Meter	⊙
Water Valve	⊙
Water Hydrant	⊙
Recorded UG Water Line	—————
Designated UG Water Line (S.U.E.*)	—————
Above Ground Water Line	—————

TV:

TV Satellite Dish	⊙
TV Pedestal	⊙
TV Tower	⊙
UG TV Cable Hand Hole	⊙
Recorded UG TV Cable	—————
Designated UG TV Cable (S.U.E.*)	—————
Recorded UG Fiber Optic Cable	—————
Designated UG Fiber Optic Cable (S.U.E.*)	—————

GAS:

Gas Valve	⊙
Gas Meter	⊙
Recorded UG Gas Line	—————
Designated UG Gas Line (S.U.E.*)	—————
Above Ground Gas Line	—————

SANITARY SEWER:

Sanitary Sewer Manhole	⊙
Sanitary Sewer Cleanout	⊙
UG Sanitary Sewer Line	—————
Above Ground Sanitary Sewer	—————
Recorded SS Forced Main Line	—————
Designated SS Forced Main Line (S.U.E.*)	—————

MISCELLANEOUS:

Utility Pole	⊙
Utility Pole with Base	⊙
Utility Located Object	⊙
Utility Traffic Signal Box	⊙
Utility Unknown UG Line	—————
UG Tank; Water, Gas, Oil	⊙
Underground Storage Tank, Approx. Loc.	⊙
AG Tank; Water, Gas, Oil	⊙
Geoenvironmental Boring	⊙
UG Test Hole (S.U.E.*)	⊙
Abandoned According to Utility Records	AATUR
End of Information	E.O.I.

NOTE: LEGEND WAS PROVIDED BY NCDOT

GEL ENGINEERING of NC, Inc.
an affiliate of THE GEL GROUP, Inc.



Post Office Box 14262
Research Triangle Park, NC 27709
(919) 544-1100

PROJECT: ncd01513

PRELIMINARY SITE ASSESSMENT

PARCEL 078
JACKSON COUNTY, NORTH CAROLINA
TIP NO. R-4753, WBS ELEMENT NO. 39999.1.1

DATE: May 6, 2014

SUPPLEMENTAL LEGEND FOR USE
WITH FIGURES 2, 3, AND 4

DRAWN BY: ADE

FIGURE
5

TABLES

TABLE 1
SUMMARY OF ANALYTICAL RESULTS FOR COLLECTED SOIL SAMPLES

Preliminary Site Assessment
Parcel 078, 10069 NC Hwy. 107
Jackson County, North Carolina
State Project No. R-4753, WBS Element #39999.1.1

Sample ID	Diesel Range Organics (DRO)	Gasoline Range Organics (GRO)	BTEX (C6-C9)	TPH (C5-C35)	Total Aromatics (C10-C35)	16 EPA PAHs	Benzo(a)pyrene
S78-1	<0.2	2.2	<0.2	2.2	2.1	0.14	<0.01
S78-2	<0.1	<0.3	<0.1	<0.7	<0.1	<0.1	<0.01
S78-3	<0.2	2.7	<0.2	2.7	2.1	0.13	<0.01
S78-4	<0.2	<0.4	<0.2	<0.4	0.03	<0.1	<0.01
S78-5	<0.1	<0.3	<0.1	<0.3	<0.1	<0.1	<0.01
S78-6	<0.1	<0.4	<0.1	<0.7	<0.1	<0.1	<0.01
S78-7	<0.1	<0.3	<0.1	<0.7	<0.1	<0.1	<0.01
NCDENR Action Level	10	10					
NCDENR MSCC							0.088

Notes:

- 1) All reported values are shown in milligrams per kilogram (mg/kg).
- 2) MSCC = NCDENR's Maximum Soil Contaminant Concentration Levels (April 2012); MSCC shown is the lowest of established Residential Soil Cleanup Levels and Soil-to Groundwater Maximum Contaminant Concentration shown in the NCDENR MSCC Table for any given constituent.
- 3) Reported values exceeding corresponding NCDENR Action Levels or MSCCs are highlighted in yellow.

