

PRELIMINARY SITE ASSESSMENT REPORT

**SR 1406 (Piney Green Road) from NC 24 to US 17
465 Piney Green Road, Parcel #057
Jacksonville, 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

PRELIMINARY SITE ASSESSMENT REPORT

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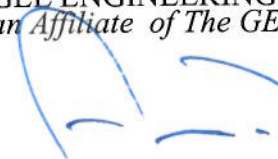
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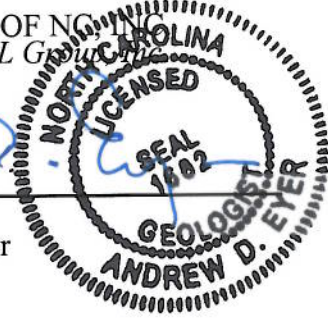
Signature Page


This document, entitled "Preliminary Site Assessment Report," has been prepared for Parcel #057, located at 465 Piney Green Road in Jacksonville, 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.
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04-16-10

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Executive Summary

The subject site is Parcel #057, located at 465 Piney Green Road in Jacksonville, 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 Rights-of-Way (ROWs) adjacent to Parcel #057. Currently, Parcel #057 contains an active florist operation.

GEL Engineering of NC, Inc. (GEL) performed a preliminary site assessment within the NCDOT proposed ROWs of Piney Green Road and Wolf Swamp Road adjacent to Parcel #057 that included a geophysical survey, and the collection and analysis of soil samples. No subsurface anomalies were identified during the geophysical investigation, and it has been concluded that there are no known, probable, or possible USTs present within the NCDOT proposed ROWs of Piney Green Road and Wolf Swamp Road adjacent to the site.

Soil samples were collected for analysis from six borings constructed within the NCDOT proposed northeasterly ROW of Piney Green Road and proposed westerly ROW of Wolf Swamp Road adjacent to Parcel #057. The soil samples were analyzed for diesel range organics (DRO) and gasoline range organics (GRO). Analytical results for a soil sample collected from one soil boring, S16-1, indicated that the detected DRO concentration slightly exceeded the North Carolina Department of Environment and Natural Resources (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 volatile organic compounds (VOCs) and polynuclear aromatic hydrocarbons (PAHs) would be needed to confirm the soil impact. The total estimated quantity of impacted soil (DRO >10 mg/kg) at the subject site is approximately 21 cubic yards in a localized area encompassing soil boring S16-1.

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Executive Summary (continued)

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. No additional environmental investigation of the site soil 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 S16-1 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 proposed North Carolina Department of Transportation (NCDOT) Rights-of-Way (ROWs) at Parcel #057 located at 465 Piney Green Road in Jacksonville, North Carolina. Parcel #057 contains an active florist operation. Two petroleum underground storage tanks were reportedly removed from this site in 1989. 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 onsite constituents of concern in soil within the NCDOT proposed ROWs 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 onsite 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 #057 and its location on Piney Green Road, respectively.

3.0 Local Geology and Surroundings

Parcel #057 is in a developed area of Jacksonville in Onslow County, North Carolina. Surrounding land uses include residential and commercial activities.

The site is located approximately 4.5 miles northeast 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

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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 Craven Fine Sandy Loam (CrC), typically composed of fine sandy loam interstratified with clay. The soils encountered at the site during the preliminary site assessment consisted predominantly of tan/brown/gray silty sand and sandy clay to depths of 8 feet below land surface (bls).

Based on the moisture content of the 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 27 feet above mean sea level. The topography in Figure 1 indicates that groundwater in the vicinity of Parcel #057 most likely flows in a northwesterly direction towards an unnamed tributary of Northeast Creek.

4.0 Subsurface Investigation

To determine the presence or absence of USTs and impact to subsurface soil within the NCDOT ROWs at Parcel #071, 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 northeasterly ROW of Piney Green Road and the proposed westerly ROW of Wolf Swamp Road adjacent to Parcel #057.
- Soil vapor screening of soil samples collected from subsurface soil borings at Parcel #057 within the proposed ROWs of Piney Green Road and Wolf Swamp 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 ROWs of Piney Green Road and Wolf Swamp Road at Parcel #057.

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

4.1 Geophysical Evaluation at Parcel #057

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 #057 on March 17, 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 northeasterly ROW of Piney Green Road and the westerly ROW of Wolf Swamp Road at Parcel #057 prior to the initiation of the preliminary site assessment field activities at the site. Underground utilities were marked by “One Call” within both ROWs at Parcel #057.

As shown on Figure 4, no EM or GPR anomalies indicating the potential presence of USTs were identified; therefore, no USTs are suspected to be present in the subsurface of the investigation area.

4.2 Subsurface Soil Investigation at Parcel #057

To determine the presence or absence of impact to subsurface soil by constituents of concern, GEL collected soil samples from six subsurface soil borings, S16-1 through S16-6, at Parcel #057 on March 23, 2010, for analysis of total petroleum hydrocarbon indicator parameters. The soil borings were constructed within the NCDOT proposed ROWs of Piney Green Road and Wolf Swamp 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.

