PRELIMINARY SITE ASSESSMENT REPORT

SR 1406 (Piney Green Road) from NC 24 to US 17
2683 Piney Green Road, Parcel #324
Midway Park, North Carolina
State Project U-3810
WBS Element # 35801.1.1
Onslow County

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

April 16, 2010

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Signature Page

This document, entitled "Preliminary Site Assessment Report," has been prepared for Parcel #324, located at 2683 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.
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04-16-10
Date

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2683 Piney Green Road, Parcel #324
Midway Park, North Carolina
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Executive Summary

The subject site is Parcel #324, located at 2683 Piney Green Road in Midway Park, North Carolina. The primary purpose of this investigation was to determine the presence or absence of underground storage tanks (USTs) and constituents of concern in soil within the North Carolina Department of Transportation (NCDOT) proposed easterly Right-of-Way (ROW) of Piney Green Road adjacent to Parcel #324. Currently, Parcel #324 is vacant, but was reportedly a former service station and convenience store where petroleum USTs had been previously removed.

GEL Engineering of NC, Inc. (GEL) performed a preliminary site assessment within the NCDOT proposed easterly ROW of Piney Green Road adjacent to Parcel #324 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 proposed easterly ROW of Piney Green Road adjacent to the site.

Soil samples were collected for analysis from seven borings constructed within the NCDOT proposed easterly ROW of Piney Green Road adjacent to Parcel #324. 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 indicated that the detected DRO concentration 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

Executive Summary (continued)

subject site is approximately 13 cubic yards in a localized area encompassing soil boring S4-5.

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.

PRELIMINARY SITE ASSESSMENT REPORT

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2683 Piney Green Road, Parcel #324
Midway Park, North Carolina
State Project U-3810
WBS Element # 35801.1.1
Onslow County

1.0 Introduction

This document presents the details of a preliminary site assessment performed within the North Carolina Department of Transportation (NCDOT) proposed easterly Right-of-Way (ROW) at to Parcel #324 located at 2683 Piney Green Road in Midway Park, North Carolina. Currently, Parcel #324 is vacant. 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 #324 and its location on Piney Green Road, respectively**.**

3.0 Local Geology and Surroundings

Parcel #324 is in a developed area of Midway Park in Onslow County, North Carolina. Surrounding land uses include residential and commercial activities.

The site is located approximately 1 mile northeast of the center of Midway Park, North Carolina, and approximately 6.5 miles east of the center of Jacksonville, North Carolina. This area is located in the Coastal Plain physiographic province of North Carolina. The land surface of the area is characterized by nearly level, and gently sloping,

well drained soils. Coastal Plain geology in the vicinity of the site is characterized by undifferentiated post-Miocene interbedded sand and clay terrace deposits overlain by aqueous and aeolian deposits of marine and non-marine origin (USGS, 1955).

The United States Department of Agriculture's *Soil Survey of Onslow County, North Carolina* (1992) maps the area as Goldsboro Fine Sandy Loam (GoA), 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/ 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 40 feet above mean sea level. The topography in Figure 1 indicates that groundwater in the vicinity of Parcel #324 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 #324, GEL performed a limited site assessment that consisted of the following tasks:

- Performance of a geophysical investigation to identify the presence or absence of USTs and associated appurtenances within the proposed easterly ROW of Piney Green Road adjacent to Parcel #324.
- Soil vapor screening of soil samples collected from subsurface soil borings at Parcel #324 within the proposed easterly ROW of Piney Green Road to determine the potential presence or absence of soil impact from petroleum constituents of concern.
- Collection and laboratory analysis of soil samples from the proposed easterly ROW of Piney Green Road at Parcel #324.

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

4.1 Geophysical Evaluation at Parcel #324

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 #324 on March 3, 2010. The extent of the investigation covers only the proposed ROW indicated by NCDOT. A GPR system time range setting of 90 nanoseconds (ns) was used during the entire investigation. This range was determined after a series of test lines were conducted to evaluate the GPR response in the local geologic section. A preliminary interpretation of the GPR data was conducted in the field and potential USTs were marked on the ground. Following the completion of the fieldwork, the data were post-processed and analyzed in more detail. GPR data processing typically included band pass filtering, background removal, horizontal smoothing, and gain adjustments.