APPENDICES

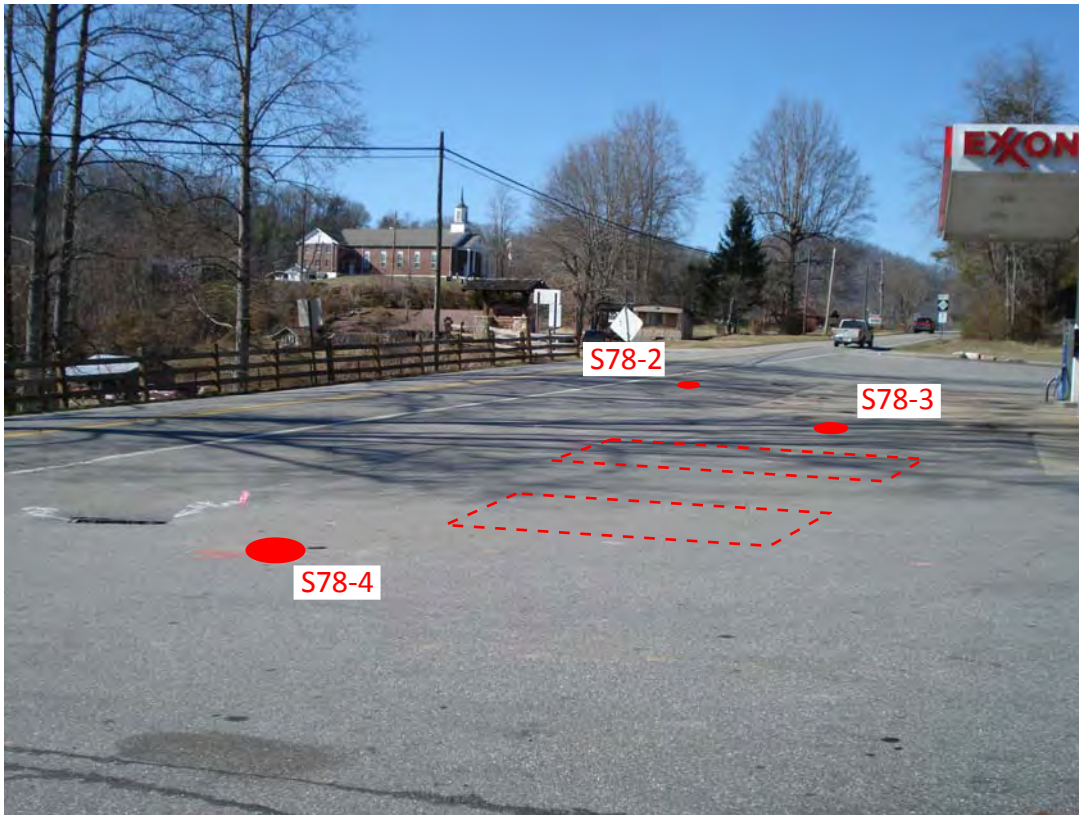
APPENDIX I
PHOTOGRAPHS



Photograph 1: View looking south at “Known USTs.” Onsite café (Café 107) is shown in the background.



Photograph 2: View looking south at locations of soil boring locations S78-1 and S78-2.



Photograph 3: View looking northwest at locations of soil borings S78-2, S78-3 and S78-4, and two GPR anomalies (red dashed rectangles).



Photograph 4: View looking north at location of soil boring S78-5.



Photograph 5: View looking west at soil boring locations S78-6 and S78-7. Canada Road (NC Hwy. 281) is shown on the left.

