

## **PRELIMINARY SITE ASSESSMENT REPORT**

**SR 1406 (Piney Green Road) from NC 24 to US 17  
2601 Piney Green Road, Parcel #317  
Midway Park, North Carolina  
State Project U-3810  
WBS Element # 35801.1.1  
Onslow County**

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

April 16, 2010

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## Signature Page

This document, entitled "Preliminary Site Assessment Report," has been prepared for Parcel #317, located at 2601 Piney Green Road in Midway Park, North Carolina (State Project U-3810, WBS Element # 35801.1.1, Onslow 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  
*an Affiliate of The GEL Group*



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04-16-10

Date

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### **Executive Summary**

The subject site is Parcel #317, located at 2601 Piney Green Road in Midway Park, North Carolina. The primary purpose of this investigation was to determine the presence or absence of underground storage tanks (USTs) and constituents of concern in soil within the North Carolina Department of Transportation (NCDOT) proposed easterly Right-of-Way (ROW) of Piney Green Road adjacent to Parcel #317. Currently, there is an active convenience store and a pizza restaurant located on Parcel #317. A service station previously operated at the site, and a total of 11 underground storage tanks (USTs) were reportedly removed from the site between 1989 and 2004.

GEL Engineering of NC, Inc. (GEL) performed a preliminary site assessment within the NCDOT proposed easterly ROW of Piney Green Road adjacent to Parcel #317 that included a geophysical survey, and the collection and analysis of soil samples. One subsurface anomaly was identified by EM-61 data during the geophysical investigation, but the anomaly could not be confirmed by ground penetration radar (GPR) data collected over the same area; therefore, this anomaly is considered to be a "Possible" UST. No USTs or other solid objects were encountered when the center of the anomaly was penetrated to a depth of 8 feet bls using direct push technology (DPT).

Soil samples were collected for analysis from 11 borings constructed within the NCDOT proposed easterly ROW of Piney Green Road adjacent to Parcel #317. The soil samples were analyzed for diesel range organics (DRO) and gasoline range organics (GRO). Analytical results for the soil sample collected from boring S5-6 indicated that the detected DRO concentration slightly exceeded the recommended North Carolina Department of Environment and Natural Resources (NCDENR) action level for DRO action level of 10 mg/kg, which is indicative of soil impact. However, analysis of the soil for petroleum hydrocarbon constituents such as VOCs and PAHs would be needed to confirm the soil impact. The total quantity of 21 cubic yards of impacted soil (DRO >10

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### **Executive Summary (continued)**

mg/kg) was estimated for a localized area encompassing soil boring S5-6. In addition, analytical results for soil samples collected from borings S5-7 and S5-8 indicated that the detected GRO and DRO concentrations significantly exceeded the NCDENR recommended GRO and DRO action levels of 10 mg/kg. Therefore, these analytical results are indicative of soil impact. However, analysis of the soil for petroleum hydrocarbon constituents such as VOCs and PAHs would be needed to confirm the soil impact. A total quantity of impacted soil (DRO >10 mg/kg and/or GRO >10 mg/kg) of approximately 1,600 cubic yards was estimated for an area encompassing soil borings S5-7 and S5-8.

Based on the data generated from this investigation, there is no evidence that a significant release(s) of constituents of concern has occurred within the NCDOT proposed ROW at the subject site in the vicinity of boring S5-6. No additional environmental investigation of the site soil in this area is recommended at this time. However, it is recommended that confirmation soil samples be collected and analyzed for petroleum hydrocarbon constituents (including VOCs and PAHs) following any planned excavation in the vicinity of boring S5-6 in order to confirm the presence or absence of soil impact from petroleum hydrocarbons.

Further investigation of the suspected area of soil impact encompassing borings S5-7 and S5-8, as shown in Figure 2, may be warranted to confirm and delineate the area of soil impact. Previous investigations of potential impact to groundwater have apparently been performed, based the presence of groundwater monitoring wells observed at the site. In any case, it is recommended that confirmation soil samples be collected and analyzed for petroleum hydrocarbon constituents (including VOCs and PAHs) following any planned excavation in the vicinity of borings S5-7 and S5-8 in order to confirm the presence or absence of soil impact from petroleum hydrocarbons.

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## **1.0 Introduction**

This document presents the details of a preliminary site assessment performed within the North Carolina Department of Transportation (NCDOT) proposed easterly Right-of-Way (ROW) at to Parcel #317 located at 2601 Piney Green Road in Midway Park, North Carolina. Currently, there is an active convenience store and a pizza restaurant located on Parcel #317. A service station previously operated at the site, and a total of 11 underground storage tanks (USTs) were reportedly removed from the site between 1989 and 2004. The site location is shown on Figure 1, an excerpt from the United States Geological Survey (USGS) 7.5-minute quadrangle map of Camp Lejeune, North Carolina. The preliminary site assessment, which included a geophysical survey, was conducted by GEL Engineering of NC, Inc. (GEL) in accordance with the Notice to Proceed issued by NCDOT on February 9, 2010.

The primary purpose of this investigation was to determine the presence or absence of USTs and on-site constituents of concern in soil within the NCDOT proposed easterly ROW of Piney Green Road at the subject site as a result of current and/or former operations.

## **2.0 Background**

NCDOT is planning road improvements to SR 1406 (Piney Green Road) between NC 24 and US 17 in Onslow County, North Carolina. NCDOT wanted to assess the proposed ROWs adjacent to the site to evaluate the presence or absence of USTs and soil contamination related to the current and/or former on-site operations, and the impact (if any) of these operations on the proposed road improvements. Figures 2 and 3 show the general site layout for Parcel #317 and its location on Piney Green Road, respectively.

## **3.0 Local Geology and Surroundings**

Parcel #317 is in a developed area of Midway Park in Onslow County, North Carolina. Surrounding land uses include residential and commercial activities.

The site is located approximately 1 mile northeast of the center of Midway Park, North Carolina, and approximately 6.5 miles east of the center of Jacksonville, North Carolina. This area is located in the Coastal Plain physiographic province of North Carolina. The land surface of the area is characterized by nearly level, and gently sloping, well drained soils. Coastal Plain geology in the vicinity of the site is characterized by undifferentiated post-Miocene interbedded sand and clay terrace deposits overlain by aqueous and aeolian deposits of marine and non-marine origin (USGS, 1955).

The United States Department of Agriculture's *Soil Survey of Onslow County, North Carolina* (1992) maps the area as Goldsboro-Urban Land Complex (GpB), typically composed of fine sandy loam grading to sandy clay loam with depth. The soils encountered at the site during the preliminary site assessment consisted predominantly of tan/grey/brown clayey, silty sand to depths of 8 feet below land surface (bls).

Based on the moisture content of the subsurface soil encountered during the preliminary site assessment, the water table is located at approximately 7 to 8 feet bls. Based on the USGS topographic map presented as Figure 1, the site is located approximately 38 feet above mean sea level. The topography in Figure 1 indicates that groundwater in the vicinity of Parcel #317 most likely flows in a westerly direction towards Mott Creek.

#### **4.0 Subsurface Investigation**

To determine the presence or absence of USTs and impact to subsurface soil within the NCDOT proposed ROW at Parcel #317, GEL performed a limited site assessment that consisted of the following tasks:

- Performance of a geophysical investigation to identify the presence or absence of USTs and associated appurtenances within the proposed easterly ROW of Piney Green Road adjacent to Parcel #317.
- Soil vapor screening of soil samples collected from subsurface soil borings at Parcel #317 within the proposed easterly ROW of Piney Green Road to determine the potential presence or absence of soil impact from petroleum constituents of concern.
- Collection and laboratory analysis of soil samples from the proposed easterly ROW of Piney Green Road at Parcel #317.

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

#### **4.1 Geophysical Evaluation at Parcel #317**

The geophysical investigation 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 on site. 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 at Parcel #335 on March 3, 2010. The extent of the investigation covers only the proposed ROW indicated by NCDOT. 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. A preliminary interpretation of the GPR data was conducted in the field and potential USTs were marked on the

ground. Following the completion of the fieldwork, the data were post-processed and analyzed in more detail. GPR data processing typically included band pass filtering, background removal, horizontal smoothing, and gain adjustments.

TDEM was also used to scan the project site. Electromagnetic anomalies indicative of buried metallic objects were marked in the field.

It should be noted that “One Call” underground utility locations had been performed within the easterly ROW of Piney Green Road at Parcel #317 prior to the initiation of the preliminary site assessment field activities at the site. Underground utilities were marked by “One Call” within the easterly ROW at Parcel #317.

As shown on Figure 4, EM anomalies indicated the potential presence of USTs. The suspected area is located in under a broken concrete pad in the center of the dirt parking lot. No fill ports or UST lid covers were visible on the surface. GPR data were inconclusive and showed no anomaly in this area; therefore, this anomaly is considered to be a “Possible” UST. Furthermore, the center of the anomaly was penetrated with a 2-inch diameter hydraulic probe to a depth of 8 feet below land surface using direct push technology (DPT) on March 22, 2010. No USTs or other solid objects were encountered.