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

It should be noted that "One Call" underground utility locations had been performed within the easterly ROW of Piney Green Road at Parcel #324 prior to the initiation of the preliminary site assessment field activities at the site. No underground utilities were marked by "One Call" within the Piney Green Road easterly ROW at Parcel #324.

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

4.2 Subsurface Soil Investigation at Parcel #324

To determine the presence or absence of impact to subsurface soil by constituents of concern, GEL collected soil samples from seven subsurface soil borings, S4-1 through S4-7, at Parcel #324 on March 9, 2010, for analysis of total petroleum hydrocarbon indicator parameters. The soil borings were constructed within the proposed NCDOT easterly ROW of NC 24 and Piney Green Road, as shown on Figure 2 and in the photographs in Appendix III. The longitude and latitude coordinates for the boring locations are listed in the table below.

All borings were advanced to a total depth of 8 feet bls. Soil samples were collected at 3-4 feet and 7-8 feet bls from each borehole. All soil samples were inspected for indications of impact by constituents of concern, including petroleum hydrocarbons, such as odors, discoloration, or visible sheen. This sampling was accomplished using 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. 324

Soil Boring	Depth Interval of Soil Sample Collected for Analysis (feet bls)	PID Reading (ppm)	Latitude/Longitude (NAD83)
S4-1	3-4	0.4	34º43'21.90"N / 77º19'12.72"W
S4-2	3-4	0.6	34º43'22.44"N / 77º19'12.78"W
S4-3	7-8	0.1	34º43'22.80"N / 77º19'12.78"W
S4-4	7-8	0.3	34º43'23.16"N / 77º19'12.78"W
S4-5	3-4	0.2	34º43'24.12"N / 77º19'12.78"W
S4-6	7-8	0.2	34º43'24.72"N / 77º19'12.60"W
S4-7	3-4	0.4	34º43'23.94"N / 77º19'12.18"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
S4-1-4	3-4	BQL	BQL
S4-2-4	3-4	BQL	BQL
S4-3-8	7-8	BQL	BQL
S4-4-8	7-8	BQL	BQL
S4-5-4	3-4	**24.8**	BQL
S4-6-8	7-8	BQL	BQL
S4-7-4	3-4	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, S4-5-4, at a concentration of 24.8 milligrams per kilogram (mg/kg), which slightly exceeds the recommended North Carolina Department of Environment and Natural Resources (NCDENR) action level for DRO (10 mg/kg). The DRO exceedance in boring S4-5 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 S4-5 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 13 cubic yards of impacted soil (DRO >10 mg/kg) in the vicinity of boring S4-5, based on the following assumed area (as shown on Figure 2) and depth of impacted soil:

