

PRELIMINARY SITE ASSESSMENT REPORT

**SR 1406 (Piney Green Road) from NC 24 to US 17
556 Piney Green Road, Parcel #071
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

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Signature Page

This document, entitled "Preliminary Site Assessment Report," has been prepared for Parcel #071, located at 556 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.
an Affiliate of The GEL Group, Inc.



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



Keith D. McCulloch, P.E.
Senior Staff Engineer

04-16-10

Date

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556 Piney Green Road, Parcel #071
Jacksonville, North Carolina
State Project U-3810
WBS Element # 35801.1.1
Onslow County**

Executive Summary

The subject site is Parcel #071, located at 556 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 #071. Currently, Parcel #071 contains an operating convenience store and service station, with two petroleum USTs.

GEL performed a preliminary site assessment within the NCDOT proposed ROWs of Piney Green Road and Country Club Road adjacent to Parcel #071 that included a geophysical survey, and the collection and analysis of soil samples. The geophysical investigation of the proposed ROWs of Country Club Road and Piney Green Road identified two operating petroleum USTs ("Known" USTs) located onsite at Parcel #071, within the NCDOT proposed easterly ROW of Country Club Road.

Soil samples were collected for analysis from six borings constructed within the NCDOT proposed ROWs for Piney Green Road and Country Club Road adjacent to Parcel #071. The soil samples were analyzed for diesel range organics (DRO) and gasoline range organics (GRO). Neither DRO nor GRO was detected in any of the collected soil samples.

Based on the data generated from this investigation, there is no evidence that a release of constituents of concern has occurred within the NCDOT proposed ROWs at Parcel #071. No additional environmental investigation of the soil at the site is recommended at this time.

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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 #071 located at 556 Piney Green Road in Jacksonville, North Carolina. Parcel #071 contains an operating convenience store and service station, with two petroleum underground storage tanks (USTs). 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 #071 and its location on Piney Green Road, respectively.

3.0 Local Geology and Surroundings

Parcel #071 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 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 orange/brown/gray silty sand and sandy, silty 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 #071 most likely flows in a southerly direction towards 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 southerly ROW of Piney Green Road and the proposed easterly ROW of Country Club Road adjacent to Parcel #071.
- Soil vapor screening of soil samples collected from subsurface soil borings at Parcel #071 within the proposed ROWs of Piney Green Road and Country Club 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 Country Club Road at Parcel #071.

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

4.1 Geophysical Evaluation at Parcel #071

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 #071 on March 4, 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 southerly ROW of Piney Green Road and the easterly ROW of Country Club Road at Parcel #071 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 #071.

As shown on Figure 4, EM anomalies indicated the presence of USTs. This area is located just west of the pump islands under a concrete pad. UST access covers and fill port valves were observed within the concrete pad as surface evidence of USTs. GPR data in this area shows large anomalies consistent with USTs. This area is considered to have “Known” USTs present on site, within the NCDOT proposed easterly ROW of Country Club Road, in the area shown on Figure 4. No other anomalies indicative of possible USTs were identified in the investigation area.

4.2 Subsurface Soil Investigation at Parcel #071

To determine the presence or absence of impact to subsurface soil by constituents of concern, GEL collected soil samples from six subsurface soil borings, S15-1 through S15-6, at Parcel #071 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 Country Club 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. 071**

Soil Boring	Depth Interval of Soil Sample Collected for Analysis (feet bls)	PID Reading (ppm)	Latitude/Longitude (NAD83)
S15-1	7-8	0.0	34°46'32.28"N / 77°21'57.00"W
S15-2	7-8	0.0	34°46'32.34"N / 77°21'57.78"W
S15-3	7-8	0.9	34°46'32.28"N / 77°21'58.50"W
S15-4	7-8	0.0	34°46'31.74"N / 77°21'58.80"W
S15-5	7-8	0.6	34°46'31.92"N / 77°21'59.10"W
S15-6	7-8	0.0	34°46'31.62"N / 77°21'59.46"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 included on the Certificates of Analysis provided in Appendix II. Neither DRO nor GRO was detected in any of the collected soil samples.