Upon GEL’s arrival at the site on March 3, 2010, two small rectangular areas outlined with dashed white paint were observed within the NCDOT proposed ROW, approximately 10 to 20 feet east of the pavement of Piney Green Road. The word “UST?” was painted next to each outlined area. Results of the geophysical survey indicated that there were no EM or GPR responses at either area indicating the possible presence of a UST. The center of each of these two outlined areas was also penetrated to a depth of 8 feet bls using direct push technology (DPT) on March 9, 2010, and no USTs or solid objects were encountered in either area.

#### **4.2 Subsurface Soil Investigation at Parcel #317**

To determine the presence or absence of impact to subsurface soil by constituents of concern, GEL collected soil samples from eleven subsurface soil borings, S5-1 through S5-11, at Parcel #317 on March 9, 2010, for analysis of total petroleum hydrocarbon indicator parameters. The soil borings were constructed within the proposed NCDOT easterly ROW of NC 24 and Piney Green Road, as shown on Figure 2 and in the photographs in Appendix III. The longitude and latitude coordinates for the boring locations are listed in the table below.

All borings were advanced to a total depth of 8 feet bls. Soil samples were collected at 3-4 feet and 7-8 feet bls 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 Regional Probing Services of Wake Forest, North Carolina (Regional Probing). Soil boring lithologic logs are attached as Appendix I of this document. No groundwater was encountered during construction of the 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.

To assess the subsurface soil quality, one soil sample was collected from each soil boring at the sampled depth interval with the highest PID reading and submitted for laboratory analysis. The depth intervals and PID measurements of the collected soil samples submitted to the laboratory for analysis are listed below.

**Summary of Location Data and PID Measurements  
for Soil Samples Collected for Analysis at Parcel No. 317**

<b>Soil Boring</b>	<b>Depth Interval of Soil Sample Collected for Analysis (feet bls)</b>	<b>PID Reading (ppm)</b>	<b>Latitude/Longitude (NAD83)</b>
S5-1	3-4	0.7	34°43'30.36"N / 77°19'12.42"W
S5-2	7-8	0.6	34°43'31.20"N / 77°19'12.66"W
S5-3	3-4	0.3	34°43'31.14"N / 77°19'12.06"W
S5-4	3-4	0.6	34°43'31.98"N / 77°19'12.00"W
S5-5	3-4	0.9	34°43'32.58"N / 77°19'12.06"W
S5-6	7-8	0.5	34°43'33.00"N / 77°19'12.06"W
S5-7	7-8	1100	34°43'31.98"N / 77°19'12.84"W
S5-8	7-8	970	34°43'32.58"N / 77°19'13.02"W
S5-9	7-8	8.3	34°43'33.12"N / 77°19'12.90"W
S5-10	7-8	0.5	34°43'33.90"N / 77°19'13.50"W
S5-11	3-4	0.7	34°43'34.32"N / 77°19'13.02"W

Notes:

- 1) Coordinates are based on North American Datum of 1983 (NAD83)
- 2) bls = below land surface
- 3) PID = photoionization detector
- 4) ppm = parts per million

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fc: ncdt00110

Following completion of the soil sampling activities, all borings were abandoned by filling the boreholes with soil cuttings and hydrated bentonite. Soil samples were submitted to SGS Laboratories, Inc. in Wilmington, North Carolina (North Carolina Certification No. 481) for analysis of diesel range organics (DRO) by EPA Method 8015 with EPA Method 3545 sample preparation, and gasoline range organics (GRO) by EPA Method 8015 with EPA Method 5035A/5030B sample preparation. The analytical results are summarized in the following table and are included on the Certificates of Analysis provided in Appendix II.

### Summary of Analytical Results for Soil Samples

Soil Sample	Depth Interval of Soil Sample Collected for Analysis (feet bls)	DRO	GRO
S5-1-4	3-4	BQL	BQL
S5-2-8	7-8	BQL	BQL
S5-3-4	3-4	BQL	BQL
S5-4-4	3-4	BQL	BQL
S5-5-4	3-4	BQL	BQL
S5-6-8	7-8	<b>25.8</b>	BQL
S5-7-8	7-8	<b>269</b>	<b>3790</b>
S5-8-8	7-8	<b>285</b>	<b>1920</b>
S5-9-8	3-4	BQL	BQL
S5-10-8	7-8	BQL	BQL
S5-11-4	3-4	BQL	BQL
<b>NCDENR Action Level</b>		<b>10*</b>	<b>10</b>

Notes:

- 1) BQL = Below Quantitation Limit
- 2) Concentrations shown are in milligram per kilogram (mg/kg).
- 3) **Bold** = detected concentration above the NCDENR action level
- 4) \* = Recommended action level for DRO. Currently the enforced NCDENR action level is 40 mg/kg.

GRO was detected at elevated concentrations in two soil samples collected at the site, S5-7-8 and S5-8-8, and DRO was detected at elevated concentrations in three soil samples: S5-6-8, S5-7-8, and S5-8-8. The DRO concentration detected in S5-6-8, 25.8 milligrams per kilogram (mg/kg), slightly exceeds the recommended North Carolina Department of Environment and Natural Resources (NCDENR) action level for DRO (10 mg/kg). The DRO exceedance in boring S5-6 is most likely the result of incidental minor spills adjacent to boring S5-6 when the site operated as a service station. This boring is

not in the vicinity of the apparent location of the former pump island to the south, and is not in the vicinity of borings S5-7 and S5-8, where more significant soil impact was encountered. Regardless, analysis of the soil from the S5-6 area for petroleum hydrocarbon constituents, including volatile organic compounds (VOCs) and polynuclear aromatic hydrocarbons (PAHs), would be needed to confirm the presence or absence of soil impact.

As shown in the summary table above, elevated levels of GRO and DRO exceeding the NCDENR action levels for DRO and GRO were detected in the soil samples collected from borings S5-7 and S5-8. These borings were in close proximity to each other, as shown in Figure 2. Field observations during the construction of both borings indicated elevated PID readings in the soil (1100 parts per million (ppm) in boring S5-7, and 970 ppm in boring S5-8), and the soil encountered in both borings had a strong petroleum odor. The suspected impact soil impact in the vicinity of borings S5-7 and S5-8 is possibly associated with a release(s) from former onsite USTs or from a former pump island, all of which were reportedly located approximately 55 feet east of the borings. Analysis of the soil for petroleum hydrocarbon constituents, including VOCs and PAHs, would be needed to confirm the presence or absence of soil impact.

It is estimated that there is an approximate total volume of 21 cubic yards of impacted soil (DRO >10 mg/kg) in the vicinity of boring S5-6, based on the following assumed area (as shown on Figure 2) and depth of impacted soil:

- S5-6: 70 sq. feet x 8 feet (assumed depth to water table) = 560 cubic feet = 21 cubic yards

It is estimated that there is an approximate total volume of 1,600 cubic yards of impacted soil (DRO >10 mg/kg and/or GRO >10 mg/kg) in the vicinity of borings S5-7 and S5-8, based on the following assumed area (as shown on Figure 2) and depth of impacted soil:

- S5-7 and S5-8: 5,400 sq. feet x 8 feet (assumed depth to water table) = 43,200 cubic feet = 1,600 cubic yards