- S4-5: 70 sq. feet x 5 feet = 350 cubic feet = 13 cubic yards

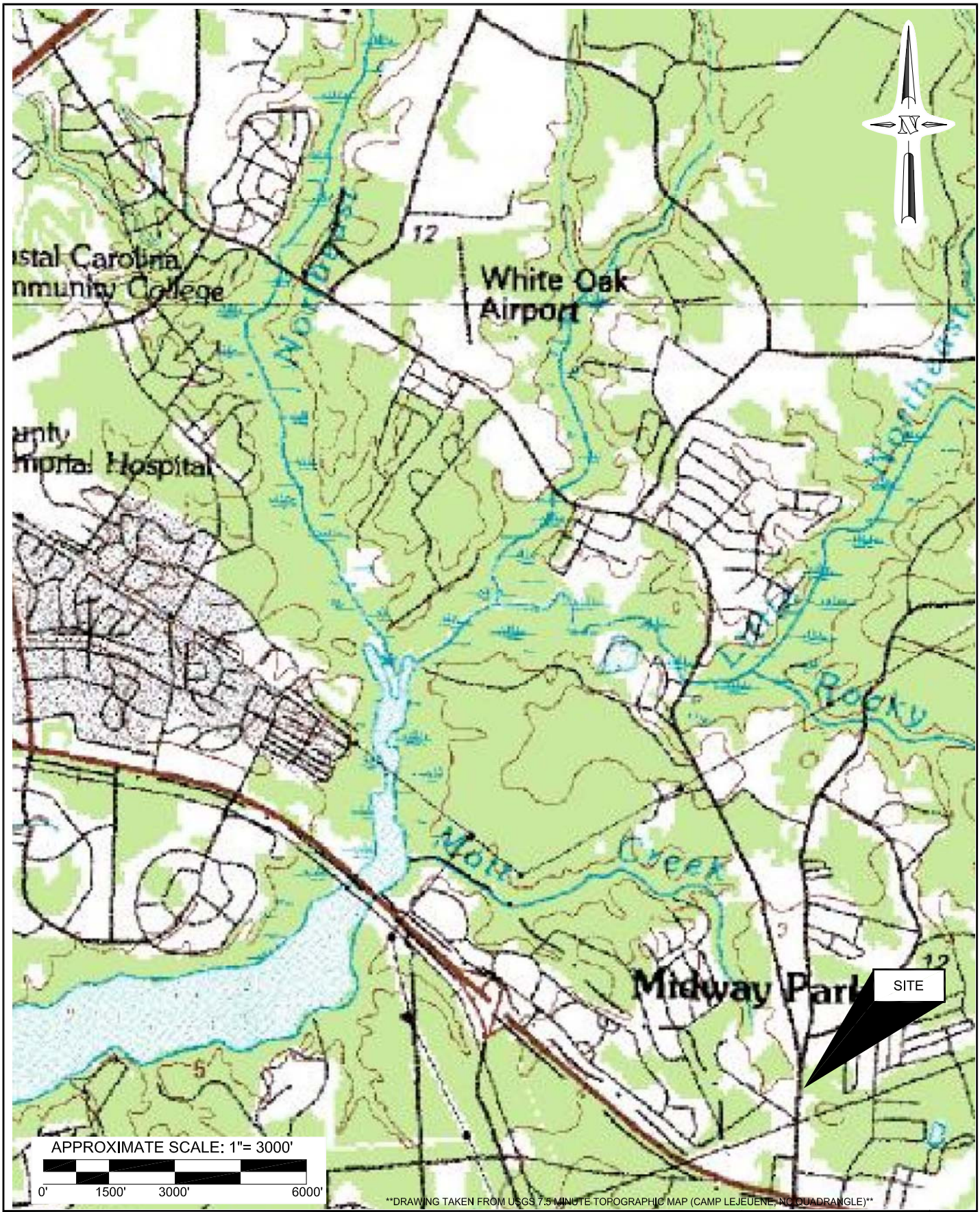
5.0 Conclusions and Recommendations

GEL performed a preliminary site assessment within the NCDOT proposed easterly ROW of Piney Green Road adjacent to Parcel #324 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 proposed easterly ROW of Piney Green Road adjacent to the site.

Soil samples were collected for analysis from seven borings constructed within the NCDOT proposed easterly ROW of Piney Green Road adjacent to Parcel #324. The soil samples were analyzed for DRO and GRO. Analytical results for a soil sample collected from one soil boring, S4-5, indicated that the detected DRO concentration 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 13 cubic yards in a localized area encompassing soil boring S4-5.

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 S4-5 in order to confirm the presence or absence of soil impact from petroleum hydrocarbons.



GEL Engineering of NC Inc.