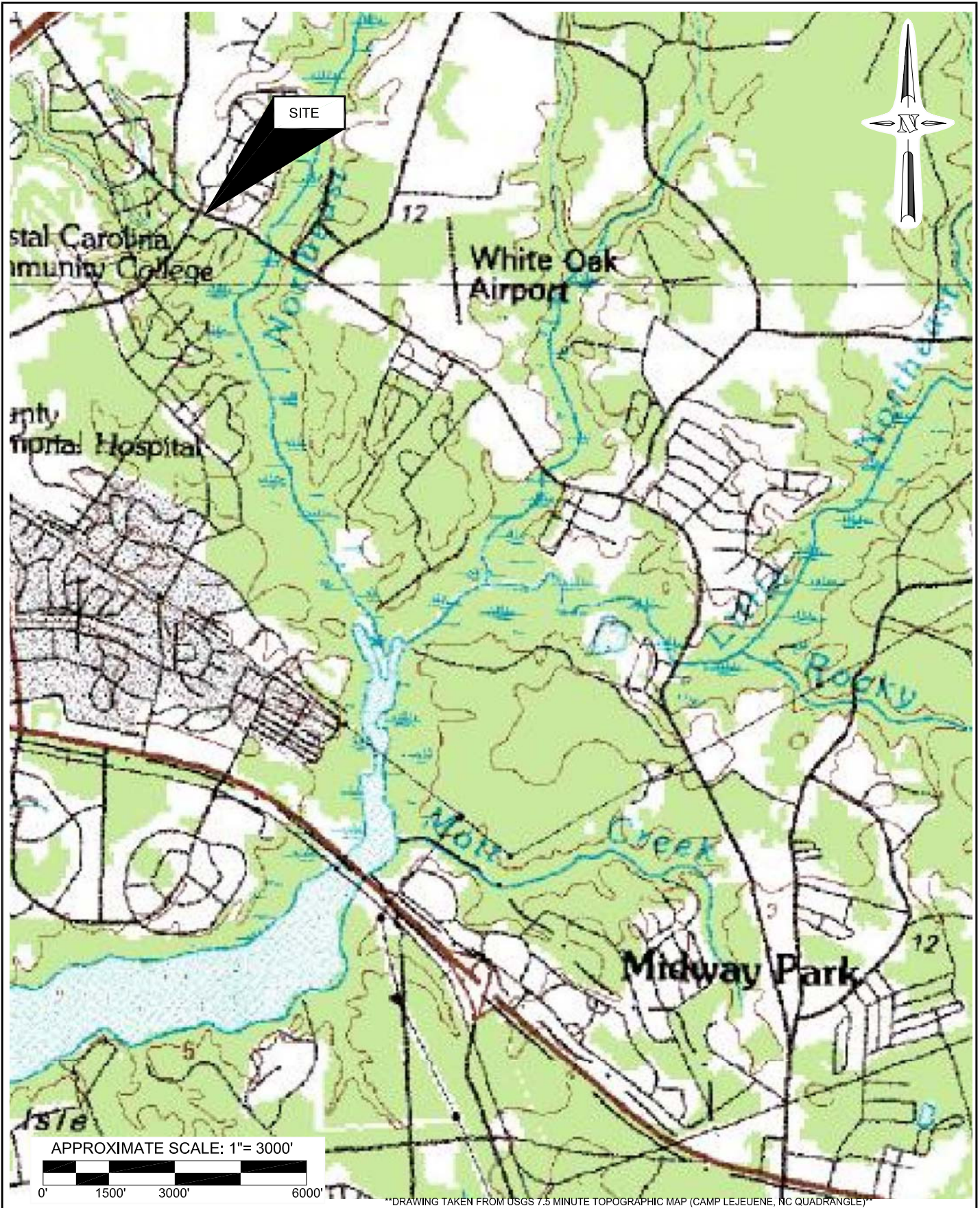
5.0 Conclusions and Recommendations


GEL performed a preliminary site assessment within the NCDOT proposed ROWs of Piney Green Road and Country Club Road adjacent to Parcel #071 that included a geophysical survey, and the collection and analysis of soil samples. The geophysical investigation of the proposed ROWs of Country Club Road and Piney Green Road

identified two operating petroleum USTs ("Known" USTs) located onsite at Parcel #071, within the NCDOT proposed easterly ROW of Country Club Road.

