

PRELIMINARY SITE ASSESSMENT REPORT

**SR 1406 (Piney Green Road) from NC 24 to US 17
2774 Piney Green Road, Parcel #335
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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TABLE OF CONTENTS

<u>Section</u>	<u>Subject</u>	<u>Page</u>
Signature Page		ii
Executive Summary		iii
1.0	Introduction.....	1
2.0	Background.....	1
3.0	Local Geology and Surroundings	1
4.0	Subsurface Investigation.....	2
	4.1 Geophysical Evaluation at Parcel #335	2
	4.1.1 Ground Penetrating Radar Methodology	3
	4.1.2 Time Domain Electromagnetic Methodology	4
	4.1.3 Field Procedures	4
	4.2 Subsurface Soil Investigation at Parcel #335.....	5
5.0	Conclusions and Recommendations	8

Figures

- 1 USGS Topographic Location Map
- 2 Site Sketch Showing Soil Boring Locations
- 3 Key Map Showing Parcel Location
- 4 Site Map Showing Results of Geophysical Survey Investigation, Parcel 335

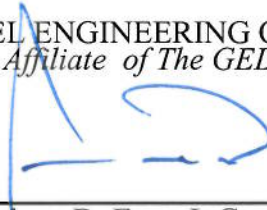
Appendices

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

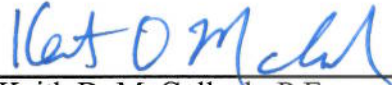
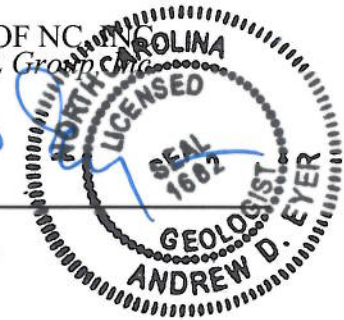
Signature Page

This document, entitled "Preliminary Site Assessment Report," has been prepared for Parcel #335, located at 2774 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, INC.
an Affiliate of The GEL Group, Inc.



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04-16-10

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Onslow County**

Executive Summary

The subject site is Parcel #335, located at 2774 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 westerly Right-of-Way (ROW) of Piney Green Road adjacent to Parcel #335. Parcel #335 was formerly a service station, and currently contains a church and automobile parts retail facility.

GEL performed a preliminary site assessment within the NCDOT proposed westerly ROW of Piney Green Road adjacent to Parcel #335 that included a geophysical survey, and the collection and analysis of soil samples. Two adjacent subsurface anomalies were identified within the proposed ROW by EM-61 data during the geophysical investigation, but the anomalies could not be confirmed by ground penetration radar (GPR) data collected over the same area; therefore, these anomalies are considered to be “Possible” USTs.

Soil samples were collected for analysis from four borings constructed within the NCDOT proposed westerly ROW Piney Green Road adjacent to Parcel #335. The soil samples were analyzed for diesel range organics (DRO) and gasoline range organics (GRO). Analytical results for soil samples collected from one soil boring, S3-1, indicated that the detected GRO and DRO concentration exceeded the North Carolina Department of Environment and Natural Resources (NCDENR) DRO and GRO action levels of 10 milligrams per kilogram (mg/kg). Therefore, these analytical results are indicative of soil impact. However, analysis of the soil for petroleum hydrocarbon constituents such as volatile organic compounds (VOCs) and polynuclear aromatic hydrocarbons (PAHs) would be needed to confirm the soil impact. The total estimated quantity of impacted soil

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Executive Summary (continued)

(DRO >10 mg/kg and GRO >10 mg/kg) at the subject site is approximately 415 cubic yards in a localized area encompassing soil boring S3-1.

Based on the data generated from this investigation, there is evidence that a release(s) of petroleum has occurred within the southerly portion of the NCDOT proposed westerly ROW at the subject site, and may have originated from a suspected former UST(s) located approximately 70 feet west of the boring. Additional environmental investigation of the suspected area of soil impact shown in Figure 2 may be warranted to confirm and delineate the area of soil impact, and to determine the presence or absence of groundwater impact. 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 boring S3-1 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 westerly Right-of-Way (ROW) at Parcel #335 located at 2774 Piney Green Road in Midway Park, North Carolina. Parcel #335 is a former service station presently used as a church. An automobile parts retail facility is also located on Parcel #335, north of the church. 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 underground storage tanks (USTs) and on-site constituents of concern in soil within the NCDOT proposed ROW 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 #335 and its location on Piney Green Road, respectively.