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. 057**

Soil Boring	Depth Interval of Soil Sample Collected for Analysis (feet bls)	PID Reading (ppm)	Latitude/Longitude (NAD83)
S16-1	3-4	0.0	34°46'39.54"N / 77°22'08.52"W
S16-2	7-8	0.0	34°46'39.00"N / 77°22'07.80"W
S16-3	3-4	0.0	34°46'38.70"N / 77°22'07.32"W
S16-4	7-8	0.0	34°46'38.28"N / 77°22'06.90"W
S16-5	7-8	0.3	34°46'38.52"N / 77°22'06.48"W
S16-6	7-8	0.0	34°46'38.88"N / 77°22'06.66"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
S16-1-4	3-4	11.4	BQL
S16-2-8	7-8	BQL	BQL
S16-3-4	3-4	BQL	BQL
S16-4-8	7-8	BQL	BQL
S16-5-8	7-8	BQL	BQL
S16-6-8	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.

GRO was not detected in any of the seven soil samples collected at the site, and DRO was detected in only one sample, S16-1-4, at a concentration of 11.4 milligrams per kilogram (mg/kg), which exceeds the recommended North Carolina Department of Environment and Natural Resources (NCDENR) action level for DRO (10 mg/kg). The DRO exceedance in boring S16-1 was for a soil sample collected in the uppermost 3 to 4 feet below land surface, and is most likely the result of incidental minor spills adjacent to boring S16-1 from vehicular traffic on Piney Green Road. 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 21 cubic yards of impacted soil (DRO >10 mg/kg) in the vicinity of boring S16-1, based on the following assumed area (as shown on Figure 2) and depth of impacted soil:

- S16-1: 70 sq. feet x 8 feet (assumed depth to the water table) = 560 cubic feet = 21 cubic yards

5.0 Conclusions and Recommendations

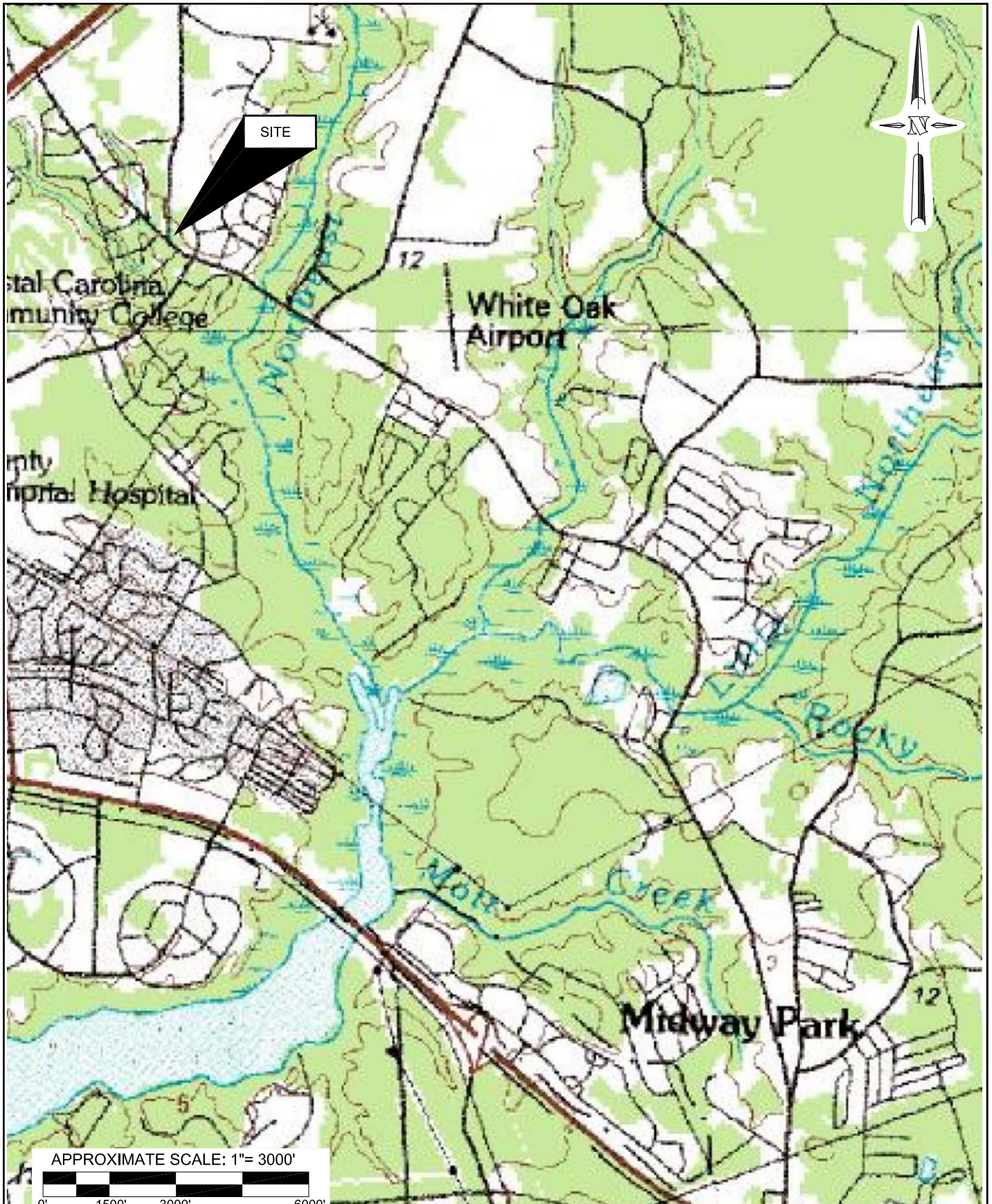
GEL performed a preliminary site assessment within the NCDOT proposed ROWs of Piney Green Road and Wolf Swamp Road adjacent to Parcel #057 that included a geophysical survey, and the collection and analysis of soil samples. No subsurface anomalies were identified during the geophysical investigation, and it has been concluded