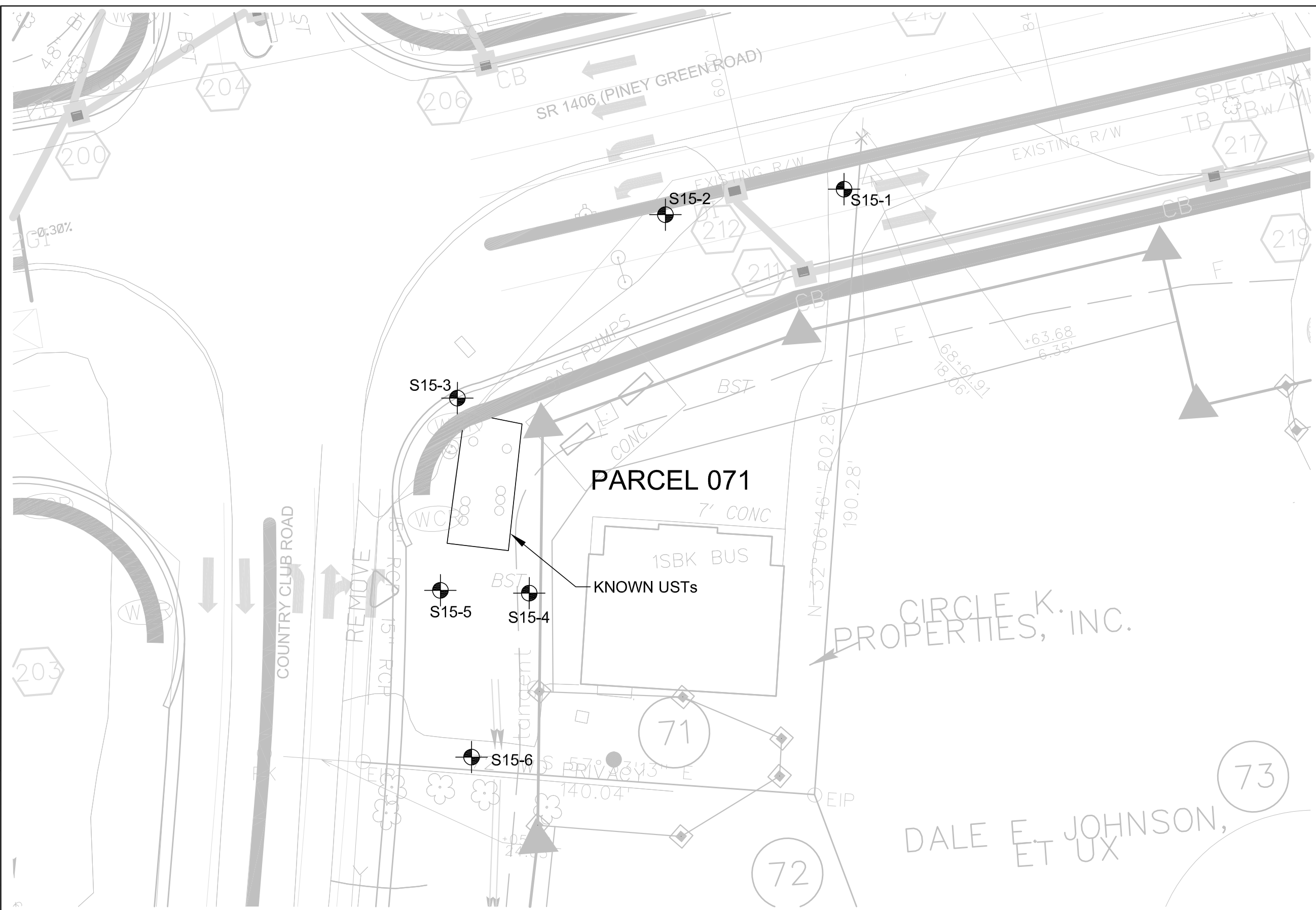
Soil samples were collected for analysis from six borings constructed within the NCDOT proposed ROWs for Piney Green Road and Country Club Road adjacent to Parcel #071. The soil samples were analyzed for DRO and GRO. Neither DRO nor GRO was detected in any of the collected soil samples.

Based on the data generated from this investigation, there is no evidence that a release of constituents of concern has occurred within the NCDOT proposed ROWs at Parcel #071. No additional environmental investigation of the soil at the site is recommended at this time.



 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	USGS TOPOGRAPHIC LOCATION MAP	FIGURE 1
		PRELIMINARY SITE ASSESSMENT REPORT PARCEL 071 JACKSONVILLE, NORTH CAROLINA STATE PROJECT U-3810, WBS# 35801.1.1		

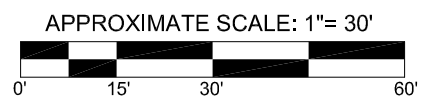
PLOTTED: May 07, 2010 - 8:34am BY: tjp FILE LOCATION: H:\Consulting Client Files\K-R\N\ncdt00110_Piney Green\ncdt00110_Fig2s-C.dwg LAYOUT TAB: D71



LEGEND

S15-2  SOIL BORING LOCATION

NOTE:
SEE FIGURE 3 FOR KEY MAP
SHOWING PARCEL LOCATIONS



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PROJECT: ncdt00110
PRELIMINARY SITE ASSESSMENT REPORT
PARCEL NO. 071, CIRCLE K STORES, INC.
556 PINEY GREEN ROAD
JACKSONVILLE, NORTH CAROLINA
STATE PROJECT U-3810, WBS #35801.1.1