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problem solved

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PROJECT: ncdt00110

PRELIMINARY SITE ASSESSMENT REPORT
PARCEL 324
MIDWAY PARK, NORTH CAROLINA
STATE PROJECT U-3810, WBS# 35801.1.1

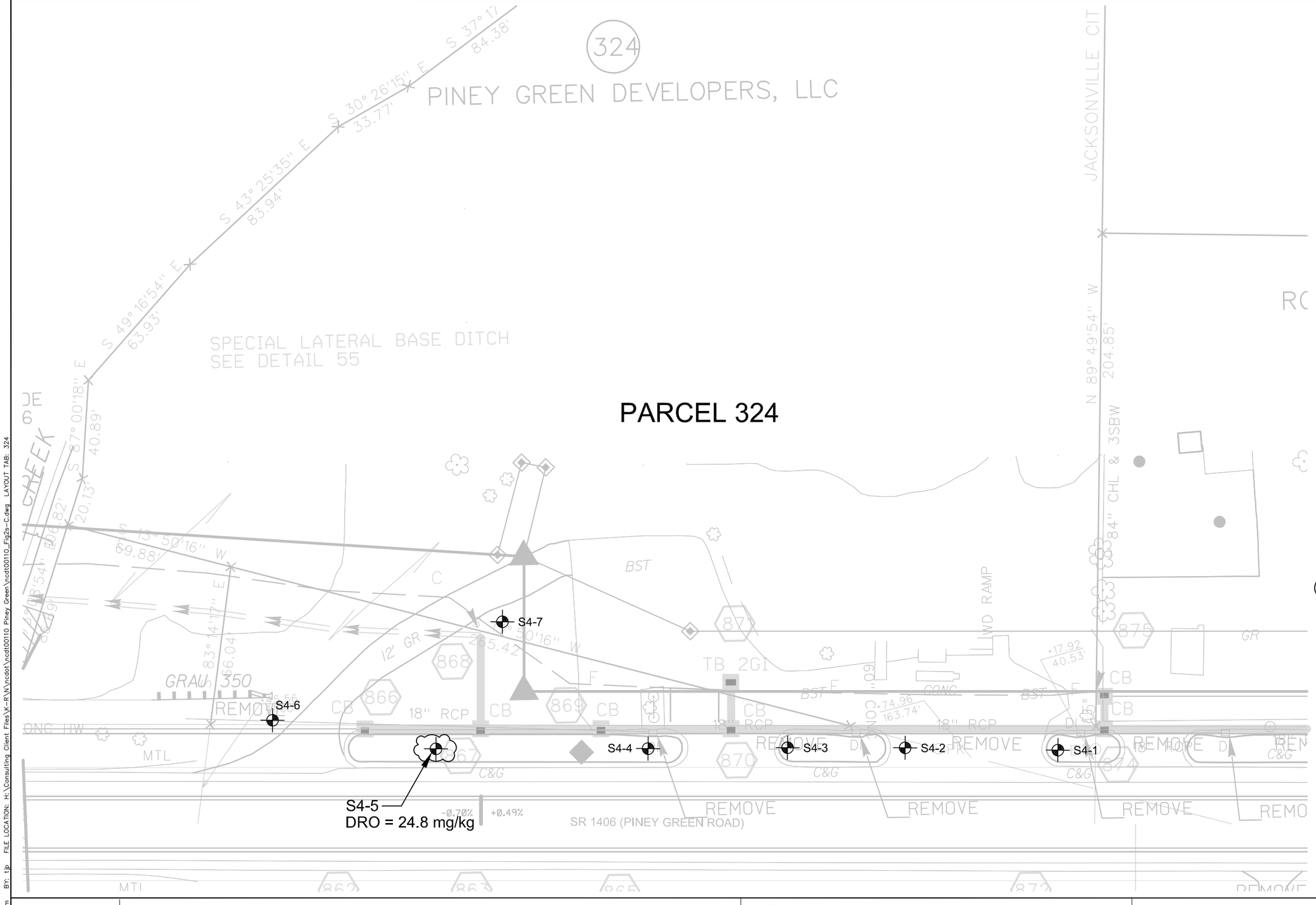
USGS TOPOGRAPHIC LOCATION MAP

FIGURE 1

DATE: April 6, 2010

DRAWN BY: TJP

APPRV. BY: ADE



PLOTTED: May 06, 2010 – 3:37pm BY: tjp FILE LOCATION: H:\Consulting Client Files\K-R\NCDOT\ncdt00110 Piney Green\ncdt00110_Fig2s-C.dwg LAYOUT TAB: 324