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that there are no known, probable, or possible USTs present within the NCDOT proposed ROWs of Piney Green Road and Wolf Swamp Road adjacent to the site.

Soil samples were collected for analysis from six borings constructed within the NCDOT proposed northeasterly ROW of Piney Green Road and proposed westerly ROW of Wolf Swamp Road adjacent to Parcel #057. The soil samples were analyzed for DRO and GRO. Analytical results for a soil sample collected from one soil boring, S16-1, 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) at the subject site is approximately 21 cubic yards in a localized area encompassing soil boring S16-1.

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. No additional environmental investigation of the site soil 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 S16-1 in order to confirm the presence or absence of soil impact from petroleum hydrocarbons.



DRAWING TAKEN FROM USGS 7.5 MINUTE TOPOGRAPHIC MAP (CAMP LEJEUENE, NC QUADRANGLE)

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problem solved

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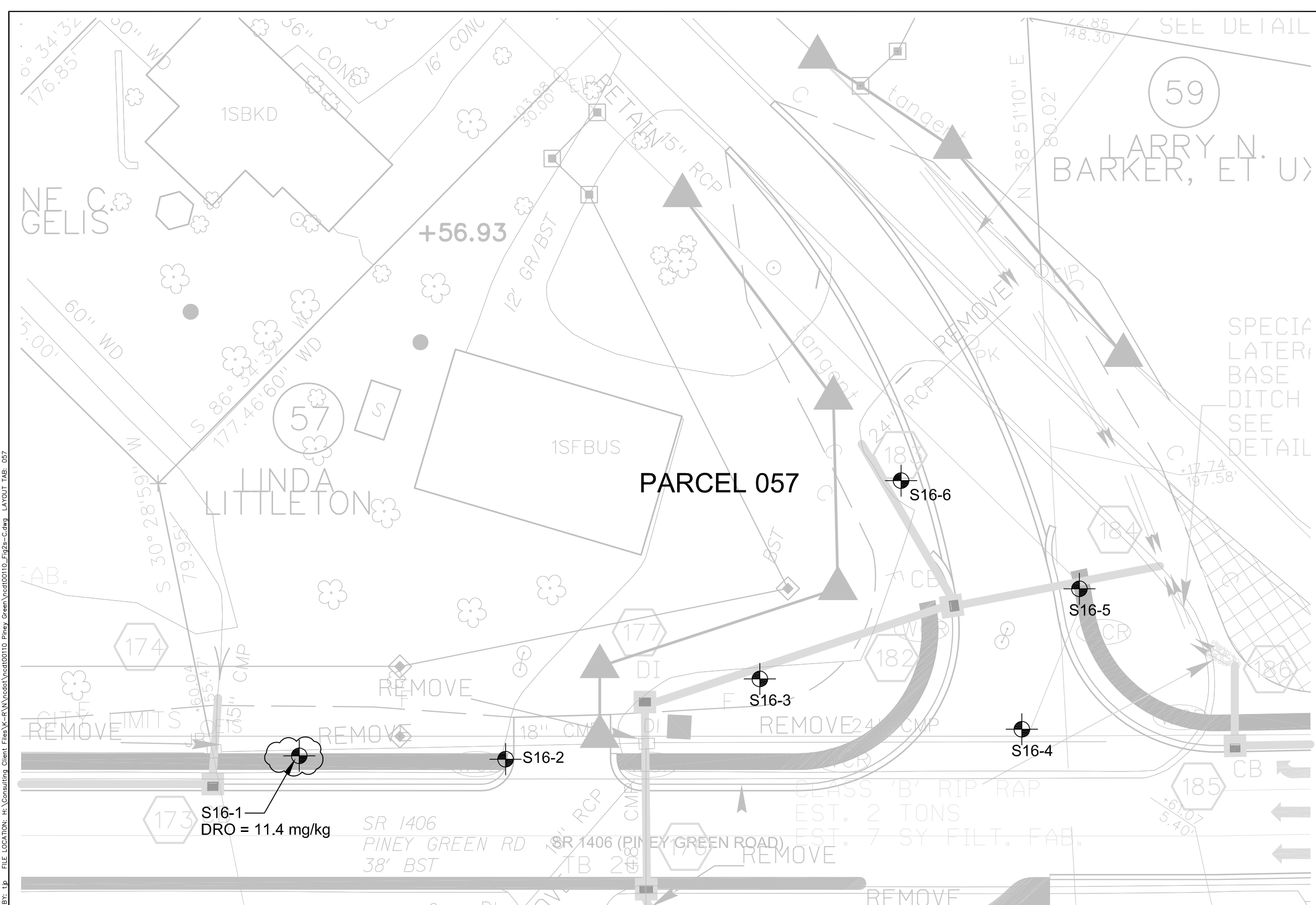
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 PARCEL 057
 JACKSONVILLE, NORTH CAROLINA
 STATE PROJECT U-3810, WBS# 35801.1.1