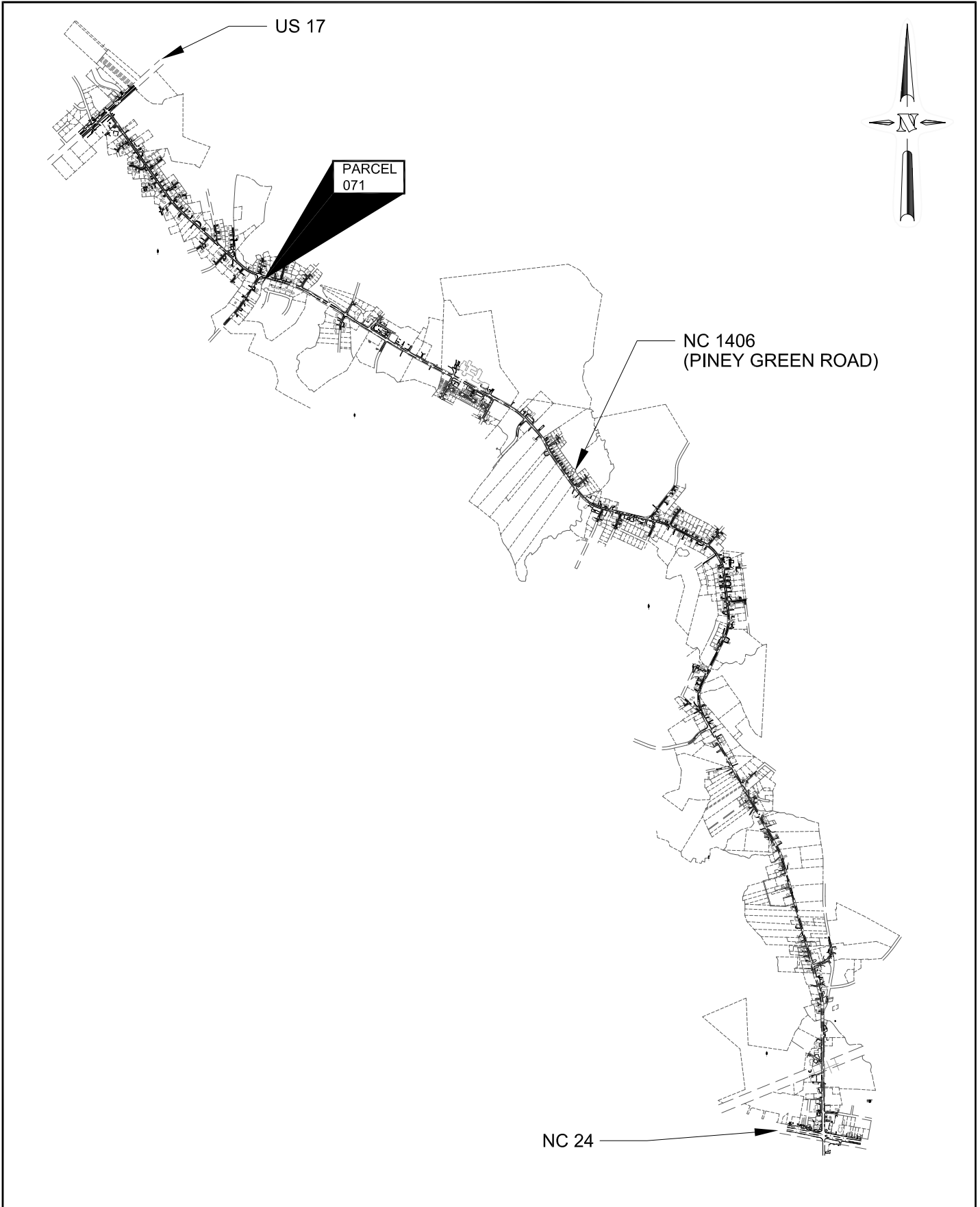
DATE: May 3, 2010

SITE SKETCH SHOWING
SOIL BORING LOCATIONS

DRAWN BY: TJP APPRV. BY: ADE

FIGURE
2

problem solved



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PRELIMINARY SITE ASSESSMENT REPORT
 PARCEL 071
 JACKSONVILLE, NORTH CAROLINA
 STATE PROJECT U-3810, WBS# 35801.1.1