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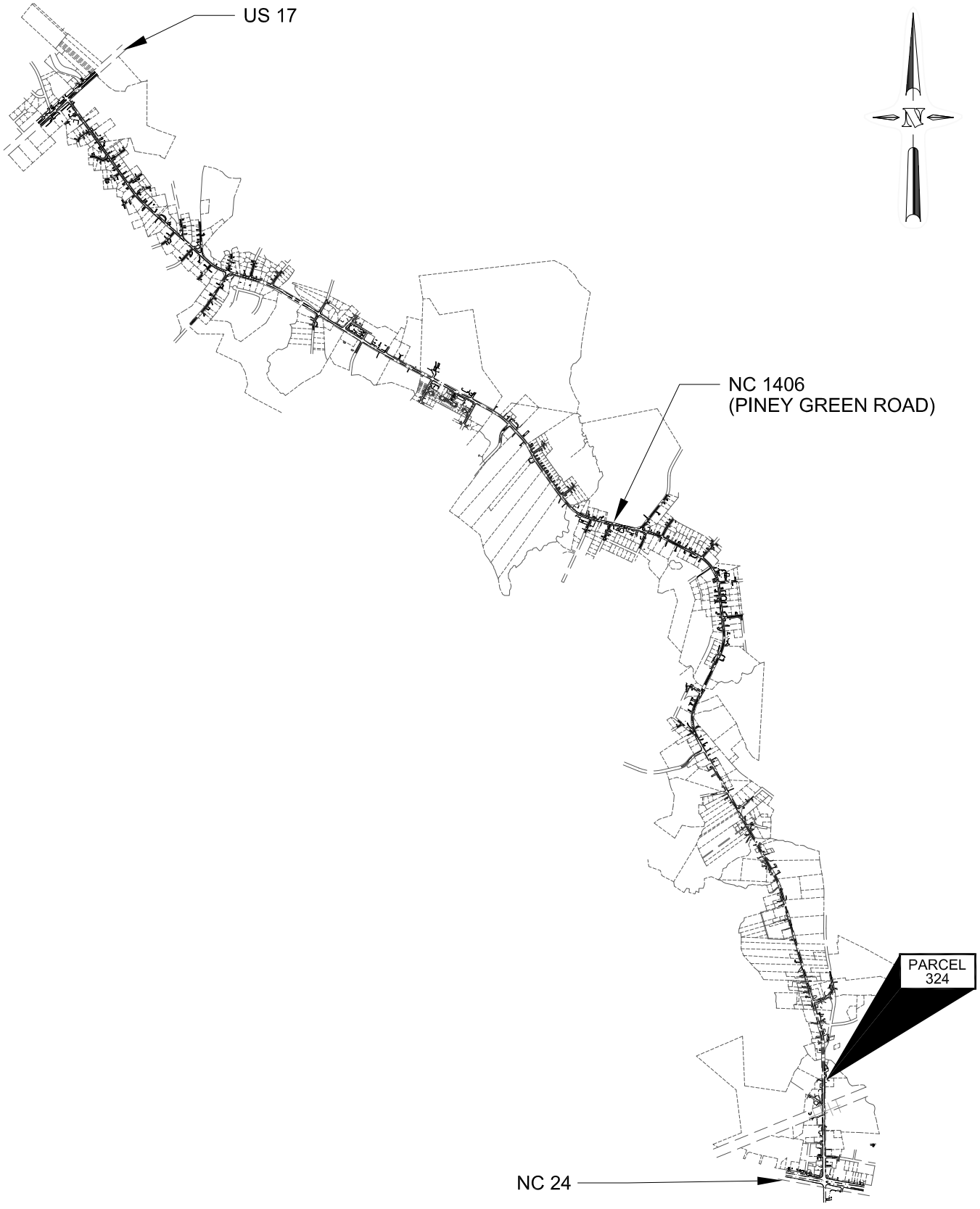
PRELIMINARY SITE ASSESSMENT REPORT
PARCEL NO. 324, DANIEL & JEAN WILLAFORD
2683 PINEY GREEN ROAD
MIDWAY PARK, NORTH CAROLINA
STATE PROJECT U-3810, WBS #35801.1.1