DATE: April 6, 2010

USGS TOPOGRAPHIC
 LOCATION MAP

DRAWN BY: TJP APPRV. BY: ADE

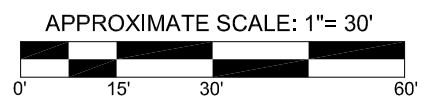
FIGURE
 1



LEGEND

- S16-2 SOIL BORING LOCATION
- DRO DIESEL 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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JACKSONVILLE, NORTH CAROLINA
STATE PROJECT U-3810, WBS #35801.1.1

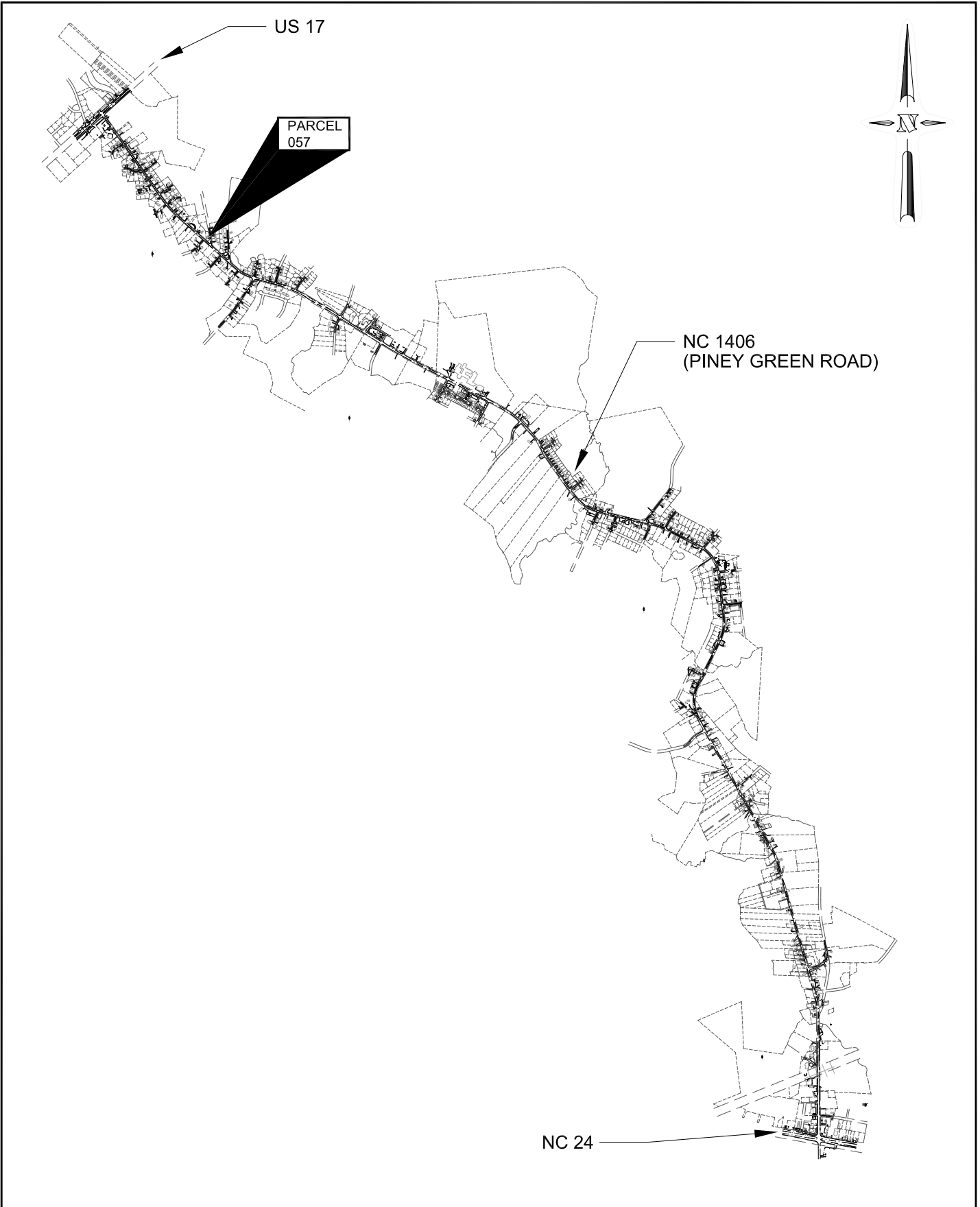
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SITE SKETCH SHOWING
SOIL BORING LOCATIONS