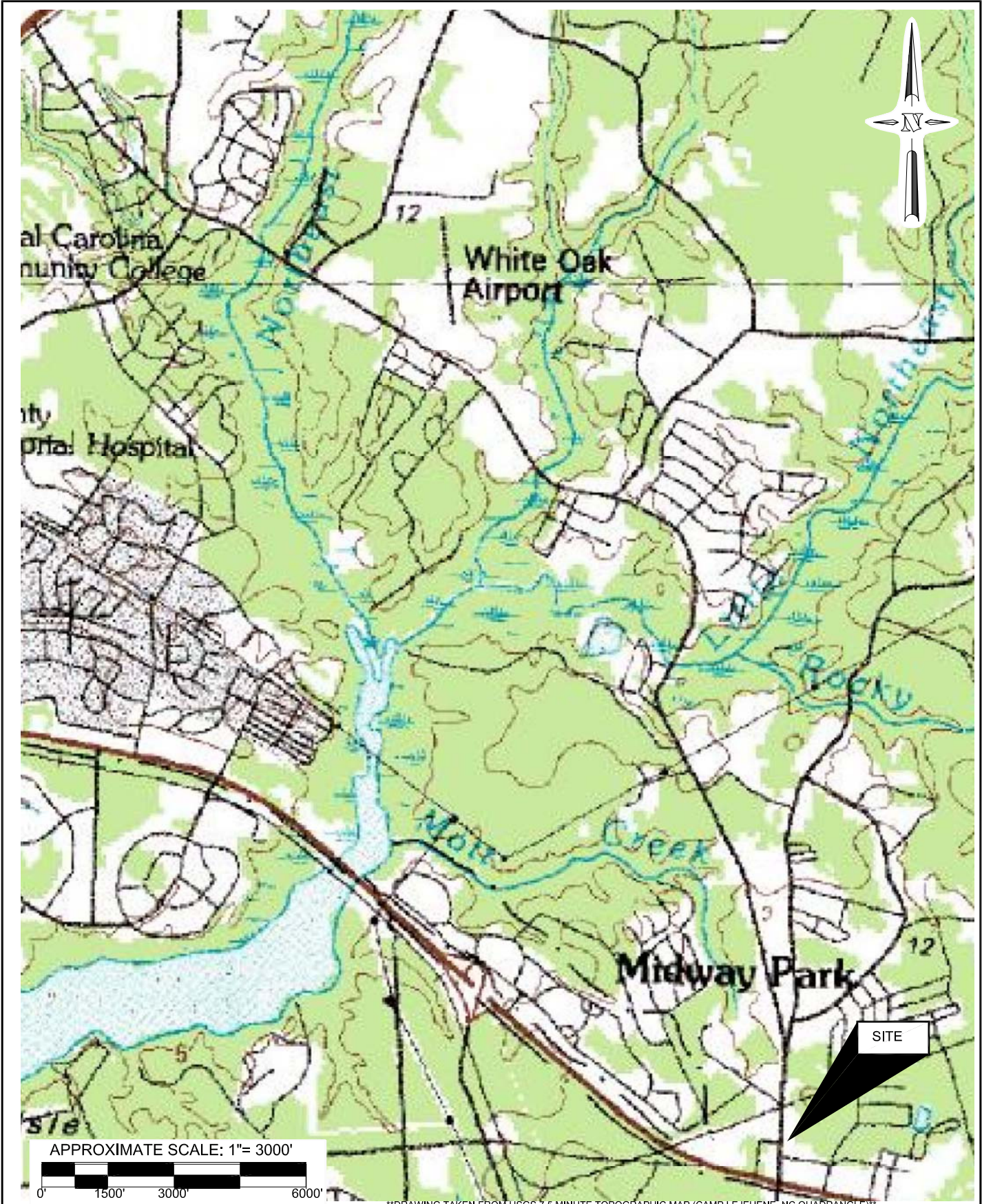
## 5.0 Conclusions and Recommendations


GEL performed a preliminary site assessment within the NCDOT proposed easterly ROW of Piney Green Road adjacent to Parcel #317 that included a geophysical survey, and the collection and analysis of soil samples. One subsurface anomaly was identified by EM-61 data during the geophysical investigation, but the anomaly could not be confirmed by GPR data collected over the same area; therefore, this anomaly is considered to be a "Possible" UST. No USTs or other solid objects were encountered when the center of the anomaly was penetrated to a depth of 8 feet bls using DPT.

Soil samples were collected for analysis from 11 borings constructed within the NCDOT proposed easterly ROW of Piney Green Road adjacent to Parcel #317. The soil samples were analyzed for DRO and GRO. Analytical results for a soil sample collected from boring S5-6 indicated that the detected DRO concentration slightly exceeded the NCDENR recommended DRO action level of 10 mg/kg. Therefore, this analytical result is indicative of soil impact. However, analysis of the soil for petroleum hydrocarbon constituents such as VOCs and PAHs would be needed to confirm the soil impact. The total estimated quantity of impacted soil (DRO >10 mg/kg) encompassing soil boring S5-6 at the subject site is approximately 26 cubic yards in a localized area. In addition, analytical results for soil samples collected from borings S5-7 and S5-8 indicated that the detected GRO and DRO concentrations significantly exceeded the NCDENR recommended GRO and DRO action levels of 10 mg/kg. Therefore, these analytical results are indicative of soil impact. However, analysis of the soil for petroleum hydrocarbon constituents such as VOCs and PAHs would be needed to confirm the soil impact. The total estimated quantity of impacted soil (DRO >10 mg/kg and/or GRO >10 mg/kg) encompassing borings S5-7 and S5-8 at the subject site is approximately 1,600 cubic yards.

Based on the data generated from this investigation, there is no evidence that a significant release(s) of constituents of concern has occurred within the NCDOT proposed ROW at the subject site in the vicinity of boring S5-6. No additional environmental investigation of the site soil in this area is recommended at this time. However, it is recommended that confirmation soil samples be collected and analyzed for petroleum hydrocarbon constituents (including VOCs and PAHs) following any planned excavation in the vicinity of boring S5-6 in order to confirm the presence or absence of soil impact from petroleum hydrocarbons.

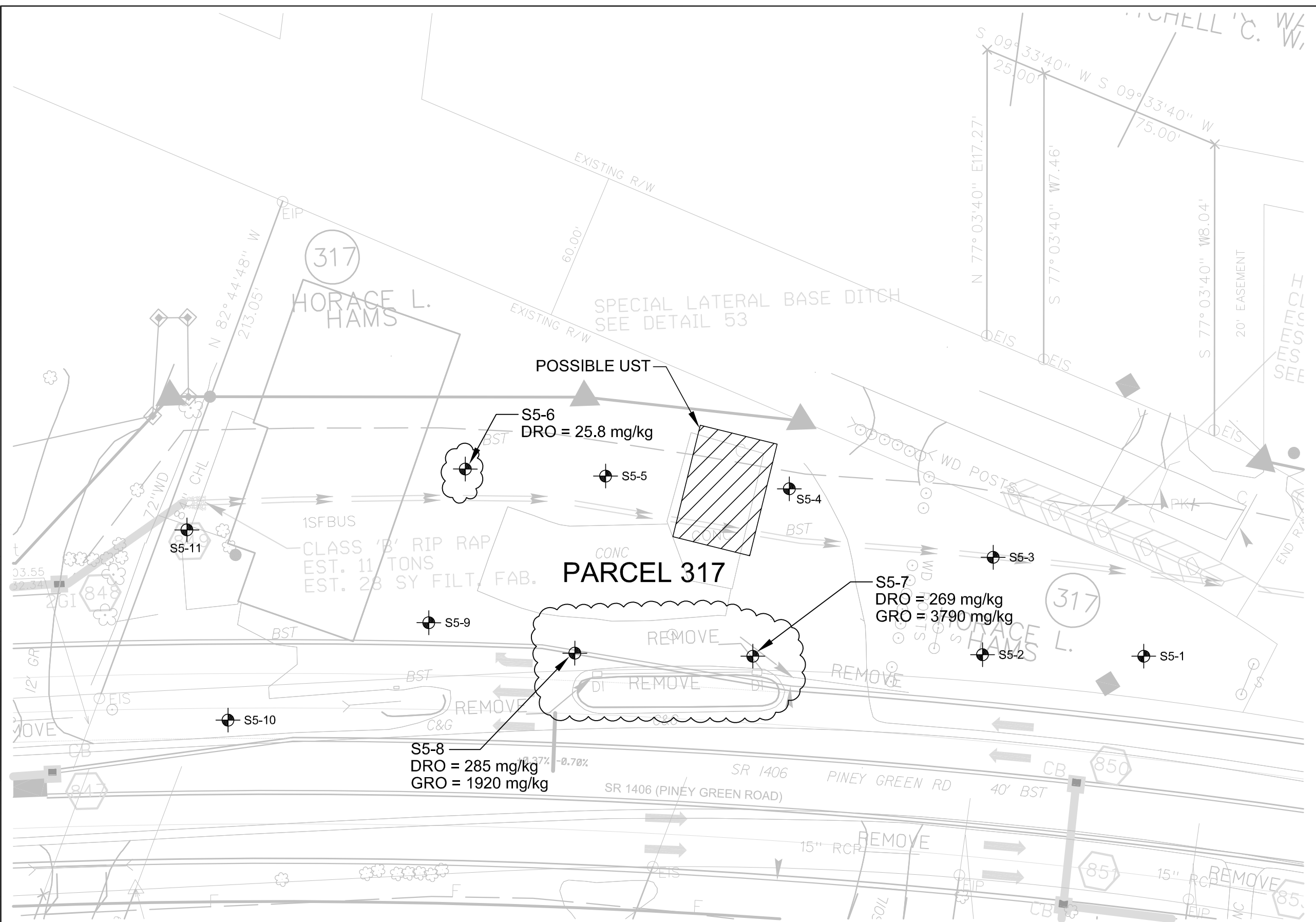
Further investigation of the suspected area of soil impact encompassing borings S5-7 and S5-8, as shown in Figure 2, may be warranted to confirm and delineate the area of soil impact. Previous investigations of potential impact to groundwater have apparently been performed, based the presence of groundwater monitoring wells observed on the site. In any case, it is recommended that confirmation soil samples be collected and analyzed for petroleum hydrocarbon constituents (including VOCs and PAHs) following any planned excavation in the vicinity of borings S5-7 and S5-8 in order to confirm the presence or absence of soil impact from petroleum hydrocarbons.