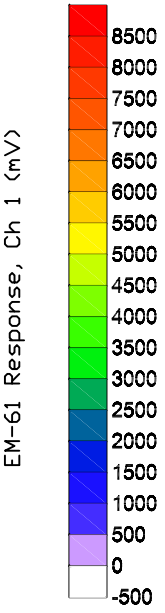
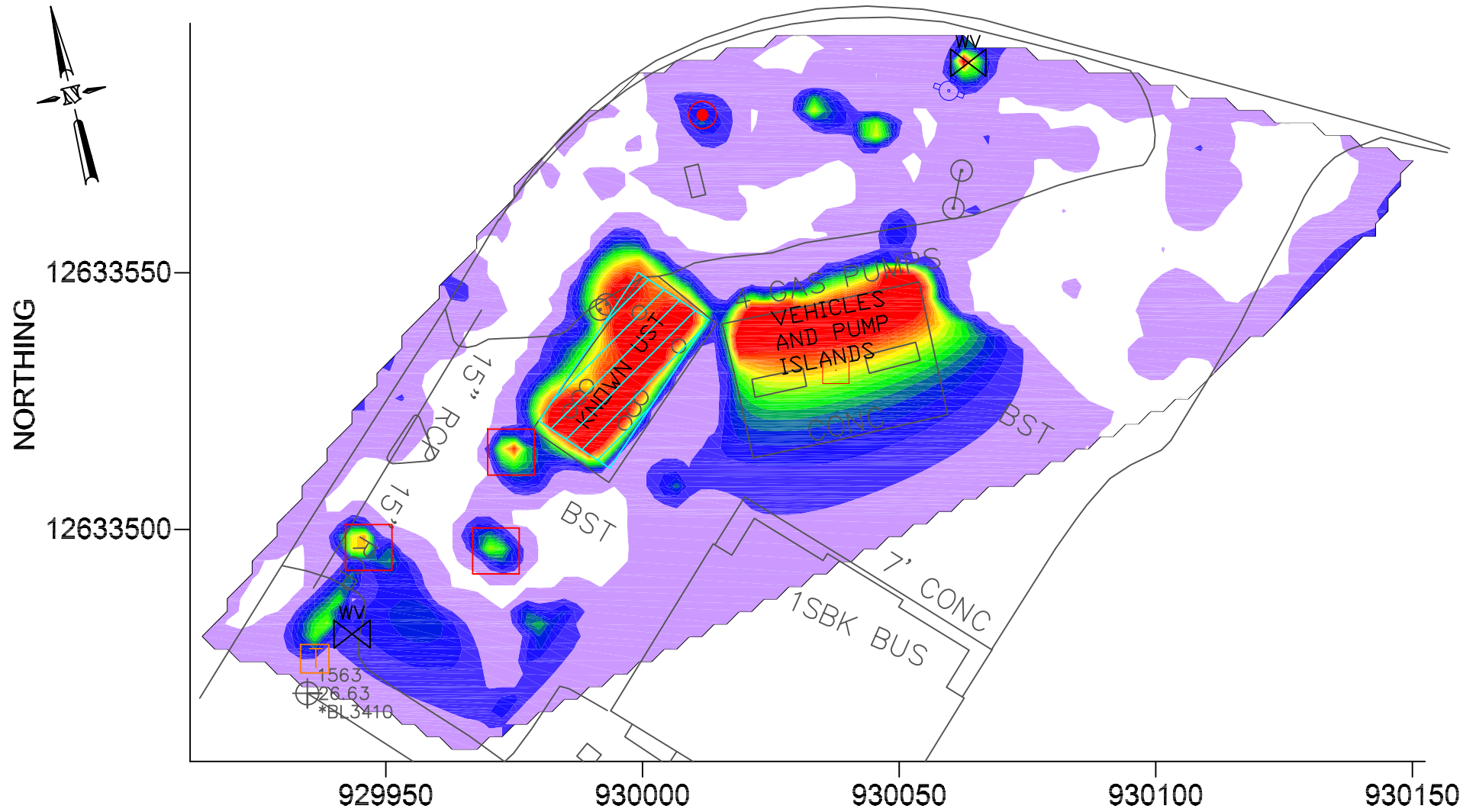
DATE: April 6, 2010

KEY MAP SHOWING
 PARCEL LOCATION

DRAWN BY: TJP

APPRV. BY: ADE

FIGURE
 3



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

NORTHING

12633550
12633500

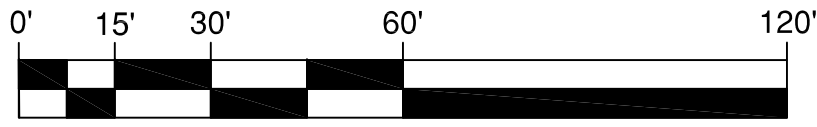
929950 930000 930050 930100 930150

EASTING

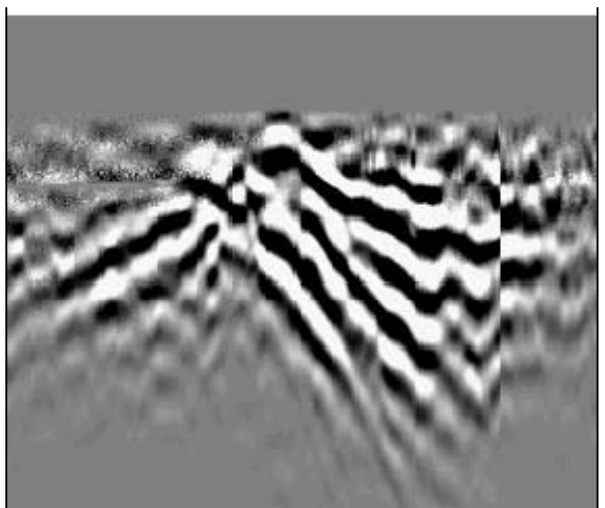
LEGEND

- WATER VALVE
- FIRE HYDRANT
- UNKNOWN UTILITY
- COMMUNICATIONS HANDHOLE
- UTILITY POLE
- KNOWN UST

GRAPHIC SCALE



(IN FEET)
1 inch = 30 ft.