DRAWN BY: TJP APPRV. BY: ADE

FIGURE
2

PLOTTED: May 07, 2010 - 8:40am BY: tjp FILE LOCATION: H:\Consulting Client Files\K-R\N\ncdt00110\Piney Green\ncdt00110_Fig2s-C.dwg LAYOUT TAB: 057

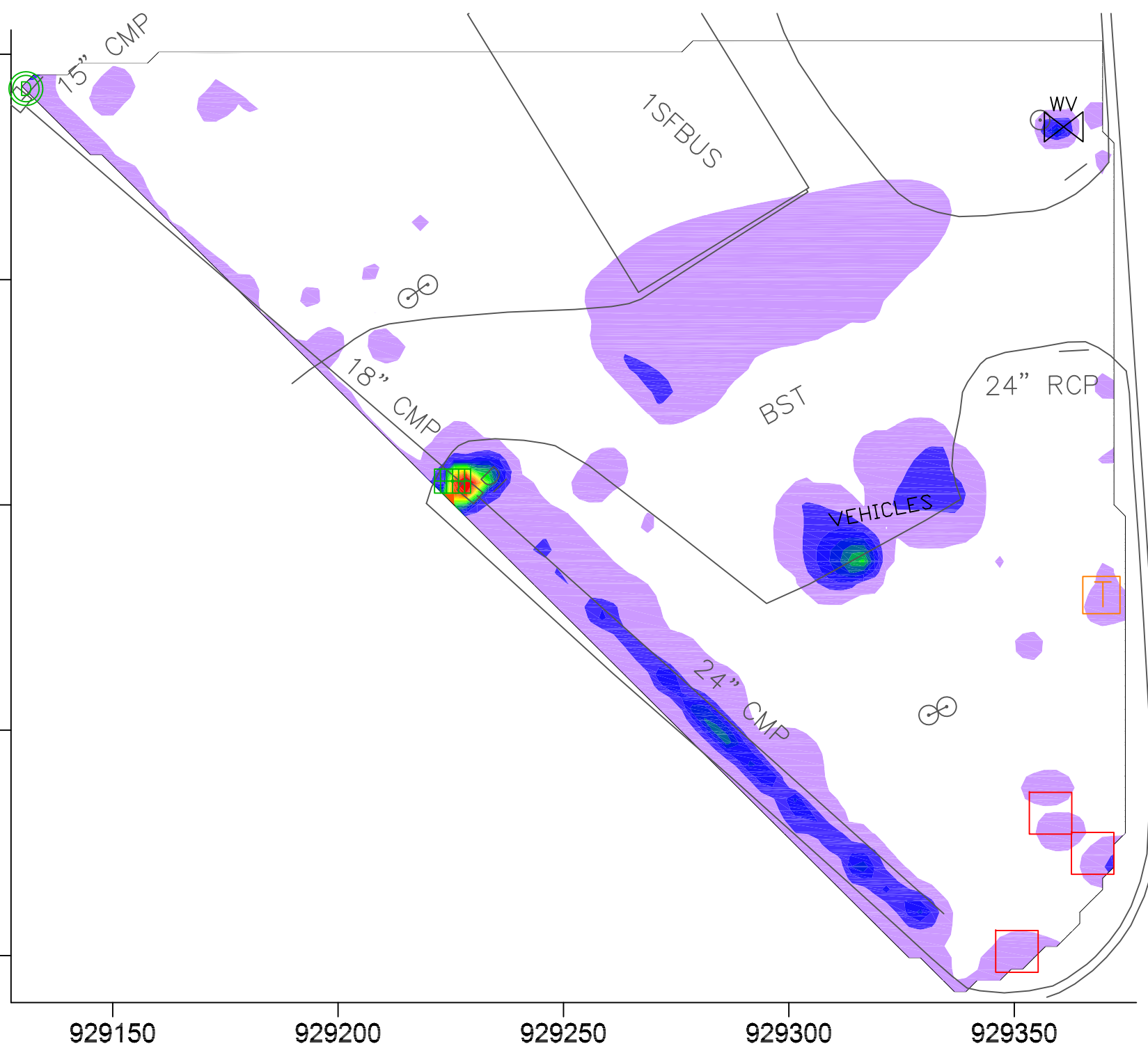


 Engineering of NC Inc. an Affiliate of THE GEL GROUP INC problem solved	P.O. Box 14262 RTP, NC 27709 P: 919.544.1100 F: 919.406.1807 www.gel.com	PROJECT: ncdt00110 PRELIMINARY SITE ASSESSMENT REPORT PARCEL 057 JACKSONVILLE, NORTH CAROLINA STATE PROJECT U-3810, WBS# 35801.1.1	KEY MAP SHOWING PARCEL LOCATION	FIGURE 3
	DATE: April 6, 2010	DRAWN BY: TJP APPRV. BY: ADE		