3.0 Local Geology and Surroundings

Parcel #335 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 east of the center of Midway Park, North Carolina, and approximately 6.5 miles east of the center of Jacksonville, North Carolina.

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fc: ncdt00110

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 37 feet above mean sea level. The topography in Figure 1 indicates that groundwater in the vicinity of Parcel #335 most likely flows in a northwesterly 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 #335, 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 westerly ROW of Piney Green Road adjacent to Parcel #335.
- Soil vapor screening of soil samples collected from subsurface soil borings at Parcel #335 within the proposed westerly 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 westerly ROW of Piney Green Road at Parcel #335.

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

4.1 Geophysical Evaluation at Parcel #335

The geophysical investigation included the deployment of ground penetrating radar (GPR) technology and time domain electromagnetic technology (TDEM) to the site.

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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 westerly ROW of Piney Green Road at Parcel #335 prior to the initiation of the preliminary site assessment field activities at the site. No underground utilities were marked by “One Call” within the westerly ROW at Parcel #335.

As shown on Figure 4, EM anomalies indicated the potential presence of USTs. The suspected area is located in under a concrete pad in front of the Word of God Church. Surface evidence suggests the existence of removed pump islands on the east side of the anomaly. GPR data were inconclusive and showed no anomaly in this area; therefore, this anomaly is considered to be a “Possible” UST.

4.2 Subsurface Soil Investigation at Parcel #335

To determine the presence or absence of impact to subsurface soil by constituents of concern, GEL collected soil samples from four subsurface soil borings, S3-1 through S3-4, at Parcel #335 on March 8, 2010, for analysis of total petroleum hydrocarbon indicator parameters. The soil borings were constructed within the proposed NCDOT westerly 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 direct push technology (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. 335**

Soil Boring	Depth Interval of Soil Sample Collected for Analysis (feet bls)	PID Reading (ppm)	Latitude/Longitude (NAD83)
S3-1	3-4	1700	34°43'07.80"N / 77°19'13.68"W
S3-2	3-4	1.7	34°43'08.16"N / 77°19'13.62"W
S3-3	7-8	2.0	34°43'08.46"N / 77°19'13.62"W
S3-4	7-8	0.2	34°43'09.30"N / 77°19'13.74"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

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
S3-1-4	3-4	151	1580
S3-2-4	3-4	BQL	BQL
S3-3-8	7-8	BQL	BQL
S3-4-8	7-8	BQL	BQL
NCDENR Action Level		10*	10

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.

Neither GRO nor DRO was detected in the soil samples collected from borings S3-2, S3-3, or S3-4. However, as shown in the summary table above, elevated levels of DRO and GRO exceeding the North Carolina Department of Environment and Natural Resources (NCDENR) action levels for DRO and GRO were detected in the soil sample collected from a depth of 3 to 4 feet bls from boring S3-1. Field observations during the construction of boring S3-1 indicated elevated PID readings in the soil (1700 parts per million (ppm) at 3 to 4 feet bls, and 1530 ppm at 7 to 8 feet bls), and the soil had a moderate to strong petroleum odor. The suspected impact soil impact in the vicinity of boring S3-1 is possibly associated with a release(s) from former onsite USTs, which appear to have been located approximately 70 feet west of the boring, in an area of missing asphalt pavement. Analysis of the soil 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.