APPENDIX II

SOIL BORING LITHOLOGIC LOGS

SOIL BORING LOG

Boring/Well No.: **S78-1**

Date Started: 3/5/14

Date Completed: 3/5/14

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0.0' – 5.0'	--	4.0	Red Brown Silt with Sand & Clay, Damp	ML-CL
2	5.0' – 8.0'	--	0.0	Red Brown, Tan Silt with Sand & Clay, Damp	ML-CL
3					
4				Total depth = 8 feet below land surface	
5					
6					
7					
8					
9					
10					

Notes:

- 1) 5-foot continuous cores using DPT.
- 2) PID readings shown are for discrete samples collected at depth intervals of 3'– 4', and 7'– 8'

SOIL BORING LOG

Boring/Well No.: **S78-2**

Date Started: 3/5/14

Date Completed: 3/5/14

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0.0' – 7.0'	--	0.0	Red Orange Silt with Sand & Clay, Damp	ML-CL
2	7.0' – 8.0'	--	0.0	Tan Gray Clay, Moist	CL
3					
4				Total depth = 8 feet below land surface	
5					
6					
7					
8					
9					
10					

Notes:

- 1) 5-foot continuous cores using DPT.
- 2) PID readings shown are for discrete samples collected at depth intervals of 3'– 4', and 7'– 8'

SOIL BORING LOG

Boring/Well No.: **S78-3**

Date Started: 3/5/14

Date Completed: 3/5/14

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0.0' – 5.0'	--	0.0	Red Orange Silt with Sand & Clay, Damp	ML-CL
2	5.0' – 8.0'	--	0.0	Red Orange Silt with Sand & Clay, Damp	ML-CL
3					
4				Total depth = 8 feet below land surface	
5					
6					
7					
8					
9					
10					

Notes:

- 1) 5-foot continuous cores using DPT.
- 2) PID readings shown are for discrete samples collected at depth intervals of 3'– 4', and 7'– 8'

SOIL BORING LOG

Boring/Well No.: **S78-4**

Date Started: 3/5/14

Date Completed: 3/5/14

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0.0' – 5.0'	--	0.0	Red Silt with Sand & Clay, Damp	ML-CL
2	5.0' – 8.0'	--	0.0	Red Orange Silt with Sand & Clay, Damp	ML-CL
3					
4				Total depth = 8 feet below land surface	
5					
6					
7					
8					
9					
10					

Notes:

- 1) 5-foot continuous cores using DPT.
- 2) PID readings shown are for discrete samples collected at depth intervals of 3'– 4', and 7'– 8'

SOIL BORING LOG

Boring/Well No.: **S78-5**

Date Started: 3/5/14

Date Completed: 3/5/14

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0.0' – 3.0'	--	--	Gray Tan Sandy Clay, Moist	CL
2	3.0' – 5.0'	--	0.0	Red Brown Silt with Sand & Clay, Moist	ML-CL
3	5.0' – 8.0'	--	0.0	Brown Sandy, Silty Clay, Moist	CL
4					
5				Total depth = 8 feet below land surface	
6					
7					
8					
9					
10					

Notes:

- 1) 5-foot continuous cores using DPT.
- 2) PID readings shown are for discrete samples collected at depth intervals of 3'– 4', and 7'– 8'

SOIL BORING LOG

Boring/Well No.: **S78-6**

Date Started: 3/5/14

Date Completed: 3/5/14

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0.0' – 5.0'	--	0.0	Gray Tan Sandy Clay, Moist	CL
2	5.0' – 8.0'	--	0.0	Brown Sandy Clay, Moist	CL
3					
4				Total depth = 8 feet below land surface	
5					
6					
7					
8					
9					
10					

Notes:

- 1) 5-foot continuous cores using DPT.
- 2) PID readings shown are for discrete samples collected at depth intervals of 3'– 4', and 7'– 8'

SOIL BORING LOG

Boring/Well No.: **S78-7**

Date Started: 3/5/14

Date Completed: 3/5/14

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0.0' – 5.0'	--	0.0	Brown Sandy Clay, Moist	CL
2	5.0' – 8.0'	--	0.0	Tan, Gray Sandy Clay, Moist	CL
3					
4				Total depth = 8 feet below land surface	
5					
6					
7					
8					
9					
10					