DATE: May 3, 2010

SITE SKETCH SHOWING
SOIL BORING LOCATIONS

DRAWN BY: TJP APPRV. BY: ADE

FIGURE
2



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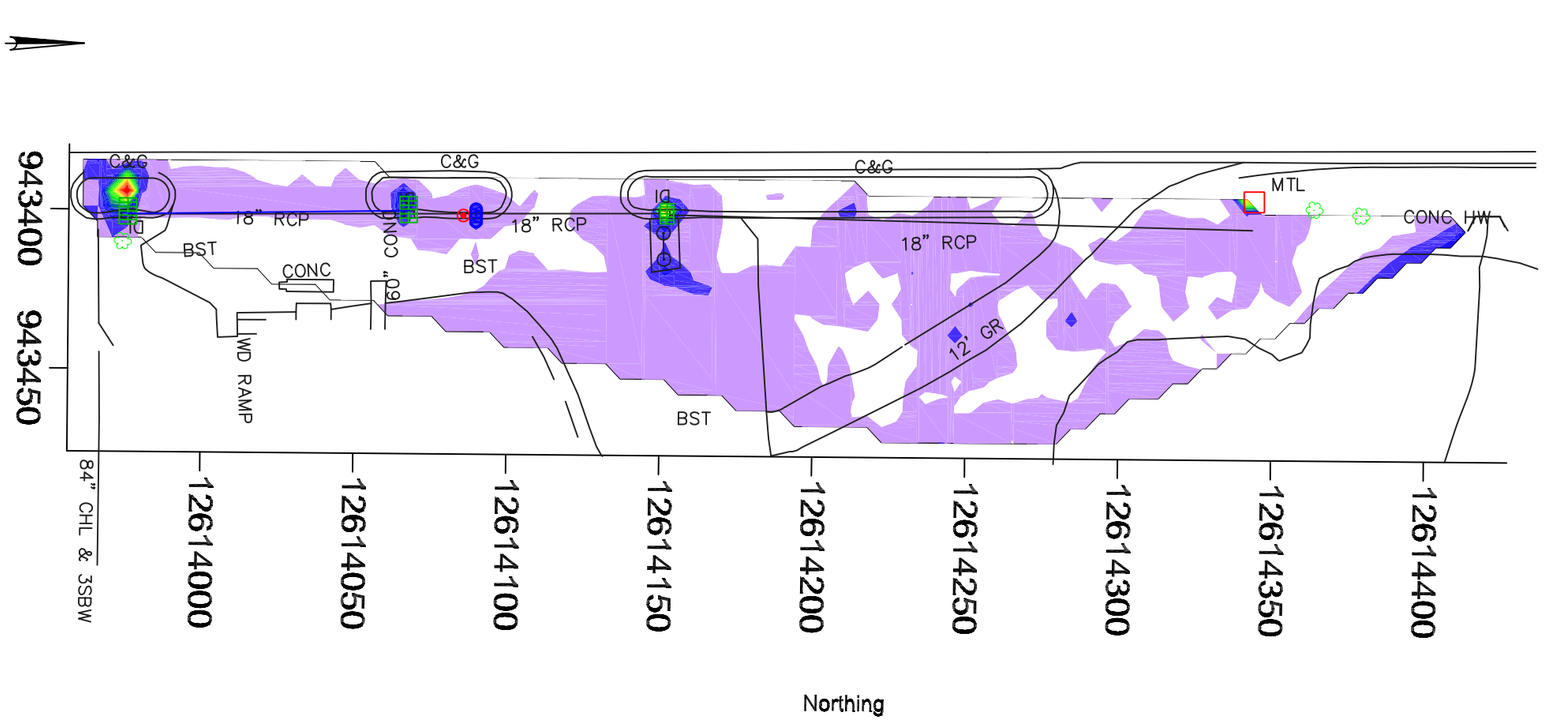
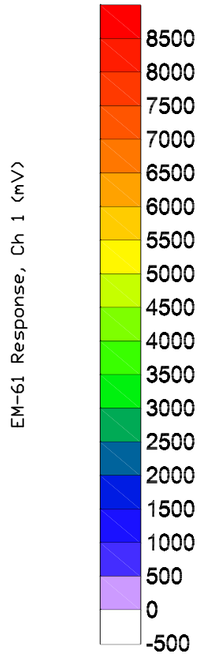
PROJECT: ncdt00110			
PRELIMINARY SITE ASSESSMENT REPORT PARCEL 324 MIDWAY PARK, NORTH CAROLINA STATE PROJECT U-3810, WBS# 35801.1.1	KEY MAP SHOWING PARCEL LOCATION		FIGURE 3
DATE: April 6, 2010	DRAWN BY: TJP	APPRV. BY: ADE	





GRAPHIC SCALE

0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

LEGEND

- UNKNOWN UTILITY
- STORMWATER DRAINAGE GRATE
- WATER METER
- UTILITY POLE

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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problem solved

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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	Site Map Showing Results Of Geophysical Survey Investigation Parcel 324	FIGURE 4
March 11, 2010	DRAWN BY: DEA / APPRV. BY: CMS	

APPENDIX I

SOIL BORING LITHOLOGIC LOGS

SOIL BORING LOG

Boring/Well No.: S4-1
Date Started: 3/9/10
Date Completed: 3/9/10

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	–	0.4	Organics, Dk. Brn Silty Sand, rock frags, Moist	
2	4-8	–	0.2	Tan Sandy Clay Tan, Gray Sandy Clay, Moist Tan, Gray Clayey Sand, Moist-Wet	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

15.00 *

Notes:

1) 4-foot continuous cores using DPT..