 <b>Engineering of NC Inc.</b> an Affiliate of THE GEL GROUP INC problem solved	P.O. Box 14262 RTP, NC 27709 P: 919.544.1100 F: 919.406.1807 www.gel.com	PROJECT: ncdt00110	USGS TOPOGRAPHIC LOCATION MAP	FIGURE 1
		PRELIMINARY SITE ASSESSMENT REPORT PARCEL 317 MIDWAY PARK, NORTH CAROLINA STATE PROJECT U-3810, WBS# 35801.1.1		



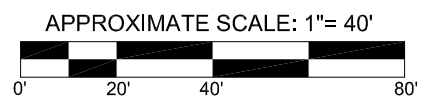
PLOTTED: May 07, 2010 - 8:22am By: tjp FILE LOCATION: H:\Consulting Client Files\K-R\N\ncdt00110\_Piney Green\ncdt00110\_Fig2s-C.dwg LAYOUT TAB: 317



**LEGEND**

- S5-2 SOIL BORING LOCATION
- DRO DIESEL RANGE ORGANICS
- GRO GASOLINE RANGE ORGANICS
- mg/kg MILLIGRAMS PER KILOGRAM
- ESTIMATED AREA OF SOIL IMPACT

**NOTE:**  
SEE FIGURE 3 FOR KEY MAP  
SHOWING PARCEL LOCATIONS



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PARCEL NO. 317, HORACE L. HAMS  
2601 PINEY GREEN ROAD  
MIDWAY PARK, NORTH CAROLINA  
STATE PROJECT U-3810, WBS #35801.1.1

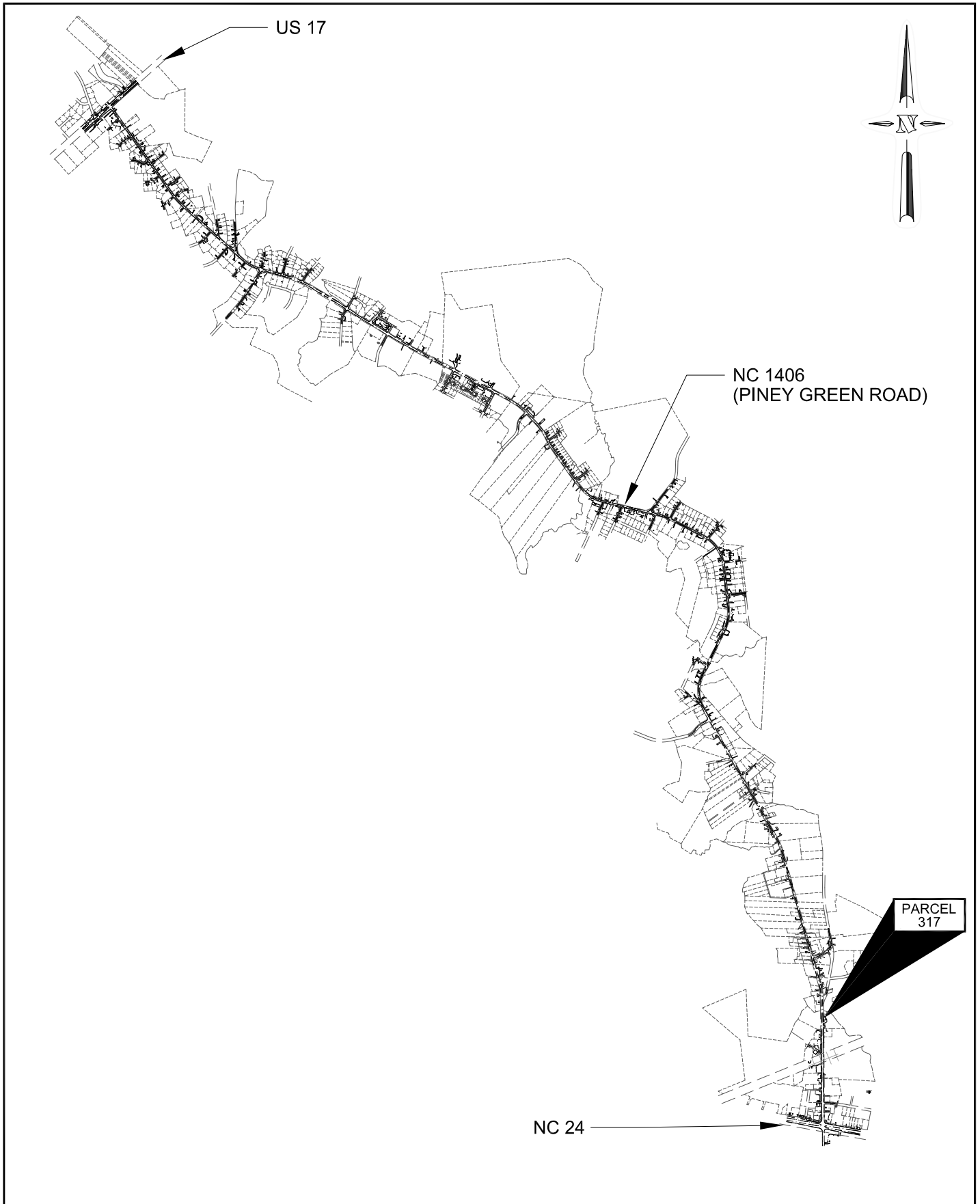
DATE: May 3, 2010

SITE SKETCH SHOWING  
SOIL BORING LOCATIONS

DRAWN BY: TJP

APPRV. BY: ADE

FIGURE  
2



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 PARCEL 317  
 MIDWAY PARK, NORTH CAROLINA  
 STATE PROJECT U-3810, WBS# 35801.1.1

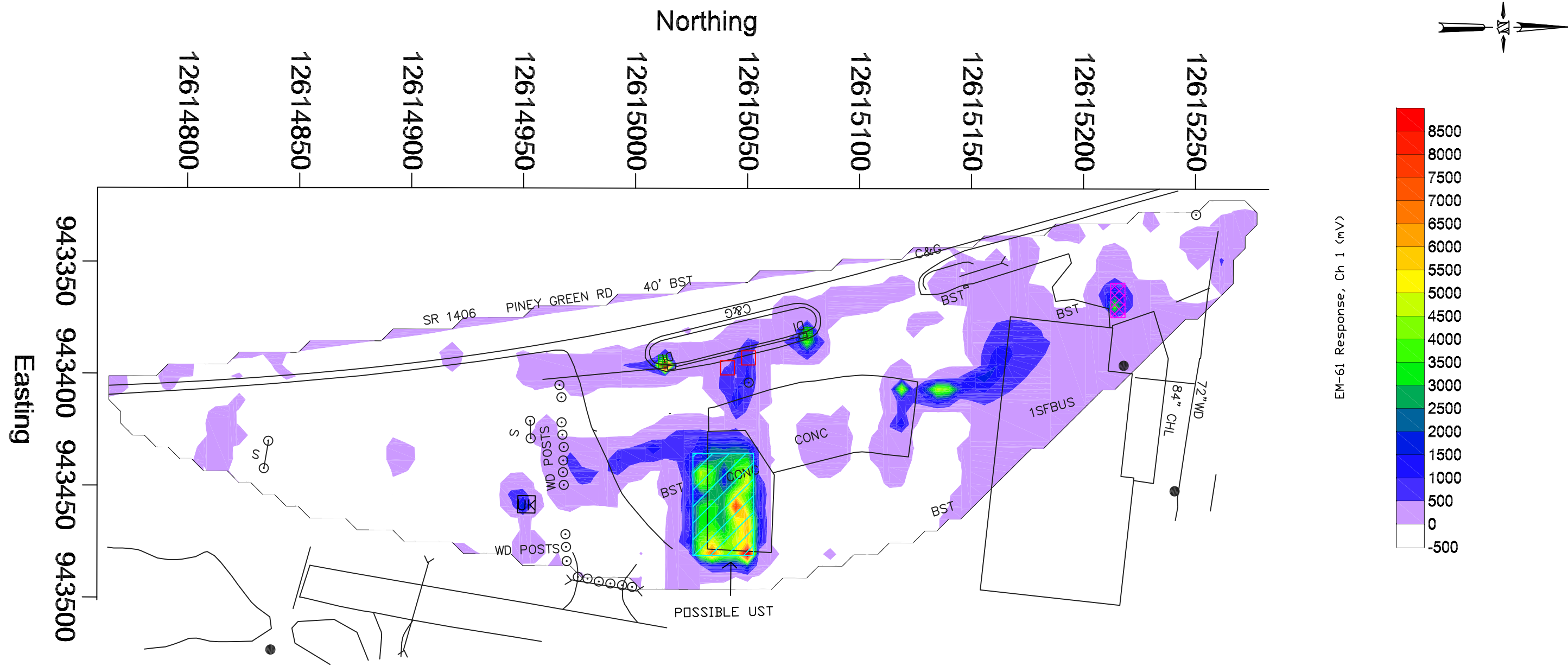
DATE: April 6, 2010

KEY MAP SHOWING  
 PARCEL LOCATION

DRAWN BY: TJP

APPRV. BY: ADE

FIGURE  
 3



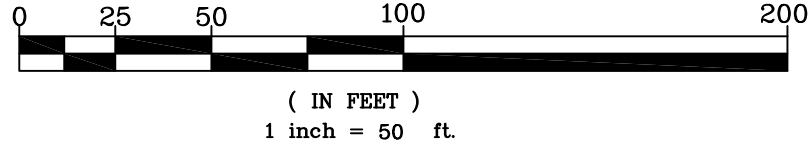
**LEGEND**

- UNKNOWN UTILITY
- STORMWATER DRAINAGE GRATE
- TRASH DUMPSTER
- UK UNKNOWN VAULT
- POSSIBLE UST

**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 AND/OR STRUCTURES MAY ONLY BE POSSIBLE WITH VACUUM OR OTHER EXCAVATION METHODS.
- 2) DATA FROM GEONICS, LTD. EM-61 MKII AND MALA GEOSCIENCE GROUND PENETRATING RADAR.
- 3) COORDINATES IN US STATE PLANE NAD 1983 DATUM.
- 4) PROJECT MICROSTATION BASEMAPS PROVIDED BY NCDOT.
- 5) **NO UNKNOWN UNDERGROUND STORAGE TANKS FOUND UNLESS NOTED IN DRAWING**