Notes:

- 1) 5-foot continuous cores using DPT.
- 2) PID readings shown are for discrete samples collected at depth intervals of 3'– 4', and 7'– 8'

APPENDIX III

**CERTIFICATES OF ANALYSIS AND
CHAIN OF CUSTODY RECORD FOR SOIL SAMPLES**

QROS, LLC Results



Hydrocarbon Analysis Results

Client: GEL Engineering
Address: Durham, NC

Samples taken Wednesday, March 5, 2014
Samples extracted Wednesday, March 5, 2014
Samples analysed Thursday, March 6, 2014

Contact: Andrew Eyer

Operator Rachel Menoher

Project: NC DTO 1513

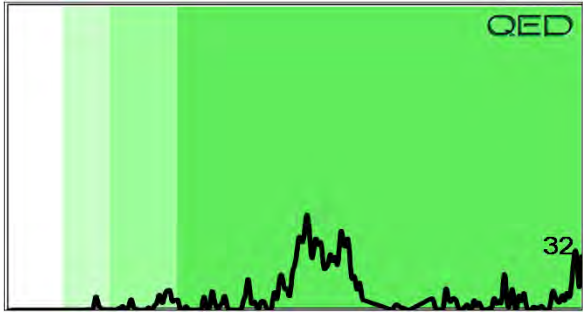
Hydrocarbon Analysis Results											Ratios			HC Fingerprint Match
Matrix	Sample ID	Dilution used	BTEX (C6 - C9)	GRO (C5 - C10)	DRO (C10 - C35)	TPH (C5 - C35)	Total Aromatics (C10-C35)	16 EPA PAHs	BaP	% light	% mid	% heavy		
s	S53-1	16.0	<0.2	<0.2	<0.4	<0.8	<0.1	<0.1	<0.01	0	0	100	TPH not detected	
s	S53-2	14.0	<0.1	<0.1	69.7	69.7	66.3	<0.1	<0.01	17.4	67.9	14.6	PAH (PFM)	
s	S53.3	15.0	<0.2	<0.2	1.1	1.1	0.23	0.02	<0.01	65.7	28.9	5.4	Deg.Fuel (FCM) (P) 83.9%	
s	S71-3	14.0	<0.1	<0.1	<0.4	<0.7	<0.1	<0.1	<0.01	0	0	100	TPH not detected	
s	S69-1	15.0	<0.2	<0.2	#DIV/0!	#DIV/0!	39	4	0.22	0	0	100	#DIV/0!	
s	S69-2	14.0	<0.1	<0.1	37.5	37.5	35.7	1.9	0.1	0	89.9	10.1	Particulate (PFM) (P)	
s	S69-3	15.0	<0.1	<0.1	3.3	3.3	2.6	0.11	<0.01	44.8	43.9	11.3	V.Deg.PHC 98.5%	
s	S69-4	14.0	<0.1	<0.1	1.7	1.7	1.3	0.09	<0.01	50.9	35.8	13.3	V.Deg.PHC 73.4%	
s	S78-1	18.0	<0.2	<0.2	2.2	2.2	2.1	0.14	<0.01	47.2	33.6	19.3	V.Deg.PHC 96.8%	
s	S78-2	14.0	<0.1	<0.1	<0.3	<0.7	<0.1	<0.1	<0.01	0	0	100	TPH not detected	

Initial Calibrator QC check OK

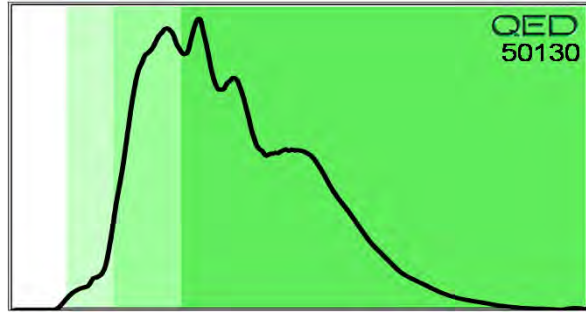
Results generated by a QED HC-1 analyser. Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values are not corrected for moisture or stone content