34° 43.365 N
77° 19.212 W

SOIL BORING LOG

Boring/Well No.: SB-2
Date Started: 3/9/10
Date Completed: 3/9/10

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
* 1	0-4	—	0.6	Organics, silty Sand DK. Brown, Moist Tan Sandy Clay	
15:10 2	4-8	—	0.1	Tan Sandy Clay, Moist Lt. Gray, Orange Brown Sandy Clay, Moist	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

1) 4-foot continuous cores using DPT..

34° 43.374 N

77° 19.213 W

SOIL BORING LOG

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

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	-	0.1	Grass Roots, Organics DK Brown Silty Sand, Cemented sands, shell frags (1'BGS) Tan Sandy Clay, Moist	
15:25 * 2	4-8	-	0.1	Tan Sandy Clay, Red Orange Gray Mottled Sandy Clay, Moist More Sand at depth	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

1) 4-foot continuous cores using DPT..

34° 43.380 N

77° 19.213 W

SOIL BORING LOG

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

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	-	0.2	Grass Roots, DK Brn Silty Sand- Moist Tan Sandy Clay, Moist	
15:40 ★ 2	4-8	-	0.3	Red, Brown, Gray Mottled Sandy Clay, Moist	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Notes:

1) 4-foot continuous cores using DPT..

34° 43.386 N
77° 19.213 W

SOIL BORING LOG

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

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	–	0.2	DK Brn, Silty Sand, organics. Rock Moist Pebbles	
2	4-8	–	0.0	DK. Brn Silty Sand Gray Silty Sand Moist - Wet	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

15:50 *

Notes:

1) 4-foot continuous cores using DPT..

31° 43.402 N

77° 19.213 W

SOIL BORING LOG

Boring/Well No.: SB-6
Date Started: 3/9/10
Date Completed: 3/9/10

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	-	0.1	Grassmat, Organics Gray F/M Sand, Moist DK. Gray, Gray Silty Sand, Moist	
2	4-8	-	0.2	DK. Gray - Gray Silty Sand Moist - Wet. Gray Sandy Clay, Moist	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

16:05

Notes:

1) 4-foot continuous cores using DPT..

34° 43. 912 N

77° 19. 210 W

SOIL BORING LOG

Boring/Well No.: SY-7
Date Started: 3/9/10
Date Completed: 3/9/10

No.	Depth Interval	Blow Counts	PID (ppm)	Soil Description	Soil Type
1	0-4	-	0.4	Brn-Gray Silty Sand, organics, shells, $CaCO_3$ (3' BGS), Moist, Red Brn Gray Mottled Sandy Clay	
2	4-8	-	0.1	Firm, Sandy Clay, Mottled - Moist	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

16:10

Notes:

1) 4-foot continuous cores using DPT..

34° 43. 399 N
77° 19. 203 W

APPENDIX II

CERTIFICATES OF ANALYSIS AND CHAIN OF CUSTODY RECORD FOR SOIL SAMPLES

SGS

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.

23March2010

Project Manager
Lori Lockamy

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.

Craig R Tronzo
Data Validation

Date 3/23/10

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

% 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.

SGS North America, Inc.

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

Client Sample ID:	S4-1-4	Analyzed By:	BAO
Client Project ID:	U-3810/NCDOT 001100	Date Collected:	3/9/2011 15:00
Lab Sample ID:	G341-616-51A	Date Received:	3/11/2010
Lab Project ID:	G341-616	Matrix:	Soil
Report Basis:	Dry Weight	Solids	83.48

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.61	mg/Kg	1	03/17/10 02:24

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	86.9	86.9		70-130

Comments:

Batch Information

Analytical Batch:	VP031610	Prep Method:	5035
Analytical Method:	8015	Initial Wt/Vol:	6.41 g
Instrument ID:	GC4	Final Volume:	5 mL
Analyst:	BAO		

Analyst: BAO

NC Certification #481

Reviewed By: _____
GRO.XLS

SGS North America, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: S4-1-4
Client Project ID: U-3810/NCDOT 001100
Lab Sample ID: G341-616-51D
Lab Project ID: G341-616

Date Collected: 3/9/2011 15:00
Date Received: 3/11/2010
Matrix: Soil
Solids 83.48
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.24	mg/Kg	1	03/18/10 00:46

Surrogate Spike Results	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	40.4	101

Comments:

Batch Information

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

Prep batch: 16215
Prep Method: 3541
Prep Date: 03/16/10
Initial Prep Wt/Vol: 33.08 G
Prep Final Vol: 10 mL

Analyst: FA

NC Certification #481

Reviewed By:

SGS North America, Inc.