**GRAPHIC SCALE**



**GEL Engineering of NC INC.**  
 An Affiliate of THE GEL GROUP, INC.  
 problem solved

P.O. Box 14262  
 RTP NC 27709  
 P: 919.544.1100  
 F: 919.406.1807  
 www.gel.com

PROJECT: NCDT00110			
Preliminary Site Assessment SR 1406 (Piney Green Rd) From NC 24 to US 17 Onslow County, North Carolina State Project U-3810, WBS# 35801.1.1		Site Map Showing Results Of Geophysical Survey Investigation Parcel 317	
March 11, 2010		DRAWN BY: DEA	APPRV. BY: CMS
		FIGURE 4	

**APPENDIX I**

**SOIL BORING LITHOLOGIC LOGS**

## SOIL BORING LOG

Boring/Well No.: 55-1  
 Date Started: 3/9/10  
 Date Completed: 3/9/10

10:45 \*

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	—	0.7	0-1' DK Brown Silty Sand, Damp Tan Sandy Clay, Moist	
2	4-8	—	0.2	Tan Sandy Clay → Lt. Brn, Gray Coarsely Silty Sand, M-wet	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

- 1) 4-foot continuous cores using DPT..

34° 43.506 N

77° 19.207 W

## SOIL BORING LOG

Boring/Well No.: 55-2

Date Started: 3/9/10

Date Completed: 3/9/10

11:00

★

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	—	0.5	Grassmat, Organics Brown, Dk. Gray Silty Sand → Clayey Sand, Moist	
2	4-8	—	0.6	Tan, Gray Mottled Clayey Sand → Sandy Clay at depth, Moist	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

- 1) 4-foot continuous cores using DPT..

34° 43.520 N

77° 19.24 W

## SOIL BORING LOG

Boring/Well No.: 55-3

Date Started: 3/9/10

Date Completed: 3/9/10

11:15 \*

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	—	0.3	Organics, Rock Frag, silty sand, Damp Brown-Tan Sandy Clay, Moist	
2	4-8	—	0.1	Orange Brown, Gray mottled sandy clay → loamy silty sand at depth, Moist	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

- 1) 4-foot continuous cores using DPT..

34° 43.519 N

77° 19.201 W

## SOIL BORING LOG

Boring/Well No.: 55-4

Date Started: 3/9/10

Date Completed: 3/9/10

11:25 \*

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	—	0.6	Lt. Brown Coarse Sand, Tan Silty Sand, Moist Orange Brown Sandy Clay, Moist	
2	4-8	—	0.2	" " Orange Brown-Lt Grey Loamy Sandy loam → silty sand, Moist	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

- 1) 4-foot continuous cores using DPT..

34° 43.533 N

77° 19.200 W



## SOIL BORING LOG

Boring/Well No.: 55-5  
 Date Started: 3/9/10  
 Date Completed: 3/9/10

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
★ 1	0-4	—	0.9	Dk Gray-Gray Brn Silty sand, Moist Moist; Orange Brown Sandy Clay	
2	4-8	—	0.2	" " , Tan Gray Sandy loam. Moist, Fine sands.	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

- 1) 4-foot continuous cores using DPT..

34043.543 N

77019.201 W

## SOIL BORING LOG

Boring/Well No.: 55-6

Date Started: 3/9/10

Date Completed: 3/9/10

11:45

\*

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	—	0.3	Coarse Sand, Lt. Gray Damp → DK. Brn Silty Sand → Tan Silty Sand, Brn Sandy Clay, Moist	
2	4-8	—	0.5	Red, Orange, Gray Mottled Sandy Clay Moist	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

- 1) 4-foot continuous cores using DPT..

34° 43.550 N

77° 19.201 W

## SOIL BORING LOG

Boring/Well No.: 55-7

Date Started: 3/9/10

Date Completed: 3/9/10

12:00  
X

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	—	25	Gray Coarse Sand, DK Gray Silty Sand, Damp Moist, Orange Brn. Sandy Clay	Slight odor (+)
2	4-8	—	1100	Orange, Brn Gray Mottled Sandy Clay, Moist Orange Gray Clayey Sand, Moist	Mod. Odor - strong Odor
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

- 1) 4-foot continuous cores using DPT..

34° 43.533 N

77° 19.214 W

## SOIL BORING LOG

Boring/Well No.: 55-8  
 Date Started: 3/9/10  
 Date Completed: 3/9/10

12:15

\*

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	-	3.4	ROC, DK Gray silty sand, Moist Gray Brn Sandy Clay, Moist	
2	4-8	-	970	Gray Sandy Clay, Moist → Orange Brn Gray silty, Clayey Sand, Moist	strong odor
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

- 1) 4-foot continuous cores using DPT..

340 43.543N

770 19.217W

## SOIL BORING LOG

Boring/Well No.: 55-9

Date Started: 3/9/10

Date Completed: 3/9/10

12:35  
X

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	—	1.7	Dk Gray Silty Sand, Damp → Brn, Gray Silty Sand, Moist Orange Brn Sandy Clay	
2	4-8	—	8.3	Orange Brn, Gray Mottled Silty Clay, Moist Gray Orange Silty Sand	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

- 1) 4-foot continuous cores using DPT..

34° 43.552 N

77° 19.215 W

## SOIL BORING LOG

Boring/Well No.: 55-10

Date Started: 3/9/10

Date Completed: 3/9/10

12:50

\*

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	-	0.1	Organics, Brn Silty Sand, Moist	
2	4-8	-	0.5	Orange Brn, Gray Mottled sandy clay, Moist " to Silty sand, Moist-Wet	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

- 1) 4-foot continuous cores using DPT..

340 43.565 N

770 19.225 W

## SOIL BORING LOG

Boring/Well No.: 55-11

Date Started: 3/9/10

Date Completed: 3/9/10

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	-	0.7	Organics, Coarse Sands, Tan silty Sand, Moist Orange Brn Sandy Clay, Moist	
2	4-8	-	0.3	" , Gray, Orange Brn Mottled Sandy Clay, Moist	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

- 1) 4-foot continuous cores using DPT..

34° 43, 572 N

77° 19 - 217 W

**APPENDIX II**

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





Andrew Eyer  
GEL Engineering of NC, Inc.  
PO Box 14262  
RTP, NC 27709

Report Number: G341-616

Client Project: U-3810/NCDOT 001100

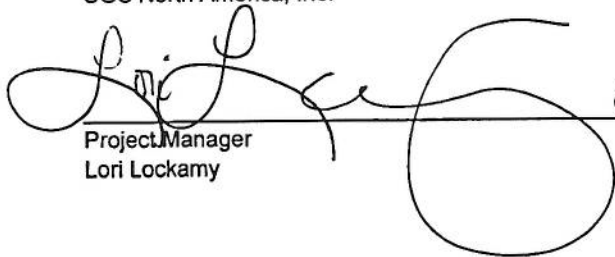
Dear Andrew Eyer,

Enclosed are the results of the analytical services performed under the referenced project for the received samples and associated QC as applicable. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of five years in the event they are required for future reference. Any samples submitted to our laboratory will be retained for a maximum of thirty (30) days from the date of this report unless other arrangements are requested.

If there are any questions about the report or services performed during this project, please call Lori Lockamy at (910) 350-1903. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS North America, Inc. for your analytical services. We look forward to working with you again on any additional analytical needs.

Sincerely,  
SGS North America, Inc.

A large, stylized handwritten signature in black ink, appearing to read 'Lori Lockamy'. The signature is written over a horizontal line that spans the width of the signature area.

Project Manager  
Lori Lockamy

23 March 2010

Date

**Case Narrative**

GEL

SGS Project: G341-616

Project Name: U-3810/NCDT001100


**SGS North America Inc.**

**March 22<sup>nd</sup>, 2010**

- Seventy four soil samples were accepted into the laboratory on March 11<sup>th</sup>, 2010 at 1515 for analyses as indicated on the chain of custody. The samples were received in good condition, with a temperature range of 2.0-2.1°C.
- All extractions and analyses were completed within holding time limits, with the following quality control exceptions.