Fingerprints provide a tentative hydrocarbon identification. The abbreviations are:- FCM = Results calculated using Fundamental Calibration Mode : % = confidence for sample fingerprint match to library (SBS) or (LBS) = Site Specific or Library Background Subtraction applied to result : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate present

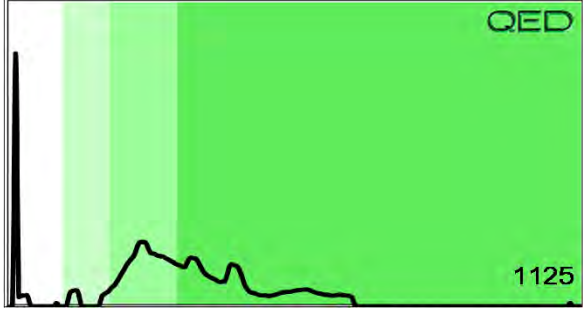
TPH not detected S53-1



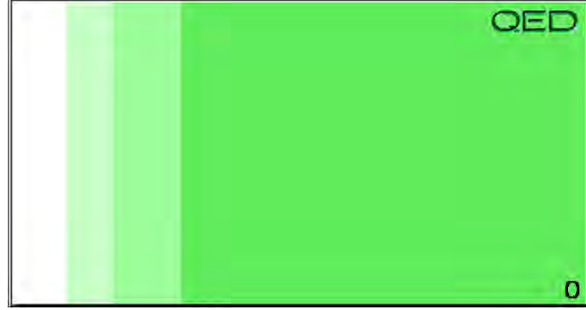
PAH (PFM) S53-2



Deg.Fuel (FCM) (P) 83.9% S53.3



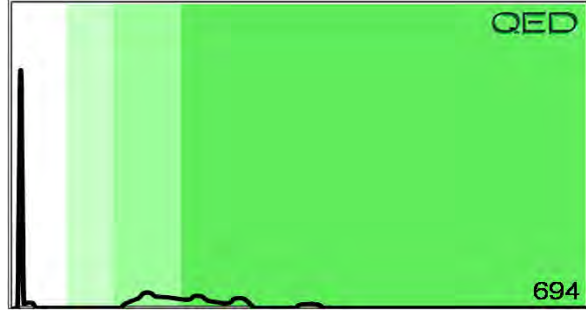
TPH not detected S71-3



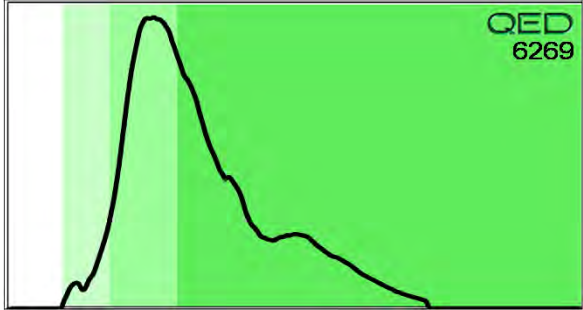
#DIV/0! S69-1



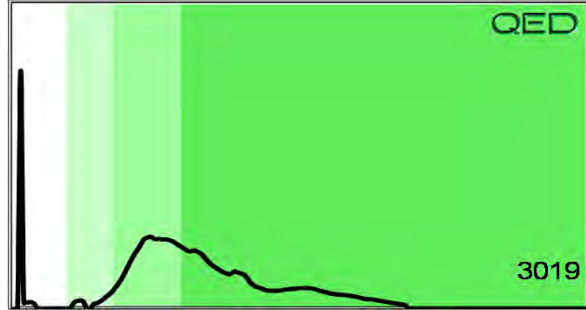
Particulate (PFM) (P) S69-2



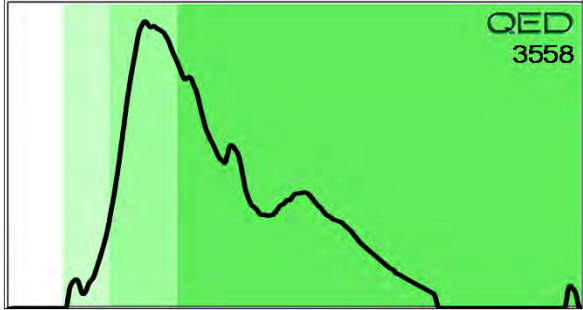
V.Deg.PHC 98.5% S69-3



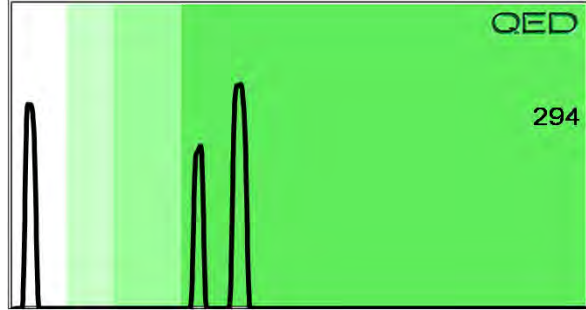
V.Deg.PHC 73.4% S69-4



V.Deg.PHC 96.8% S78-1



TPH not detected S78-2





Hydrocarbon Analysis Results

Client: GEL Engineering
Address: Durham, NC

Samples taken Wednesday, March 5, 2014
Samples extracted Wednesday, March 5, 2014