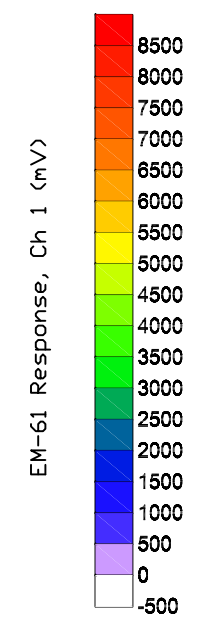
NORTHING

12634350
12634300
12634250
12634200
12634150



929150 929200 929250 929300 929350

EASTING



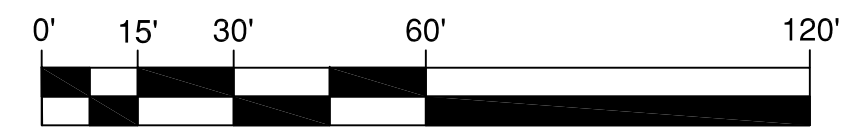
LEGEND

- STORM DRAIN MANHOLE
- WATER VALVE
- STORMWATER DRAINAGE GRATE
- UNKNOWN UTILITY
- COMMUNICATIONS PEDESTAL

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



(IN FEET)
1 inch = 30 ft.

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Preliminary Site Assessment
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Onslow County, North Carolina
State Project U-3810, WBS# 35801.1.1

March 11, 2010

Site Map Showing Results Of
Geophysical Survey Investigation
Parcel 057
DRAWN BY: DEA APPRV. BY: CMS

FIGURE
4

APPENDIX I

SOIL BORING LITHOLOGIC LOGS

SOIL BORING LOG

Boring/Well No.: *516-1*

Date Started: *3/23/10*

Date Completed: *3/23/10*

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	-	0.0	Grass Mat, Brown Silty Sand, Moist - Wet @ 4'	
2	4-8	-	0.0	" Brn - Lt. Gray Silty Fine Sand, Wet	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

1745 *

Notes:

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

659
 340 46. ~~656~~ N
 770 22. ~~142~~ W
~~142~~
 142

SOIL BORING LOG

Boring/Well No.: 516-2
 Date Started: 3/23/10
 Date Completed: 3/23/10

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	-	0.0	Grass Mat, Brun Tan Organic Silty Sand, Moist	
2	4-8	-	0.0	Brown Sandy Clay, Moist " Gray clayey sand, wet	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

1755 *

Notes:

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

34° 46.650 N
 77° 22.128 W
 130

SOIL BORING LOG

Boring/Well No.: S16-3
 Date Started: 3/23/10
 Date Completed: 3/23/10

1810 *

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	—	0.0	Grass Mat, Organic Silty Sand, Moist Tan Sandy Clay	
2	4-8	—	0.0	Tan Brown Sandy Clay, Moist Wet	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

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

34° 46.645 N

77° 22.122 W

SOIL BORING LOG

Boring/Well No.: 516-~~4~~
 Date Started: 3/23/10
 Date Completed: 3/23/10

1820
 &

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	—	0.0	Organic, DK Brn S: lty Sand → Tan Sandy Clay, Moist. DK Brn Clayey Sand, Moist-wet	
2	4-8	—	0.0	Brn Tan Clayey Sand, Tan Sandy Clay, Moist	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

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

340 46.638 N
 77° 22.115 W

SOIL BORING LOG

Boring/Well No.: 516-5
 Date Started: 3/23/10
 Date Completed: 3/23/10

1730
 *

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	—	0.0	Bn Organic Silty Sand, Moist → Bn Clayey Sand, Orange Brn, Tan Sandy Clay	Moist
2	4-8	—	0.3	11, Lt. Gray, Tan Sandy Clay, Moist-Wet	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

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

34° 46.642 N

77° 22.108 W

SOIL BORING LOG

Boring/Well No.: 516-6
 Date Started: 3/23/10
 Date Completed: 3/23/10

1840

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	—	0.0	Grassmat, Organics silty sand, Brn, Moist	
2	4-8	—	0.0	Brn Sandy silt, Wet Tan clayey sand, Wet	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

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

34° 46.648 N

77° 22.111 W

APPENDIX II

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



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

Report Number: G341-617

Client Project: U-3810/NCDOT 001100

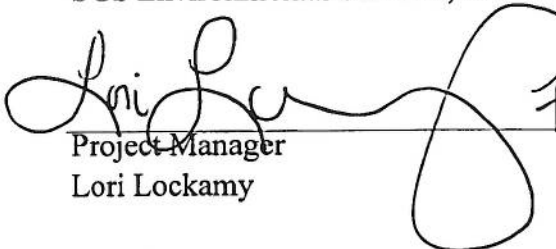
Dear Mr. Eyer:

Enclosed are the results of the analytical services performed under the referenced project. 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 the services performed during this project, please call SGS at (910) 350-1903. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS Environmental Services for your analytical services. We look forward to working with you again on any additional analytical needs which you may have.

Sincerely,
SGS Environmental Services, Inc.