It is estimated that there is an approximate total volume of 415 cubic yards of impacted soil (DRO >10 milligrams per kilogram (mg/kg) and/or GRO >10 mg/kg) in the vicinity of boring S3-1, based on the following assumed area (as shown on Figure 2) and depth of impacted soil:

- S3-1: 1400 sq. feet x 8 feet (assumed water table depth) = 11,200 cubic feet = 415 cubic yards

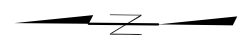
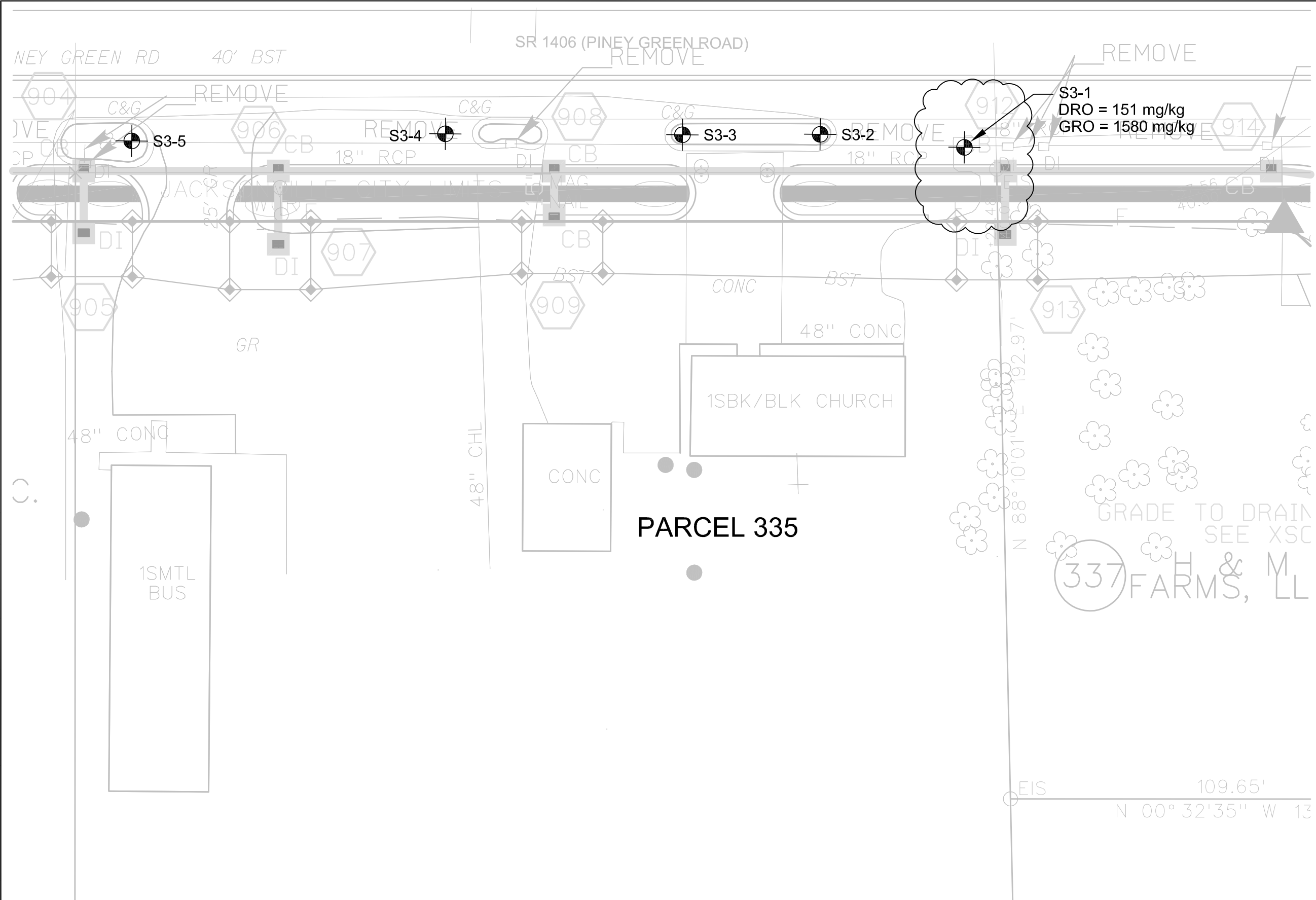
5.0 Conclusions and Recommendations

GEL performed a preliminary site assessment within the NCDOT proposed westerly ROW of Piney Green Road adjacent to Parcel #335 that included a geophysical survey, and the collection and analysis of soil samples. Subsurface anomalies were identified during the geophysical investigation, and it has been concluded that there are possible USTs present within the proposed westerly ROW of Piney Green Road adjacent to the site.