Samples analysed Thursday, March 6, 2014

Contact: Andrew Eyer

Operator Rachel Menoher

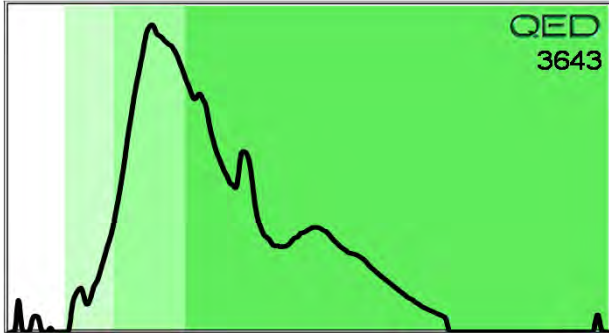
Project: NCDTO 1513

Matrix	Sample ID	Dilution used	BTEX (C6 - C9)	GRO (C5 - C10)	DRO (C10 - C35)	TPH (C5 - C35)	Total Aromatics (C10-C35)	16 EPA PAHs	BaP	Ratios			HC Fingerprint Match	
										% light	% mid	% heavy		
s	S78-3	16.0	<0.2	<0.2	2.7	2.7	2.1	0.13	<0.01	55.3	29.2	15.6	V.Deg.PHC 86.5%	
s	S78-4	17.0	<0.2	<0.2	<0.4	<0.4	0.03	<0.1	<0.01	90.4	9.6	0	Deg.Gas (FCM) (P) 24.6%	
s	S78-5	14.0	<0.1	<0.1	<0.3	<0.3	<0.1	<0.1	<0.01	100	0	0	Deg.Gas (FCM) (P) 27%	
s	S78-6	14.0	<0.1	<0.1	<0.4	<0.7	<0.1	<0.1	<0.01	0	0	100	#DIV/0!	
s	S78-7	14.0	<0.1	<0.1	<0.3	<0.7	<0.1	<0.1	<0.01	0	0	100	#DIV/0!	
s	S13-1	15.0	<0.1	<0.1	<0.4	<0.8	<0.1	<0.1	<0.01	0	0	100	#DIV/0!	
s	S13-2	16.0	<0.2	<0.2	<0.4	<0.4	0.03	<0.1	<0.01	0	0	100	TPH not detected	
s	S13-3	15.0	<0.1	<0.1	<0.4	<0.8	<0.1	<0.1	<0.01	0	0	100	#DIV/0!	
s	S13-4	17.0	0.65	0.65	<0.4	0.65	<0.1	<0.1	<0.01	100	0	0	Deg.Gas (FCM) 29.8%	
s	S13-5	13.0	<0.1	<0.1	6.9	6.9	5.3	0.24	<0.01	36.1	49.3	14.5	V.Deg.PHC 97.3%	