Project Manager
Lori Lockamy

7 April 2010
Date

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

$\mu\text{g}/\text{kg}$ = micrograms per kilogram, ppb, parts per billion

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

$\mu\text{g}/\text{L}$ = 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: S16-1-4
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-36A
 Lab Project ID: G341-617
 Report Basis: Dry Weight

Analyzed By: BAO
 Date Collected: 3/23/2010 17:45
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 76.78

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.27	mg/Kg	1	03/30/10 14:50

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	94.5	94.5		70-130

Comments:

Batch Information

Analytical Batch: VP033010
 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: [Signature]
GRO.XLS

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

Client Sample ID: S16-1-4
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-36D
 Lab Project ID: G341-617

Date Collected: 3/23/2010 17:45
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 76.78
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	11.4	7.62	mg/Kg	1	03/26/10 14:27
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	27.5	68.7

Comments:

Batch Information

Analytical Batch: EP032610
 Analytical Method: 8015
 Instrument: GC6
 Analyst: DTF

Prep batch: 16276
 Prep Method: 3541
 Prep Date: 03/25/10
 Initial Prep Wt/Vol: 34.18 G
 Prep Final Vol: 10 mL

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: S16-2-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-37A
 Lab Project ID: G341-617
 Report Basis: Dry Weight

Analyzed By: BAO
 Date Collected: 3/23/2010 17:55
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 82.78

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.03	mg/Kg	1	03/30/10 15:17

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	94.8	94.8		70-130

Comments:


Batch Information

Analytical Batch: VP033010
 Analytical Method: 8015
 Instrument ID: GC4
 Analyst: BAO

Prep Method: 5035
 Initial Wt/Vol: 7.21 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: S16-2-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-37D
 Lab Project ID: G341-617

Date Collected: 3/23/2010 17:55
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 82.78
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.06	mg/Kg	1	03/26/10 14:55
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	36.7	91.7

Comments:

Batch Information

Analytical Batch: EP032610
 Analytical Method: 8015
 Instrument: GC6
 Analyst: DTF

Prep batch: 16276
 Prep Method: 3541
 Prep Date: 03/25/10
 Initial Prep Wt/Vol: 34.23 G
 Prep Final Vol: 10 mL

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: S16-3-4
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-38A
 Lab Project ID: G341-617
 Report Basis: Dry Weight

Analyzed By: BAO
 Date Collected: 3/23/2010 18:10
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 78.63

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.90	mg/Kg	1	03/30/10 15:43

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	97.5	97.5		70-130

Comments:

Batch Information

Analytical Batch: VP033010
 Analytical Method: 8015
 Instrument ID: GC4
 Analyst: BAO

Prep Method: 5035
 Initial Wt/Vol: 6.47 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: S16-3-4
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-38E
 Lab Project ID: G341-617

Date Collected: 3/23/2010 18:10
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 78.63
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.81	mg/Kg	1	03/30/10 17:05
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	27.9	69.9

Comments:

Batch Information

Analytical Batch: EP033010
 Analytical Method: 8015
 Instrument: GC6
 Analyst: DTF

Prep batch: 16288
 Prep Method: 3541
 Prep Date: 03/26/10
 Initial Prep Wt/Vol: 32.55 G
 Prep Final Vol: 10 mL

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: S16-4-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-39A
 Lab Project ID: G341-617
 Report Basis: Dry Weight

Analyzed By: BAO
 Date Collected: 3/23/2010 18:20
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 83.52

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	4.66	mg/Kg	1	03/30/10 16:10

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	98.8	98.8		70-130

Comments:


Batch Information

Analytical Batch: VP033010
 Analytical Method: 8015
 Instrument ID: GC4
 Analyst: BAO

Prep Method: 5035
 Initial Wt/Vol: 7.71 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: S16-4-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-39E
 Lab Project ID: G341-617

Date Collected: 3/23/2010 18:20
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 83.52
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.02	mg/Kg	1	03/26/10 15:23
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	36.5	91.2

Comments:


Batch Information

Analytical Batch: EP032610
 Analytical Method: 8015
 Instrument: GC6
 Analyst: DTF

Prep batch: 16276
 Prep Method: 3541
 Prep Date: 03/25/10
 Initial Prep Wt/Vol: 34.12 G
 Prep Final Vol: 10 mL

Analyst: FD

NC Certification #481

Reviewed By: 
 DRO.XLS

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: S16-5-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-40A
 Lab Project ID: G341-617
 Report Basis: Dry Weight

Analyzed By: BAO
 Date Collected: 3/23/2010 18:30
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 82.29

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.11	mg/Kg	1	03/30/10 16:37

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	98.4	98.4		70-130

Comments:

Batch Information

Analytical Batch: VP033010
 Analytical Method: 8015
 Instrument ID: GC4
 Analyst: BAO

Prep Method: 5035
 Initial Wt/Vol: 7.14 g
 Final Volume: 5 mL

Analyst: BAO

NC Certification #481

Reviewed By: MA
GRO.XLS

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

Client Sample ID: S16-5-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-40G
 Lab Project ID: G341-617

Date Collected: 3/23/2010 18:30
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 82.29
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.31	mg/Kg	1	03/26/10 15:52
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	35.1	87.8