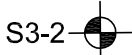




Soil samples were collected for analysis from four borings constructed within the NCDOT proposed westerly ROW Piney Green Road adjacent to Parcel #335. The soil samples were analyzed for DRO and GRO. Analytical results for soil samples collected from one soil boring, S3-1, indicated that the detected GRO and DRO concentration exceeded the NCDENR DRO and GRO 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 GRO >10 mg/kg) at the subject site is approximately 415 cubic yards in a localized area encompassing soil boring S3-1.

Based on the data generated from this investigation, there is evidence that a release(s) of petroleum has occurred within the southerly portion of the NCDOT proposed westerly ROW at the subject site, and may have originated from a suspected former UST(s) located approximately 70 feet west of the boring. Additional environmental investigation of the suspected area of soil impact shown in Figure 2 may be warranted to confirm and delineate the area of soil impact, and to determine the presence or absence of groundwater impact. 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 boring S3-1 in order to confirm the presence or absence of soil impact from petroleum hydrocarbons.

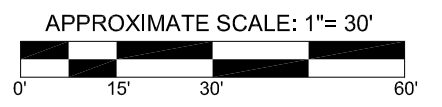
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LEGEND

-  S3-2 SOIL BORING LOCATION
-  DRO DIESEL RANGE ORGANICS
-  GRO GASOLINE RANGE ORGANICS
-  MILLIGRAMS PER KILOGRAM
-  ESTIMATED AREA OF SOIL IMPACT

NOTE:
SEE FIGURE 3 FOR KEY MAP
SHOWING PARCEL LOCATIONS



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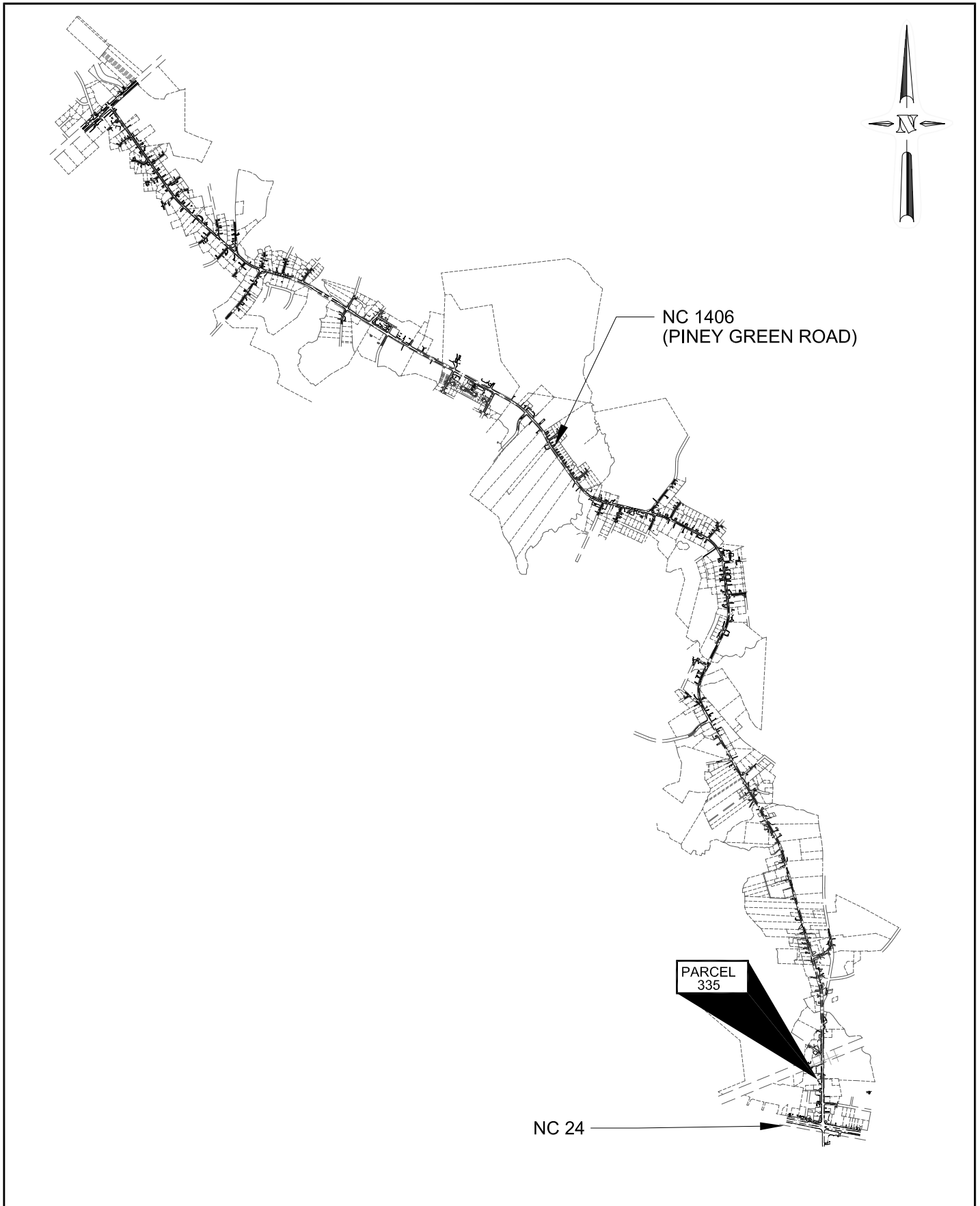
PROJECT: ncdt00110
PRELIMINARY SITE ASSESSMENT REPORT
PARCEL NO. 335, MACIE W. GREGORY
2774 PINEY GREEN ROAD
MIDWAY PARK, NORTH CAROLINA
STATE PROJECT U-3810, WBS #35801.1.1