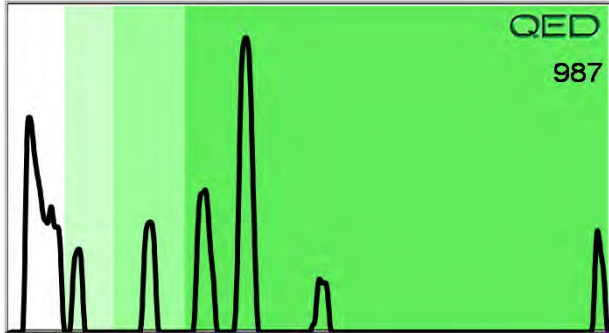
Initial Calibrator QC check OK

Results generated by a QED HC-1 analyser. Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values are not corrected for moisture or stone content
 Fingerprints provide a tentative hydrocarbon identification. The abbreviations are:- FCM = Results calculated using Fundamental Calibration Mode : % = confidence for sample fingerprint match to library
 (SBS) or (LBS) = Site Specific or Library Background Subtraction applied to result : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate present

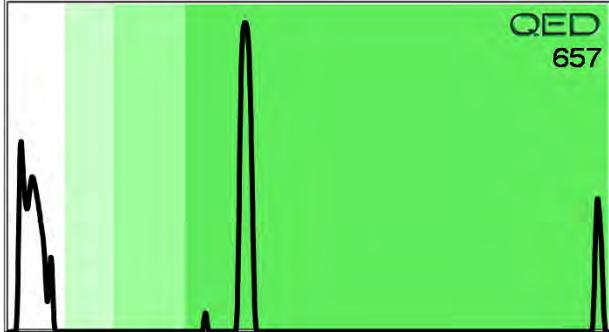
V.Deg.PHC 86.5% S78-3



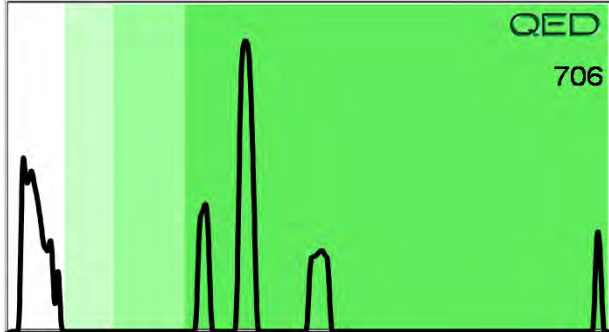
Deg.Gas (FCM) (P) 24.6% S78-4



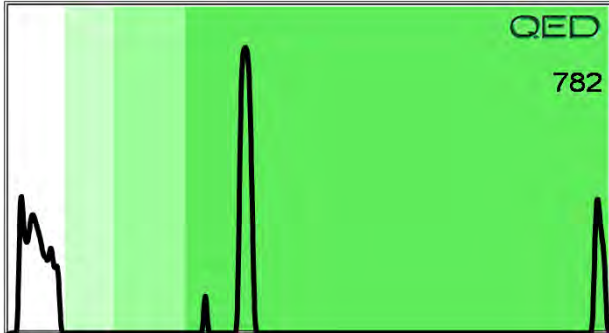
Deg.Gas (FCM) (P) 27% S78-5



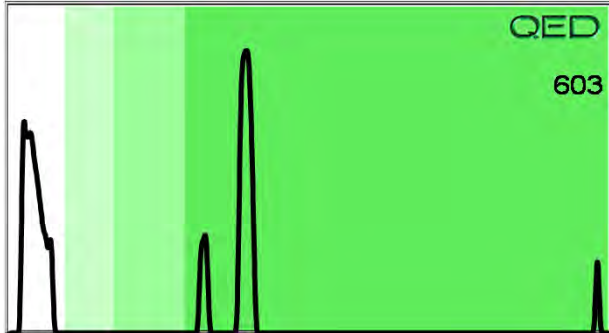
#DIV/0! S78-6



#DIV/0! S78-7



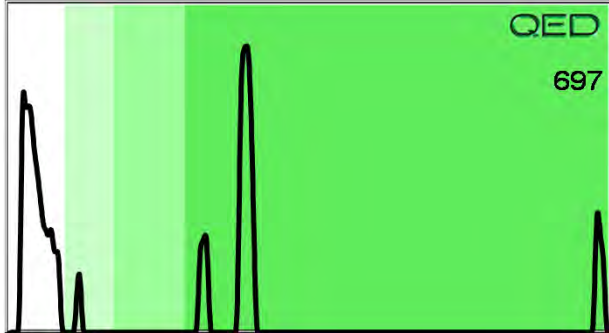
#DIV/0! S13-1



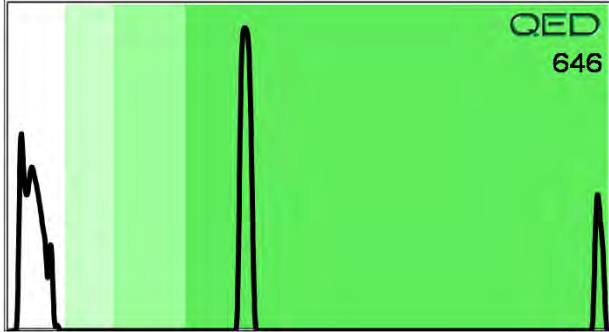
TPH not detected S13-2