GPR IMAGE OF UST

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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 29, 2010

Site Map Showing Results Of
Geophysical Survey Investigation
Parcel 071

DRAWN BY: DEA

APPRV. BY: CMS

FIGURE
4

APPENDIX I

SOIL BORING LITHOLOGIC LOGS

SOIL BORING LOG

Boring/Well No.: S15-1
 Date Started: 3/23/10
 Date Completed: 3/23/10

1445

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	-	0.0	DK Brn Silty Sand, Tan Silty Clay Moist	
2	4-8	-	0.0	Mottled Orange Brn/Gray Silty Clay Tight, Moist	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

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

538
 34° 46.005 N
 77° 20.839 W
 21.950

SOIL BORING LOG

Boring/Well No.: 515-2
 Date Started: 3/23/10
 Date Completed: 3/23/10

1455
 +505
 *

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	-	0.0	DK Brn Organic Silty Sand, Orange Brn Sandy Clay, Moist	
2	4-8	-	0.0	Tight Mottled Red Brn, Gray Silty Clay, Moist	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

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

539
 340 46.544 N
 770 21.959 W
 963

SOIL BORING LOG

Boring/Well No.: S15-3

Date Started: 3/23/10

Date Completed: 3/23/10

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	-	0.4	DK. Brn Organic Silty Sand, Orange Brn Mottled Sandy Clay, Moist	
* 2	4-8	-	0.9	Tight Orange Brn, Gray Mottled Silty Clay	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

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

340 46.538N

770 21.975W

SOIL BORING LOG

Boring/Well No.: S 15-4

Date Started: 3/23/10

Date Completed: 3/23/10

1515
★

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	-	0.0	Asphalt, ROC, Tan Clayey Sand, Moist Mottled Sandy Clay Moist	
2	4-8	-	0.0	Light Mottled Orange Brn. Gray Moist silty clay	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

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

34° 46.529

77° 21.980

SOIL BORING LOG

Boring/Well No.: 515-5-
 Date Started: 3/23/10
 Date Completed: 3/23/10

1525
★

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	-	0.0	Asphalt, ROC, Brn s. lty Sand - Moist	
2	4-8	-	0.6	Orange Brn Mottled sandy Clay, Moist	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

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

340 46.532 N

770 21.985 W

SOIL BORING LOG

Boring/Well No.: S15-C
 Date Started: 3/23/10
 Date Completed: 3/23/10

1600

★

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	-	0.0	DK. Brn organic silty sand → Tan Fine Sand, Moist → Mottled silty clay, organics, Moist	
2	4-8	-		Orange Brn Gray silty clay, Moist Tight	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

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

39° 46.527 N

77° 21.991 W

SOIL BORING LOG

Boring/Well No.: 515-7

Date Started: 3/23/10

Date Completed:

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4			Asphalt, ROC	
2	4-8		3.2	ROC, No Sample Collected	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

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

34° 46.536 N

77° 21.974

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

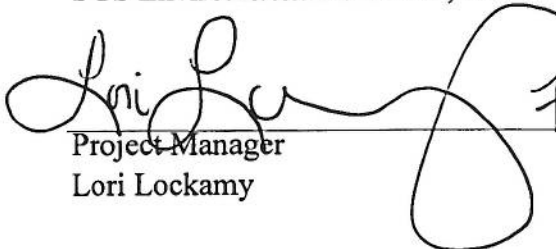
Dear Mr. Eyer:

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

% Soilds = 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: S15-1-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-30A
 Lab Project ID: G341-617
 Report Basis: Dry Weight

Analyzed By: BAO
 Date Collected: 3/23/2010 14:45
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 68.73

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	6.97	mg/Kg	1	03/30/10 12:06

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: 6.26 g
 Final Volume: 5 mL

Analyst: BAO

NC Certification #481

Reviewed By: BAO
GRO.XLS

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: S15-1-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-30D
 Lab Project ID: G341-617

Date Collected: 3/23/2010 14:45
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 68.73
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	8.95	mg/Kg	1	03/26/10 11:38
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	31	77.5

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: 32.5 G
 Prep Final Vol: 10 mL

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: S15-2-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-31A
 Lab Project ID: G341-617
 Report Basis: Dry Weight

Analyzed By: BAO
 Date Collected: 3/23/2010 14:55
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 70.38

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	6.96	mg/Kg	1	03/30/10 12:34

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	96.3	96.3		70-130

Comments:

Batch Information

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

Prep Method: 5035
 Initial Wt/Vol: 6.12 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: S15-2-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-31D
 Lab Project ID: G341-617