DATE: May 3, 2010

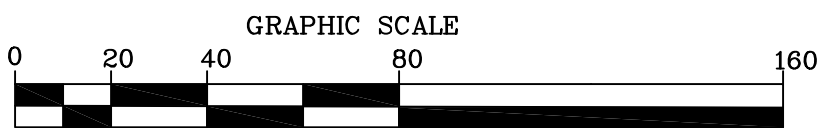
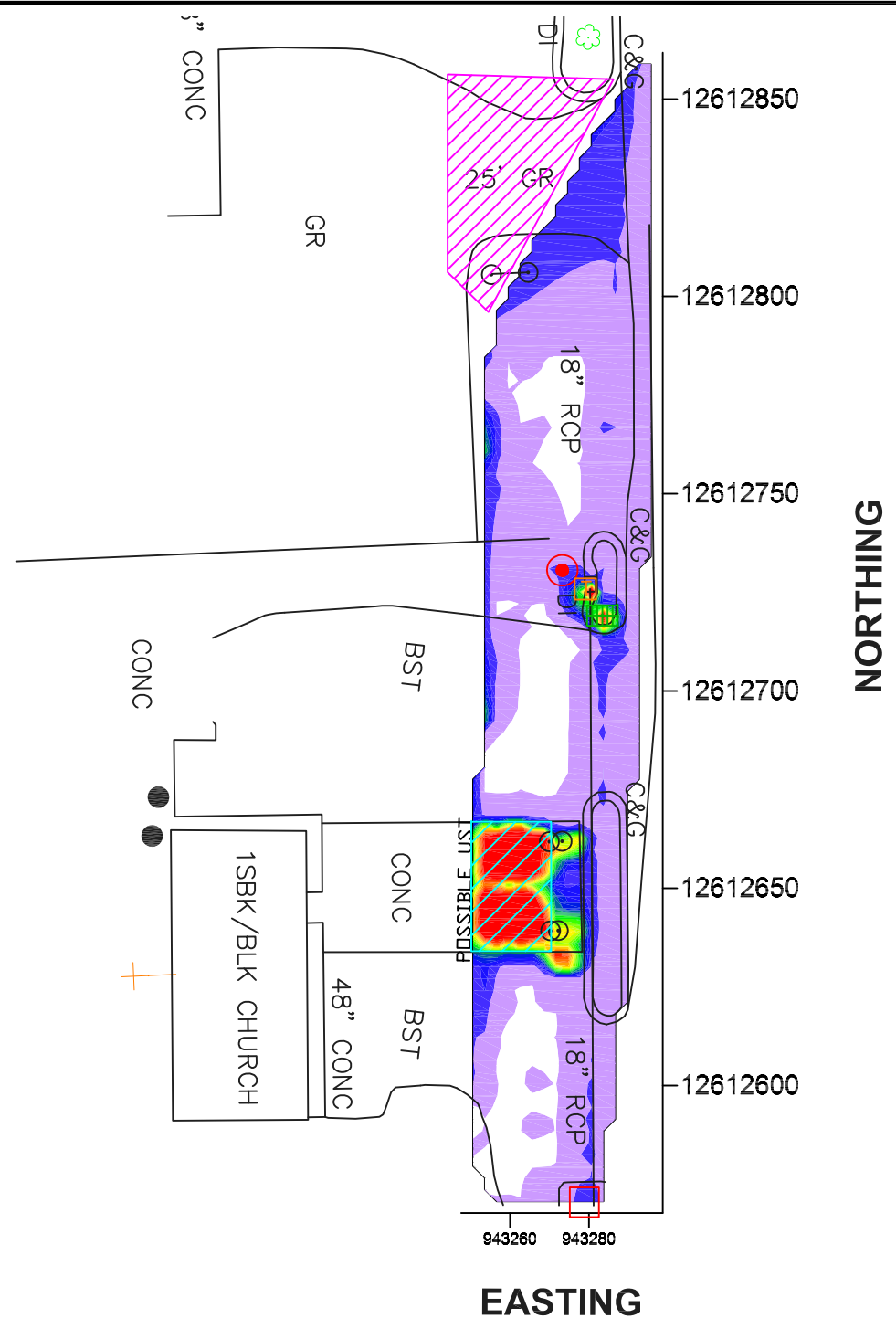
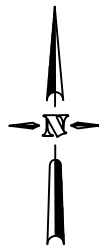
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APPRV. BY: ADE