Comments:

Batch Information

Analytical Batch: EP032610
 Analytical Method: 8015
 Instrument: GC6
 Analyst: DTF

Prep batch: 16276
 Prep Method: 3541
 Prep Date: 03/25/10
 Initial Prep Wt/Vol: 33.26 G
 Prep Final Vol: 10 mL

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: S16-6-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-41A
 Lab Project ID: G341-617
 Report Basis: Dry Weight

Analyzed By: BAO
 Date Collected: 3/23/2010 18:40
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 82.94

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.23	mg/Kg	1	03/30/10 17:04

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	97.4	97.4		70-130

Comments:

Batch Information

Analytical Batch: VP033010
 Analytical Method: 8015
 Instrument ID: GC4
 Analyst: BAO

Prep Method: 5035
 Initial Wt/Vol: 6.91 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: S16-6-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-41D
 Lab Project ID: G341-617

Date Collected: 3/23/2010 18:40
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 82.94
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.08	mg/Kg	1	03/29/10 18:50
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	35.9	89.7

Comments:

Batch Information

Analytical Batch: EP032910
 Analytical Method: 8015
 Instrument: GC6
 Analyst: DTF

Prep batch: 16288
 Prep Method: 3541
 Prep Date: 03/26/10
 Initial Prep Wt/Vol: 34.06 G
 Prep Final Vol: 10 mL

Analyst: FX

NC Certification #481

Reviewed By: MA
DRO.XLS



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 Engineering of NC, Inc.
 CONTACT: Andrew Eyer PHONE NO: 919-323-8828
 PROJECT: U-3818/NC0700110 SITE/PWSID#: Onslow Co.
 REPORTS TO: Andrew Eyer EMAIL: ade@gel.com
 INVOICE TO: NC DOT QUOTE #: _____
WBS # 35801.1.1 P.O. #: _____

SGS Reference #: G341-617 page 4 of 5

LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX/MATRIX CODE	# CONTAINERS	SAMPLE TYPE C= COMP G= GRAB MI= Multi Incremental Samples	Preservatives Used Analysis Required	MCOH	REMARKS/LOC ID
	S15-2-8	3/23/10	1455	50	3	G			
	S15-3-8		1505	50	3	G			
	S15-4-8		1515	50	3	G			
	S15-5-8		1525	50	3	G			
	S15-6-8		1600	50	3	G			
	S16-1-4		1745	50	3	G			
	S16-2-8		1755	50	3	G			
	S16-3-4		1810	50	3	G			
	S16-4-8		1820	50	3	G			
	S16-5-8		1830	50	3	G			

4

Collected/Relinquished By: (1) Andrew Eyer 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 _____
 Requested Turnaround Time and/or Special Instructions: _____

Special Deliverable Requirements: _____

Samples Received Cold? YES NO
 Cooler TB
 Temperature °C: 3.2, 4.2

Chain of Custody Seal: (Circle)
 INTACT BROKEN ABSENT



SGS Environmental Services Inc. CHAIN OF CUSTODY RECORD

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

1 CLIENT: GEL Engineering of NC, Inc.
 CONTACT: Andrew Eyer PHONE NO: 919-323-8828
 PROJECT: U-3818/NCDT0010 SITE/PWSID#: Onslow Co
 REPORTS TO: Andrew Eyer EMAIL: ade@gel.com
 INVOICE TO: NC DOT QUOTE #: _____
 WBS # 35801.1.1 P.O. #: _____

SGS Reference #: G341-617 page 5 of 5

LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX/MATRIX CODE	# CONTAINERS	SAMPLE TYPE C= COMP G= GRAB MI= Multi Incremental Samples	Preservatives Used Analysis Required ③	Meth	DRO	GRD	REMARKS/ LOC ID
	S16-6-8	3/23/10	1840	50	3	G	X		X		
	S17-1-8	3/24/10	0935	50	3	G	X		X		
	S17-2-4	3/24/10	0945	50	3	G	X		X		
	S17-3-8		0955	50	3	G	X		X		
	S17-4-8		1005	50	3	G	X		X		
	S17-5-4		10:15	50	3	G	X		X		
	S17-6-8		10:25	50	3	G	X		X		
	S17-7-8		10:35	50	3	G	X		X		
	S17-8-4		10:45	50	3	G	X		X		

2

Collected/Relinquished By: (1)	Date	Time	Received By:
<u>[Signature]</u>	<u>3/24/10</u>	<u>12:40</u>	<u>[Signature]</u>
Relinquished By: (2)	Date	Time	Received By:
Relinquished By: (3)	Date	Time	Received By:
Relinquished By: (4)	Date	Time	Received For Laboratory By:

5

DOD Project? YES NO
Cooler ID _____

Special Deliverable Requirements:

Requested Turnaround Time and/or Special Instructions:

Samples Received Cold? YES NO
Cooler TB _____

Temperature °C: 3.2, 4.2, 6

Chain of Custody Seal: (Circle)
INTACT BROKEN ABSENT

APPENDIX III

PHOTOGRAPHS SHOWING SOIL BORING LOCATIONS