Date Collected: 3/23/2010 14:55
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 70.38
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	8.77	mg/Kg	1	03/26/10 12:06
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	23.5	58.6

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: 32.42 G
 Prep Final Vol: 10 mL

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: S15-3-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-32A
 Lab Project ID: G341-617
 Report Basis: Dry Weight

Analyzed By: BAO
 Date Collected: 3/23/2010 15:05
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 69.68

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	6.93	mg/Kg	1	03/30/10 13:01

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	98.1	98.1		70-130

Comments:


Batch Information

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

Prep Method: 5035
 Initial Wt/Vol: 6.21 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: S15-3-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-32D
 Lab Project ID: G341-617

Date Collected: 3/23/2010 15:05
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 69.68
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	8.56	mg/Kg	1	03/26/10 12:35
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	30.5	76.3

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: 33.54 G
 Prep Final Vol: 10 mL

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: S15-4-8
 Client Project ID: U-3810/NCDOT 001100
 Lab Sample ID: G341-617-33A
 Lab Project ID: G341-617
 Report Basis: Dry Weight

Analyzed By: BAO
 Date Collected: 3/23/2010 15:15
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 71.51

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	6.64	mg/Kg	1	03/30/10 13:29

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: 6.32 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: S15-4-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-33D
 Lab Project ID: G341-617

Date Collected: 3/23/2010 15:15
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 71.51
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	8.44	mg/Kg	1	03/26/10 13:03
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	24.8	61.9

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: 33.13 G
 Prep Final Vol: 10 mL

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: S15-5-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-34A
 Lab Project ID: G341-617
 Report Basis: Dry Weight

Analyzed By: BAO
 Date Collected: 3/23/2010 15:25
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 70.65

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	6.95	mg/Kg	1	03/30/10 13:56

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	94.2	94.2		70-130

Comments:

Batch Information

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

Prep Method: 5035
 Initial Wt/Vol: 6.11 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: S15-5-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-34D
 Lab Project ID: G341-617

Date Collected: 3/23/2010 15:25
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 70.65
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	8.74	mg/Kg	1	03/26/10 13:31
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	23.5	58.9

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: 32.39 G
 Prep Final Vol: 10 mL

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: S15-6-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-35A
 Lab Project ID: G341-617
 Report Basis: Dry Weight

Analyzed By: BAO
 Date Collected: 3/23/2010 16:00
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 70.25

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	7.07	mg/Kg	1	03/30/10 14:23

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	95.7	95.7		70-130

Comments:


Batch Information

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

Prep Method: 5035
 Initial Wt/Vol: 6.04 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: S15-6-8
 Client Project ID: U-3810/NC DOT 001100
 Lab Sample ID: G341-617-35D
 Lab Project ID: G341-617

Date Collected: 3/23/2010 16:00
 Date Received: 3/24/2010
 Matrix: Soil
 Solids 70.25
 Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	8.54	mg/Kg	1	03/26/10 13:59
Surrogate Spike Results		Spike Added	Control Limits	Spike Result	Percent Recovery
OTP		40	40-140	19.9	49.9

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: 33.35 G
 Prep Final Vol: 10 mL



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: 919-323-6828
 PROJECT: U-3818/NC DOT 0110 SITE/PWSID#: Onslow Co.
 REPORTS TO: Andrew Eyer EMAIL:
 INVOICE TO: NC DOT QUOTE #:
WPS # 35801.1.1 P.O. #:

SGS Reference #: 6341-617 page 3 of 5

2

LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX/ MATRIX CODE
	514-2-8	3/23/10	11:45	50
	514-3-8		11:55	50
	514-4-8		12:05	50
	514-5-8		12:15	50
	514-6-8		12:25	50
	514-7-8		12:35	50
	514-8-8		12:45	50
	514-9-8		12:55	50
	514-10-4		13:05	50
	515-1-6		14:45	50

5

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

#	CONTAINERS	SAMPLE TYPE C= COMP G= GRAB MI= Multi Incremental Samples	Preservatives Used	Medi	REMARKS/ LOC ID
3		G	X		
3		G	X		
3		G	X		
3		G	X		
3		G	X		
3		G	X		
3		G	X		
3		G	X		
3		G	X		
3		G	X		
3		G	X		
3		G	X		

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 °C: 3.2, 4.2, C

Chain of Custody Seal: (Circle)
INTACT BROKEN ABSENT



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: 919-323-4828
 PROJECT: U-3818/NCDT00110 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

SGS North America, Inc.