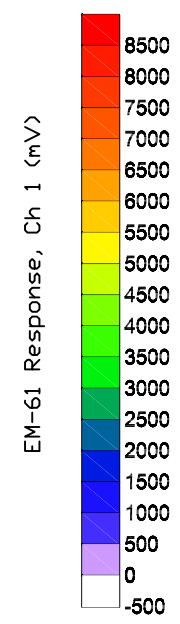
FIGURE
2









 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	KEY MAP SHOWING PARCEL LOCATION	FIGURE 3
		PRELIMINARY SITE ASSESSMENT REPORT PARCEL 335 MIDWAY PARK, NORTH CAROLINA STATE PROJECT U-3810, WBS# 35801.1.1		
DATE: April 6, 2010		DRAWN BY: TJP	APPRV. BY: ADE	



(IN FEET)
1 INCH = 40 ft.



LEGEND

-  COMMUNICATIONS HANDHOLE
-  UTILITY POLE
-  UNKNOWN UTILITY
-  STORMWATER DRAINAGE GRATE
-  CONSTRUCTION EQUIPMENT IN AREA, INCOMPLETE DATA
-  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**



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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
March 11, 2010

Site Map Showing Results Of
Geophysical Survey Investigation
Parcel 335
DRAWN BY: DEA
APPRV. BY: CMS

FIGURE
4

APPENDIX I

SOIL BORING LITHOLOGIC LOGS

SOIL BORING LOG

Boring/Well No.: 53-1

Date Started: 3/9/10

Date Completed: 3/9/10

08:50 →

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	—	1700	DK. Gray Brown Silty Sand 0'-2'; Damp Gray, Brown Clayey Sand, Moist, Organics	Mod. Odor Strong
2	4-8		1530	Gray, Brown Clayey Sand → Firm, Lt. Gray Tan Sandy Clay → Lt. Gray Silty Sand (7'-8')	Moist Strong Odor
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

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

34° 43.130 N

77° 19.228 W

SOIL BORING LOG

Boring/Well No.: 53-2

Date Started: 3/9/10

Date Completed: 3/9/10

09:00 *

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	—	1.7	Grass Mat, Organics, Brown Clayey Sand-Damp layer gravel: old concrete (1'), Brown Sandy Clay, Moist	
2	4-8	—	0.7	Gray, Orange Brown, Mottled Sandy Clay - Moist (6.5'-8') ⇒ Mottled Clayey, silty sand, Moist-Wet	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