8260 Analyses

- The ICAL dated 9032110 has a reported linear  $r^2$  value for Acetone that is below 0.990. Only samples S8-2-8, S8-6-8, S8-8-4, S7-1-4, S7-2-4 and S7-3-4 were affected and these samples had no Acetone detected.
- Samples S8-4-4 and S8-7-8 have reported recoveries for 1,2-Dichloroethane-d4 that are above the QC limit. These recoveries were confirmed by duplicate analysis.

 \_\_\_\_\_ Date 3/23/10  
Craig R Tronzo  
Data Validation

SGS North America, Inc.  
List of Reporting Abbreviations  
And Data Qualifiers

B = Compound also detected in batch blank

BQL = Below Quantification Limit (RL or MDL)

DF = Dilution Factor

Dup = Duplicate

D = Detected, but RPD is > 40% between results in dual column method.

E = Estimated concentration, exceeds calibration range.

J = Estimated concentration, below calibration range and above MDL

LCS(D) = Laboratory Control Spike (Duplicate)

MDL = Method Detection Limit

MS(D) = Matrix Spike (Duplicate)

PQL = Practical Quantitation Limit

RL/CL = Reporting Limit / Control Limit

RPD = Relative Percent Difference

UJ = Target analytes with recoveries that are  $10\% < \%R < LCL$ ; # of MEs are allowable and compounds are not detected in the sample.

mg/kg = milligram per kilogram, ppm, parts per million

ug/kg = micrograms per kilogram, ppb, parts per billion

mg/L = milligram per liter, ppm, parts per million

ug/L = micrograms per liter, ppb, parts per billion

% Rec = Percent Recovery

% solids = Percent Solids

Special Notes:

- 1) Metals and mercury samples are digested with a hot block; see the standard operating procedure document for details.
- 2) Uncertainty for all reported data is less than or equal to 30 percent.

**Results for Total Petroleum Hydrocarbons**  
by GC/FID 8015

Client Sample ID: S5-1-4  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-7A  
 Lab Project ID: G341-616  
 Report Basis: Dry Weight

Analyzed By: BAO  
 Date Collected: 3/9/2010 10:45  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 79.24

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	4.89	mg/Kg	1	03/16/10 16:30

**Surrogate Spike Results**

	Added	Result	Recovery	Flag	Limits
BFB	100	86.6	86.6		70-130

**Comments:**


**Batch Information**

Analytical Batch: VP031610  
 Analytical Method: 8015  
 Instrument ID: GC4  
 Analyst: BAO

Prep Method: 5035  
 Initial Wt/Vol: 7.75 g  
 Final Volume: 5 mL

Analyst: BAO

NC Certification #481

Reviewed By:   
GRO.XLS

**Results for Total Petroleum Hydrocarbons**  
by GC/FID 8015

Client Sample ID: S5-1-4  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-7D  
 Lab Project ID: G341-616

Date Collected: 3/9/2010 10:45  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 79.24  
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.62	mg/Kg	1	03/16/10 18:39
<b>Surrogate Spike Results</b>		<b>Spike Added</b>	<b>Control Limits</b>	<b>Spike Result</b>	<b>Percent Recovery</b>
OTP		40	40-140	36.8	92

**Comments:**

**Batch Information**

Analytical Batch: EP031610  
 Analytical Method: 8015  
 Instrument: GC6  
 Analyst: DTF

Prep batch: 16210  
 Prep Method: 3541  
 Prep Date: 03/15/10  
 Initial Prep Wt/Vol: 33.13 G  
 Prep Final Vol: 10 mL

**Results for Total Petroleum Hydrocarbons**  
by GC/FID 8015

Client Sample ID: S5-2-8  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-8A  
 Lab Project ID: G341-616  
 Report Basis: Dry Weight

Analyzed By: BAO  
 Date Collected: 3/9/2010 11:00  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 80.96

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	3.64	mg/Kg	1	03/16/10 16:57

**Surrogate Spike Results**

	Added	Result	Recovery	Flag	Limits
BFB	100	85.2	85.2		70-130

**Comments:**


**Batch Information**

Analytical Batch: VP031610  
 Analytical Method: 8015  
 Instrument ID: GC4  
 Analyst: BAO

Prep Method: 5035  
 Initial Wt/Vol: 10.2 g  
 Final Volume: 5 mL

Analyst: BAO

NC Certification #481

Reviewed By:   
GRO.XLS

**Results for Total Petroleum Hydrocarbons  
by GC/FID 8015**

Client Sample ID: S5-2-8  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-8D  
 Lab Project ID: G341-616

Date Collected: 3/9/2010 11:00  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 80.96  
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.48	mg/Kg	1	03/16/10 19:07
<b>Surrogate Spike Results</b>		<b>Spike Added</b>	<b>Control Limits</b>	<b>Spike Result</b>	<b>Percent Recovery</b>
OTP		40	40-140	34.9	87.3

**Comments:**

**Batch Information**

Analytical Batch: EP031610  
 Analytical Method: 8015  
 Instrument: GC6  
 Analyst: DTF

Prep batch: 16210  
 Prep Method: 3541  
 Prep Date: 03/15/10  
 Initial Prep Wt/Vol: 33.03 G  
 Prep Final Vol: 10 mL

**Results for Total Petroleum Hydrocarbons**  
by GC/FID 8015

Client Sample ID: S5-3-4  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-9A  
 Lab Project ID: G341-616  
 Report Basis: Dry Weight

Analyzed By: BAO  
 Date Collected: 3/9/2010 11:15  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 79.69

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.51	mg/Kg	1	03/16/10 17:24

**Surrogate Spike Results**

	Added	Result	Recovery	Flag	Limits
BFB	100	85.7	85.7		70-130

**Comments:**

**Batch Information**

Analytical Batch: VP031610  
 Analytical Method: 8015  
 Instrument ID: GC4  
 Analyst: BAO

Prep Method: 5035  
 Initial Wt/Vol: 6.83 g  
 Final Volume: 5 mL

Analyst: BAO

NC Certification #481

Reviewed By:   
GRO.XLS



**Results for Total Petroleum Hydrocarbons  
by GC/FID 8015**

Client Sample ID: S5-3-4  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-9D  
 Lab Project ID: G341-616

Date Collected: 3/9/2010 11:15  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 79.69  
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.64	mg/Kg	1	03/16/10 19:35
<b>Surrogate Spike Results</b>		<b>Spike Added</b>	<b>Control Limits</b>	<b>Spike Result</b>	<b>Percent Recovery</b>
OTP		40	40-140	35.5	88.7

**Comments:**

**Batch Information**

Analytical Batch: EP031610  
 Analytical Method: 8015  
 Instrument: GC6  
 Analyst: DTF

Prep batch: 16210  
 Prep Method: 3541  
 Prep Date: 03/15/10  
 Initial Prep Wt/Vol: 32.83 G  
 Prep Final Vol: 10 mL

**Results for Total Petroleum Hydrocarbons**  
by GC/FID 8015

Client Sample ID: S5-4-4  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-10A  
 Lab Project ID: G341-616  
 Report Basis: Dry Weight

Analyzed By: BAO  
 Date Collected: 3/9/2010 11:25  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 82.15

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.62	mg/Kg	1	03/16/10 17:51

**Surrogate Spike Results**

	Added	Result	Recovery	Flag	Limits
BFB	100	83.4	83.4		70-130

**Comments:**

**Batch Information**

Analytical Batch: VP031610  
 Analytical Method: 8015  
 Instrument ID: GC4  
 Analyst: BAO

Prep Method: 5035  
 Initial Wt/Vol: 6.5 g  
 Final Volume: 5 mL

Analyst: BAO

NC Certification #481

Reviewed By:   
 GRO.XLS

**Results for Total Petroleum Hydrocarbons**  
by GC/FID 8015

Client Sample ID: S5-4-4  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-10D  
 Lab Project ID: G341-616

Date Collected: 3/9/2010 11:25  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 82.15  
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.26	mg/Kg	1	03/16/10 20:03
<b>Surrogate Spike Results</b>		<b>Spike Added</b>	<b>Control Limits</b>	<b>Spike Result</b>	<b>Percent Recovery</b>
OTP		40	40-140	38.7	96.8

Comments:

**Batch Information**

Analytical Batch: EP031610  
 Analytical Method: 8015  
 Instrument: GC6  
 Analyst: DTF

Prep batch: 16210  
 Prep Method: 3541  
 Prep Date: 03/15/10  
 Initial Prep Wt/Vol: 33.52 G  
 Prep Final Vol: 10 mL

Analyst: Fat

NC Certification #481

NC Certification #481

Reviewed By:   
 DRO.XLS  
 Page 167 of 230

**Results for Total Petroleum Hydrocarbons**  
by GC/FID 8015

Client Sample ID: S5-5-4  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-44A  
 Lab Project ID: G341-616  
 Report Basis: Dry Weight

Analyzed By: BAO  
 Date Collected: 3/9/2011 11:35  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 80.03

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	4.95	mg/Kg	1	03/16/10 18:18

**Surrogate Spike Results**

	Added	Result	Recovery	Flag	Limits
BFB	100	85.3	85.3		70-130

**Comments:**

**Batch Information**

Analytical Batch: VP031610  
 Analytical Method: 8015  
 Instrument ID: GC4  
 Analyst: BAO