# CONTAINERS	SAMPLE TYPE C= COMP G= GRAB MI= Multi Incremental Samples	Preservatives Used	Analysis Required	REMARKS/ LOC ID	
				DRG	GRG
3	G		③		
3	G				
3	G				
3	G				
3	G				
3	G				
3	G				
3	G				
3	G				
3	G				
3	G				
3	G				

2

LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX CODE
	S15-2-8	3/23/10	1455	50
	S15-3-8		1505	50
	S15-4-8		1515	50
	S15-5-8		1525	50
	S15-6-8		1600	50
	S16-1-4		1745	50
	S16-2-8		1755	50
	S16-3-4		1810	50
	S16-4-8		1820	50
	S16-5-8		1830	50

5

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:

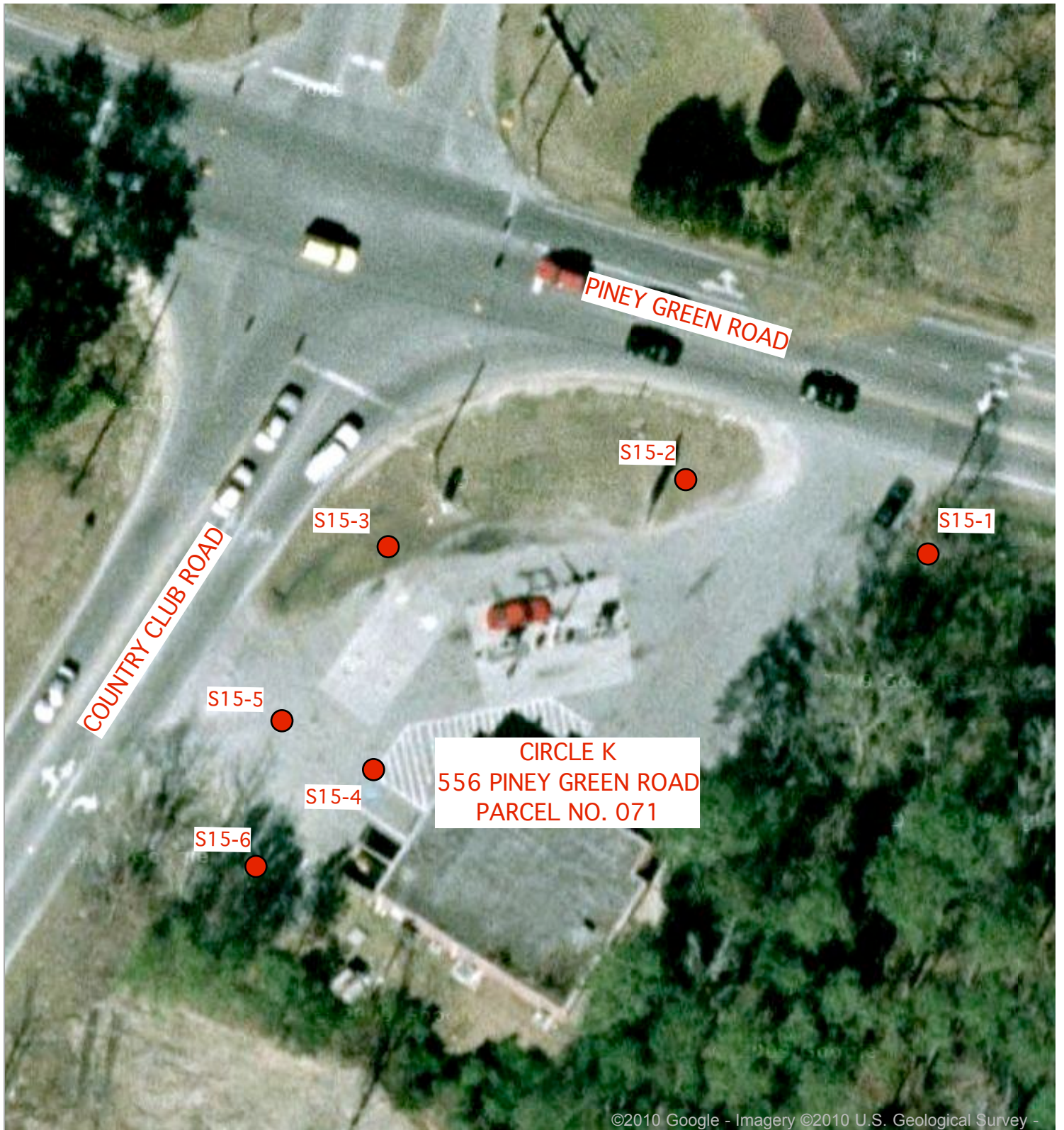
Special Deliverable Requirements:

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

Chain of Custody Seal: (Circle)
INTACT BROKEN ABSENT

APPENDIX III

PHOTOGRAPHS SHOWING SOIL BORING LOCATIONS



CIRCLE K
556 PINEY GREEN ROAD
PARCEL NO. 071

COUNTRY CLUB ROAD

PINEY GREEN ROAD

S15-3

S15-2

S15-1

S15-5

S15-4

S15-6