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

34943.136N

77019.227W

SOIL BORING LOG

Boring/Well No.: 53-3
 Date Started: 3/9/10
 Date Completed: 3/9/10

09:15 *

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	—	0.5	Grass Mat, Organics, Cemented Sands & shell fragments, Gray-tan Firm Clayey Sand, Moist	
2	4-8	—	2.0	Asphalt layer (5") Brn Gray, Moist Clayey Sand - 7" Lt. Gray Orange Sandy Clay, Moist / (More sand towards depth)	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

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

34° 43.141 N

77° 19.227 W

SOIL BORING LOG

Boring/Well No.: 53-4
 Date Started: 3/9/10
 Date Completed: 3/9/10

09:40 *

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	—	0.1	Grass and Organics, Asphalt (1") Brown, Silty Sand → Orange Brown, Tan Sandy Clay - Moist	Damp
2	4-8	—	0.2	Tan → Gray Sandy Clay. Moist → Gray Silty Sand Moist - Wet	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

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

34° 43.155 N

77° 19.229 W

SOIL BORING LOG

Boring/Well No.: 53-5

Date Started: 3/9/10

Date Completed: 3/9/10

09:50 *

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	—	0.3	Grass Mat, Organics, (1" Bls) Gravel-Concrete Brown Silty Sand → Orange Gray Mottled	Sandy Clay - Moist
2	4-8	—	0.1	Orange Gray Silty Clay - Moist → Lt. Gray fine Silty Sand, Moist - Wet	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

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

34° 43.164 N

77° 19.228 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

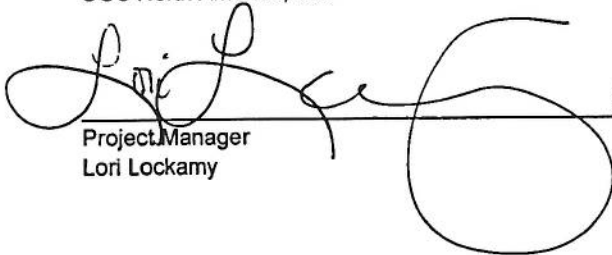
Dear Andrew Eyer,

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', written over a horizontal line.

Project Manager
Lori Lockamy

23 March 2010
Date

Case Narrative
GEL

SGS Project: G341-616
Project Name: U-3810/NCDT001100

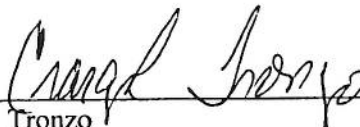
SGS North America Inc.

March 22nd, 2010

- Seventy four soil samples were accepted into the laboratory on March 11th, 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: S3-1-4
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-616-2A
 Lab Project ID: G341-616
 Report Basis: Dry Weight

Analyzed By: BAO
 Date Collected: 3/9/2010 8:50
 Date Received: 3/11/2010
 Matrix: Soil
 Solids 85.24

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	1580	337	mg/Kg	125	03/15/10 15:24

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	91.0	91.0		70-130

Comments:

Batch Information

Analytical Batch: VP031510
 Analytical Method: 8015
 Instrument ID: GC4
 Analyst: BAO

Prep Method: 5035
 Initial Wt/Vol: 8.71 g
 Final Volume: 5 mL

Analyst: BAO

NC Certification #481

Reviewed By: CB
GRO.XLS

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

Client Sample ID: S3-1-4
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-616-2D
 Lab Project ID: G341-616

Date Collected: 3/9/2010 8:50
 Date Received: 3/11/2010
 Matrix: Soil
 Solids 85.24
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	151	7.00	mg/Kg	1	03/17/10 04:52
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	42.1	105

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: 33.5 G
 Prep Final Vol: 10 mL

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: S3-2-4
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-616-3A
 Lab Project ID: G341-616
 Report Basis: Dry Weight

Analyzed By: BAO
 Date Collected: 3/9/2010 9:00
 Date Received: 3/11/2010
 Matrix: Soil
 Solids 84.81