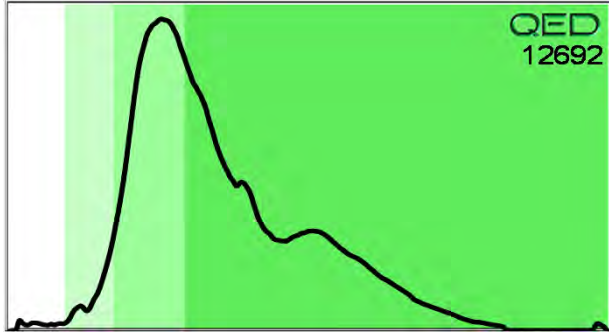
#DIV/0! S13-3



Deg.Gas (FCM) 29.8% S13-4



V.Deg.PHC 97.3% S13-5





Chain of Custody Record and Analytical Request Form

Sample ID	Sample Collection			TAT Requested		
	QED UVF	Date	Time	Initials	24 Hour	48 Hour
578-1		3-5-14	10:43	RSG		✓
578-2		↓	11:00	↓		✓
578-3		↓	11:13	↓		✓
578-4		↓	11:25	↓		✓
578-6		↓	11:57	↓		✓
578-5		↓	12:06	↓		✓
578-7		↓	12:15	↓		✓

Client: GEL

Contact: Andrew Eyer

Phone: (919) 323-8828

Email: ade@gel.com

Project Reference: NCDT01513

Each Sample will be analyzed for total BTEX, GRO, DRO, TPH, and PAH

Each Sample will generate a fingerprint representative of the petroleum product within the sample. Electronic Data will be submitted to the email above.

Relinquished by	Date/time	Accepted by	Date/time
<u>Alt Oliver</u>	<u>3-5-14 13:50</u>	<u>[Signature]</u>	<u>3-6-14 12:30p.m</u>
Relinquished by	Date/time	Accepted by	Date/time
Relinquished by	Date/time	Accepted by	Date/time

SHIP TO: QROS

420 Raleigh Street Suite E

Wilmington, NC 28412