Prep Method: 5035  
 Initial Wt/Vol: 7.57 g  
 Final Volume: 5 mL

Analyst: BAO

NC Certification #481

Reviewed By:   
GRO.XLS

**Results for Total Petroleum Hydrocarbons  
by GC/FID 8015**

Client Sample ID: S5-5-4  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-44D  
 Lab Project ID: G341-616

Date Collected: 3/9/2011 11:35  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 80.03  
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.58	mg/Kg	1	03/17/10 21:30
<b>Surrogate Spike Results</b>		<b>Spike Added</b>	<b>Control Limits</b>	<b>Spike Result</b>	<b>Percent Recovery</b>
OTP		40	40-140	38.8	97

**Comments:**

**Batch Information**

Analytical Batch: EP031710  
 Analytical Method: 8015  
 Instrument: GC6  
 Analyst: DTF

Prep batch: 16215  
 Prep Method: 3541  
 Prep Date: 03/16/10  
 Initial Prep Wt/Vol: 32.97 G  
 Prep Final Vol: 10 mL

**Results for Total Petroleum Hydrocarbons  
by GC/FID 8015**

Client Sample ID: S5-6-8  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-45A  
 Lab Project ID: G341-616  
 Report Basis: Dry Weight

Analyzed By: BAO  
 Date Collected: 3/9/2011 11:45  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 81.82

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	4.94	mg/Kg	1	03/16/10 18:45

**Surrogate Spike Results**

	Added	Result	Recovery	Flag	Limits
BFB	100	88.9	88.9		70-130

**Comments:**


**Batch Information**

Analytical Batch: VP031610  
 Analytical Method: 8015  
 Instrument ID: GC4  
 Analyst: BAO

Prep Method: 5035  
 Initial Wt/Vol: 7.42 g  
 Final Volume: 5 mL

Analyst: BAO

NC Certification #481

Reviewed By:   
 GRO.XLS

**Results for Total Petroleum Hydrocarbons**  
by GC/FID 8015

Client Sample ID: S5-6-8  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-45D  
 Lab Project ID: G341-616

Date Collected: 3/9/2011 11:45  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 81.82  
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	25.8	7.52	mg/Kg	1	03/17/10 21:58
<b>Surrogate Spike Results</b>		<b>Spike Added</b>	<b>Control Limits</b>	<b>Spike Result</b>	<b>Percent Recovery</b>
OTP		40	40-140	37.1	92.7

Comments:

**Batch Information**

Analytical Batch: EP031710  
 Analytical Method: 8015  
 Instrument: GC6  
 Analyst: DTF

Prep batch: 16215  
 Prep Method: 3541  
 Prep Date: 03/16/10  
 Initial Prep Wt/Vol: 32.5 G  
 Prep Final Vol: 10 mL

**Results for Total Petroleum Hydrocarbons**  
by GC/FID 8015

Client Sample ID: S5-7-8  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-46A  
 Lab Project ID: G341-616  
 Report Basis: Dry Weight

Analyzed By: BAO  
 Date Collected: 3/9/2011 12:00  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 81.99

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	3790	852	mg/Kg	250	03/16/10 12:00

**Surrogate Spike Results**

	Added	Result	Recovery	Flag	Limits
BFB	100	90.3	90.3		70-130

**Comments:**


**Batch Information**

Analytical Batch: VP031610  
 Analytical Method: 8015  
 Instrument ID: GC4  
 Analyst: BAO

Prep Method: 5035  
 Initial Wt/Vol: 7.16 g  
 Final Volume: 5 mL

Analyst: BAO

NC Certification #481

Reviewed By:   
GRO.XLS



**Results for Total Petroleum Hydrocarbons  
by GC/FID 8015**

Client Sample ID: S5-7-8  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-46D  
 Lab Project ID: G341-616

Date Collected: 3/9/2011 12:00  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 81.99  
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	269	15.1	mg/Kg	2	03/18/10 17:31
<b>Surrogate Spike Results</b>		<b>Spike Added</b>	<b>Control Limits</b>	<b>Spike Result</b>	<b>Percent Recovery</b>
OTP		40	40-140	35.6	89.1

**Comments:**

**Batch Information**

Analytical Batch: EP031810  
 Analytical Method: 8015  
 Instrument: GC6  
 Analyst: DTF

Prep batch: 16215  
 Prep Method: 3541  
 Prep Date: 03/16/10  
 Initial Prep Wt/Vol: 32.25 G  
 Prep Final Vol: 10 mL

Analyst: FA

NC Certification #481

Reviewed By: CA  
 DRO.XLS  
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**Results for Total Petroleum Hydrocarbons**  
by GC/FID 8015

Client Sample ID: S5-8-8  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-47A  
 Lab Project ID: G341-616  
 Report Basis: Dry Weight

Analyzed By: BAO  
 Date Collected: 3/9/2011 12:15  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 82.34

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	1920	357	mg/Kg	100	03/16/10 12:54

**Surrogate Spike Results**

	Added	Result	Recovery	Flag	Limits
BFB	100	85.1	85.1		70-130

**Comments:**

**Batch Information**

Analytical Batch: VP031610  
 Analytical Method: 8015  
 Instrument ID: GC4  
 Analyst: BAO

Prep Method: 5035  
 Initial Wt/Vol: 6.8 g  
 Final Volume: 5 mL

Analyst: BAO

NC Certification #481

Reviewed By:   
GRO.XLS

**Results for Total Petroleum Hydrocarbons**  
by GC/FID 8015

Client Sample ID: S5-8-8  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-47D  
 Lab Project ID: G341-616

Date Collected: 3/9/2011 12:15  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 82.34  
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	285	14.4	mg/Kg	2	03/18/10 18:00
<b>Surrogate Spike Results</b>		<b>Spike Added</b>	<b>Control Limits</b>	<b>Spike Result</b>	<b>Percent Recovery</b>
OTP		40	40-140	35.8	89.6

Comments:

**Batch Information**

Analytical Batch: EP031810  
 Analytical Method: 8015  
 Instrument: GC6  
 Analyst: DTF

Prep batch: 16215  
 Prep Method: 3541  
 Prep Date: 03/16/10  
 Initial Prep Wt/Vol: 33.64 G  
 Prep Final Vol: 10 mL

**Results for Total Petroleum Hydrocarbons**  
by GC/FID 8015

Client Sample ID: S5-9-8  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-48A  
 Lab Project ID: G341-616  
 Report Basis: Dry Weight

Analyzed By: BAO  
 Date Collected: 3/9/2011 12:35  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 83.58

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	4.85	mg/Kg	1	03/17/10 01:03

**Surrogate Spike Results**

	Added	Result	Recovery	Flag	Limits
BFB	100	84.8	84.8		70-130

**Comments:**

**Batch Information**

Analytical Batch: VP031610  
 Analytical Method: 8015  
 Instrument ID: GC4  
 Analyst: BAO

Prep Method: 5035  
 Initial Wt/Vol: 7.4 g  
 Final Volume: 5 mL

Analyst: BAO

NC Certification #481

Reviewed By:   
GRO.XLS

**Results for Total Petroleum Hydrocarbons**  
by GC/FID 8015

Client Sample ID: S5-9-8  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-48D  
 Lab Project ID: G341-616

Date Collected: 3/9/2011 12:35  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 83.58  
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.22	mg/Kg	1	03/18/10 23:22
<b>Surrogate Spike Results</b>		<b>Spike Added</b>	<b>Control Limits</b>	<b>Spike Result</b>	<b>Percent Recovery</b>
OTP		40	40-140	38.3	95.8

**Comments:**

**Batch Information**

Analytical Batch: EP031710  
 Analytical Method: 8015  
 Instrument: GC6  
 Analyst: DTF

Prep batch: 16215  
 Prep Method: 3541  
 Prep Date: 03/16/10  
 Initial Prep Wt/Vol: 33.13 G  
 Prep Final Vol: 10 mL

**Results for Total Petroleum Hydrocarbons**  
by GC/FID 8015

Client Sample ID: S5-10-8  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-49A  
 Lab Project ID: G341-616  
 Report Basis: Dry Weight

Analyzed By: BAO  
 Date Collected: 3/9/2011 12:50  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 81.88

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.01	mg/Kg	1	03/17/10 01:30

**Surrogate Spike Results**

	Added	Result	Recovery	Flag	Limits
BFB	100	85.6	85.6		70-130

**Comments:**

**Batch Information**

Analytical Batch: VP031610  
 Analytical Method: 8015  
 Instrument ID: GC4  
 Analyst: BAO

Prep Method: 5035  
 Initial Wt/Vol: 7.32 g  
 Final Volume: 5 mL

Analyst: BAO

NC Certification #481

Reviewed By:   
 GRO.XLS

**Results for Total Petroleum Hydrocarbons  
by GC/FID 8015**

Client Sample ID: S5-10-8  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-49D  
 Lab Project ID: G341-616