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.13	mg/Kg	1	03/13/10 04:17

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	92.0	92.0		70-130

Comments:


Batch Information

Analytical Batch: VP031210
 Analytical Method: 8015
 Instrument ID: GC4
 Analyst: BAO

Prep Method: 5035
 Initial Wt/Vol: 6.9 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: S3-2-4
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-616-3D
 Lab Project ID: G341-616

Date Collected: 3/9/2010 9:00
 Date Received: 3/11/2010
 Matrix: Soil
 Solids 84.81
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.01	mg/Kg	1	03/16/10 16:46
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	40	100

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: 33.63 G
 Prep Final Vol: 10 mL

Analyst: FX

NC Certification #481

Reviewed By: 
 DR0.XLS
 Page 160 of 230

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: S3-3-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-616-4A
 Lab Project ID: G341-616
 Report Basis: Dry Weight

Analyzed By: BAO
 Date Collected: 3/9/2010 9:15
 Date Received: 3/11/2010
 Matrix: Soil
 Solids 83.15

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	4.61	mg/Kg	1	03/13/10 04:44

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	91.4	91.4		70-130

Comments:

Batch Information

Analytical Batch: VP031210
 Analytical Method: 8015
 Instrument ID: GC4
 Analyst: BAO

Prep Method: 5035
 Initial Wt/Vol: 7.82 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: S3-3-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-616-4D
 Lab Project ID: G341-616

Date Collected: 3/9/2010 9:15
 Date Received: 3/11/2010
 Matrix: Soil
 Solids 83.15
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.40	mg/Kg	1	03/16/10 17:15
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	39	97.4

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: 32.51 G
 Prep Final Vol: 10 mL

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: S3-4-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-616-5A
 Lab Project ID: G341-616
 Report Basis: Dry Weight

Analyzed By: BAO
 Date Collected: 3/9/2010 9:40
 Date Received: 3/11/2010
 Matrix: Soil
 Solids 81.63

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	4.46	mg/Kg	1	03/13/10 05:11

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	91.3	91.3		70-130

Comments:

Batch Information

Analytical Batch: VP031210
 Analytical Method: 8015
 Instrument ID: GC4
 Analyst: BAO

Prep Method: 5035
 Initial Wt/Vol: 8.24 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: S3-4-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-616-5D
 Lab Project ID: G341-616

Date Collected: 3/9/2010 9:40
 Date Received: 3/11/2010
 Matrix: Soil
 Solids 81.63
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.42	mg/Kg	1	03/16/10 17:43
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	36.2	90.6

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 G
 Prep Final Vol: 10 mL

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: S3-5-4
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-616-6A
 Lab Project ID: G341-616
 Report Basis: Dry Weight

Analyzed By: BAO
 Date Collected: 3/9/2010 9:50
 Date Received: 3/11/2010
 Matrix: Soil
 Solids 84.20

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.52	mg/Kg	1	03/13/10 05:39

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	89.8	89.8		70-130

Comments:

Batch Information

Analytical Batch: VP031210
 Analytical Method: 8015
 Instrument ID: GC4
 Analyst: BAO

Prep Method: 5035
 Initial Wt/Vol: 6.46 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: S3-5-4
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-616-6D
 Lab Project ID: G341-616

Date Collected: 3/9/2010 9:50
 Date Received: 3/11/2010
 Matrix: Soil
 Solids 84.20
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.13	mg/Kg	1	03/16/10 18:11
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	36.6	91.5

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: 33.3 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/COLO SITE/PWSID#: ONG Low Ca.
 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

SGS North America, Inc.

#	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	08:50	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

4

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

Relinquished By: (2) _____ Received By: _____

Relinquished By: (3) _____ Received By: _____

Relinquished By: (4) _____ Received 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
Temperature: 2.0 p, 2.0 c

Chain of Custody Seal: (Circle)
INTACT BROKEN ABSENT

APPENDIX III

PHOTOGRAPHS SHOWING SOIL BORING LOCATIONS



2774 PINEY GREEN ROAD
PARCEL NO. 335

S3-5

S3-4

S3-3

S3-2

S3-1

PINEY GREEN ROAD