Date Collected: 3/9/2011 12:50  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 81.88  
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.48	mg/Kg	1	03/18/10 23:50
<b>Surrogate Spike Results</b>		<b>Spike Added</b>	<b>Control Limits</b>	<b>Spike Result</b>	<b>Percent Recovery</b>
OTP		40	40-140	37.6	94

**Comments:**

**Batch Information**

Analytical Batch: EP031710  
 Analytical Method: 8015  
 Instrument: GC6  
 Analyst: DTF

Prep batch: 16215  
 Prep Method: 3541  
 Prep Date: 03/16/10  
 Initial Prep Wt/Vol: 32.67 G  
 Prep Final Vol: 10 mL

**Results for Total Petroleum Hydrocarbons**  
by GC/FID 8015

Client Sample ID: S5-11-4  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-50A  
 Lab Project ID: G341-616  
 Report Basis: Dry Weight

Analyzed By: BAO  
 Date Collected: 3/9/2011 13:10  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 83.58

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	4.82	mg/Kg	1	03/17/10 01:57

**Surrogate Spike Results**

	Added	Result	Recovery	Flag	Limits
BFB	100	84.7	84.7		70-130

**Comments:**

**Batch Information**

Analytical Batch: VP031610  
 Analytical Method: 8015  
 Instrument ID: GC4  
 Analyst: BAO

Prep Method: 5035  
 Initial Wt/Vol: 7.45 g  
 Final Volume: 5 mL

Analyst: BAO

NC Certification #481

Reviewed By:   
 GRO.XLS



**Results for Total Petroleum Hydrocarbons**  
by GC/FID 8015

Client Sample ID: S5-11-4  
 Client Project ID: U-3810/NC DOT 001100  
 Lab Sample ID: G341-616-50D  
 Lab Project ID: G341-616

Date Collected: 3/9/2011 13:10  
 Date Received: 3/11/2010  
 Matrix: Soil  
 Solids 83.58  
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.32	mg/Kg	1	03/18/10 00:18
<b>Surrogate Spike Results</b>		<b>Spike Added</b>	<b>Control Limits</b>	<b>Spike Result</b>	<b>Percent Recovery</b>
OTP		40	40-140	37.7	94.3

Comments:

**Batch Information**

Analytical Batch: EP031710  
 Analytical Method: 8015  
 Instrument: GC6  
 Analyst: DTF

Prep batch: 16215  
 Prep Method: 3541  
 Prep Date: 03/16/10  
 Initial Prep Wt/Vol: 32.68 G  
 Prep Final Vol: 10 mL



**SGS Environmental Services Inc.**  
**CHAIN OF CUSTODY RECORD**

Locations Nationwide  
 • Alaska  
 • Maryland  
 • New Jersey  
 • North Carolina  
 • Ohio  
 • West Virginia  
 www.us.sgs.com

1 CLIENT: GEL ENG OF NC, INC  
 CONTACT: Andrew Eyer PHONE NO: 919-323-8828  
 PROJECT: V-3810/ACR/00100 SITE/PWSID#: ONG Low Co.  
 REPORTS TO: Andrew Eyer EMAIL: ade@egel.com  
 INVOICE TO: NC DOT QUOTE #:  
 WBS# 35801.1.1 P.O. #:

SGS Reference #: 6341-616 page      of     

#	CONTAINERS	SAMPLE TYPE C= COMP G= GRAB M= Multi Incremental Samples	Preservatives Used	Analysis Required	REMARKS/LOC ID
1	3	G			
2	3	G			
3	3	G			
4	3	G			
5	3	G			
6	3	G			
7	3	G			
8	3	G			
9	3	G			
10	3	G			

2

LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX/MATRIX CODE
1	51-6-8	3/3/10	16:45	50
2	53-1-4	3/9/10	09:50	50
3	53-2-4		09:00	50
4	53-3-8		09:15	50
5	53-4-8		09:40	50
6	53-5-4		09:50	50
7	55-1-4		10:45	50
8	55-2-8		11:00	50
9	55-3-4		11:15	50
10	55-4-4		11:25	50

3

4

5

Collected/Relinquished By: (1) Phil Doherty Received By: Andrew Eyer

Relinquished By: (2) \_\_\_\_\_ Received By: \_\_\_\_\_

Relinquished By: (3) \_\_\_\_\_ Received By: \_\_\_\_\_

Relinquished By: (4) \_\_\_\_\_ Received For Laboratory By: \_\_\_\_\_

DOD Project? YES NO  
Cooler ID \_\_\_\_\_

Special Deliverable Requirements:

Requested Turnaround Time and/or Special Instructions:

Samples Received Cold? YES NO  
Cooler TB  
Temperature: 2.0 2.1 2.0 °C

Chain of Custody Seal: (Circle)  
INTACT BROKEN **ABSENT**



# SGS Environmental Services Inc. CHAIN OF CUSTODY RECORD

- Locations Nationwide
- Alaska
  - Maryland
  - New Jersey
  - New York
  - North Carolina
  - Ohio
  - West Virginia
- www.us.sgs.com

1 CLIENT: GEL Eng of NC, INC PHONE NO: 919-323-8828

CONTACT: Andrew Eyler SITE/PWSID#: ONSLAW Co.

PROJECT: V-3810/NCDA110 EMAIL: ade@gel.com

REPORTS TO: ANDREW EYLER

INVOICE TO: NC DOT QUOTE #: \_\_\_\_\_

2 WBS# 35801.1.1 P.O. #: \_\_\_\_\_

SGS Reference #: G341-616 page \_\_\_\_\_ of \_\_\_\_\_

#	CONTAINERS	SAMPLE TYPE C= COMP G= GRAB MI= Multi Incremental Samples	PRESERVATIVES USED	ANALYSIS REQUIRED	REMARKS/LOC ID
41	3	G			D70
42	3	G			GRO
43	3	G			
44	3	G			

SGS North America, Inc.

LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX/MATRIX CODE
41	510-7-4	3/4/10	11:50	50
42	510-8-8	↓	12:00	50
43	510-9-4	↓	12:10	50
44	55-5-4	3/7/10	11:35	50

5 Collected/Relinquished By: (1) [Signature] Received By: [Signature]

Relinquished By: (2) \_\_\_\_\_ Received By: \_\_\_\_\_

Relinquished By: (3) \_\_\_\_\_ Received By: \_\_\_\_\_

Relinquished By: (4) \_\_\_\_\_ Received For Laboratory By: \_\_\_\_\_

4 DOD Project? YES NO  
Cooler ID: \_\_\_\_\_

Special Deliverable Requirements: \_\_\_\_\_

Requested Turnaround Time and/or Special Instructions: \_\_\_\_\_

Samples Received Cold? YES NO  
Cooler TB 2-02-1, 20cc

Chain of Custody Seal: (Circle) INTACT BROKEN ABSENT

Temperature °C: \_\_\_\_\_



# SGS Environmental Services Inc. CHAIN OF CUSTODY RECORD

- Locations Nationwide
- Alaska
  - Maryland
  - New Jersey
  - New York
  - North Carolina
  - Ohio
  - West Virginia
- www.us.sgs.com

1 CLIENT: GEL KING OF NC INC  
 CONTACT: Andrew Eyer PHONE NO: 919-323-8828  
 PROJECT: V-3810/NCDC110 SITE/PWSID#: ONSLAW Ca.  
 REPORTS TO: Andrew Eyer EMAIL: ade@gel.com  
 INVOICE TO: NC DOT QUOTE #:  
 WBS # 35801.1.1 P.O. #:

SGS Reference #: G341-616 page      of     

LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX/MATRIX CODE	# CONTAINERS	SAMPLE TYPE C= COMP G= GRAB MI= Multi Incremental Samples	Preservatives Used	Analysis Required	REMARKS/LOC ID
45	55-6-8	3/9/10	11:45	50	3	G			
46	55-7-8		12:00	50	3	G			
47	55-8-8		12:15	50	3	G			
48	55-9-8		12:35	50	3	G			
49	55-10-8		12:50	50	3	G			
50	55-11-4		13:10	50	3	G			
51	54-1-4		15:00	50	3	G			
52	54-2-4		15:10	50	3	G			
53	54-3-8		15:25	50	3	G			
54	54-4-8		15:40	50	3	G			

2

Collected/Relinquished By: (1)	Date	Time	Received By:	Time
<u>Rob DL</u>	<u>3/11/10</u>	<u>15:15</u>	<u>Andrew Eyer</u>	
Relinquished By: (2)	Date	Time	Received By:	Time
Relinquished By: (3)	Date	Time	Received By:	Time
Relinquished By: (4)	Date	Time	Received For Laboratory By:	Time

4

DOD Project? YES NO  
Cooler ID \_\_\_\_\_

Special Deliverable Requirements:

Requested Turnaround Time and/or Special Instructions:

Samples Received Cold?  YES  NO  
Cooler TB 2-01-2-1,2,20

Temperature °C: 2-01-2-1,2,20

Chain of Custody Seal: (Circle)  
INTACT  BROKEN  ABSENT

**APPENDIX III**

**PHOTOGRAPHS SHOWING SOIL BORING LOCATIONS**