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

Client Sample ID: S4-2-4
Client Project ID: U-3810/NCDOT 001100
Lab Sample ID: G341-616-52A
Lab Project ID: G341-616
Report Basis: Dry Weight

Analyzed By: BAO
Date Collected: 3/9/2011 15:10
Date Received: 3/11/2010
Matrix: Soil
Solids 84.58

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	4.28	mg/Kg	1	03/17/10 02:51

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	86.1	86.1		70-130

Comments:

Batch Information

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

Prep Method: 5035
Initial Wt/Vol: 8.29 g
Final Volume: 5 mL

Analyst: BAO

NC Certification #481

Reviewed By: GRO.XLS

SGS North America, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: S4-2-4
Client Project ID: U-3810/NCDOT 001100
Lab Sample ID: G341-616-52D
Lab Project ID: G341-616

Date Collected: 3/9/2011 15:10
Date Received: 3/11/2010
Matrix: Soil
Solids 84.58
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.26	mg/Kg	1	03/18/10 01:14

Surrogate Spike Results	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	38.5	96.2

Comments:

Batch Information

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

Prep batch: 16215
Prep Method: 3541
Prep Date: 03/16/10
Initial Prep Wt/Vol: 32.57 G
Prep Final Vol: 10 mL

Analyst: _____

NC Certification #481

Reviewed By: _____

SGS North America, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: S4-3-8
Client Project ID: U-3810/NCDOT 001100
Lab Sample ID: G341-616-53A
Lab Project ID: G341-616
Report Basis: Dry Weight

Analyzed By: BAO
Date Collected: 3/9/2011 15:25
Date Received: 3/11/2010
Matrix: Soil
Solids 82.35

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.55	mg/Kg	1	03/17/10 03:18

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	87.0	87.0		70-130

Comments:

Batch Information

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

Prep Method: 5035
Initial Wt/Vol: 6.56 g
Final Volume: 5 mL

Analyst: BAO

NC Certification #481

Reviewed By: GRO.XLS

SGS North America, Inc.

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

Client Sample ID: S4-3-8
Client Project ID: U-3810/NCDOT 001100
Lab Sample ID: G341-616-53D
Lab Project ID: G341-616

Date Collected: 3/9/2011 15:25
Date Received: 3/11/2010
Matrix: Soil
Solids 82.35
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.58	mg/Kg	1	03/18/10 01:42

Surrogate Spike Results	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	38.7	96.7

Comments:

Batch Information

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

Prep batch: 16215
Prep Method: 3541
Prep Date: 03/16/10
Initial Prep Wt/Vol: 32.05 G
Prep Final Vol: 10 mL

Analyst: FK

NC Certification #481

Reviewed By:

SGS North America, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: S4-4-8
Client Project ID: U-3810/NCDOT 001100
Lab Sample ID: G341-616-54A
Lab Project ID: G341-616
Report Basis: Dry Weight

Analyzed By: BAO
Date Collected: 3/9/2011 15:40
Date Received: 3/11/2010
Matrix: Soil
Solids 84.20

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	4.82	mg/Kg	1	03/17/10 03:45

Surrogate Spike Results

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

Comments:

Batch Information

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

Prep Method: 5035
Initial Wt/Vol: 7.39 g
Final Volume: 5 mL

Analyst: BAO

NC Certification #481

Reviewed By: GRO.XLS

SGS North America, Inc.

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

Client Sample ID: S4-4-8
Client Project ID: U-3810/NCDOT 001100
Lab Sample ID: G341-616-54D
Lab Project ID: G341-616

Date Collected: 3/9/2011 15:40
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	7.21	mg/Kg	1	03/18/10 02:10

Surrogate Spike Results	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	37.3	93.3

Comments:

Batch Information

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

Prep batch: 16215
Prep Method: 3541
Prep Date: 03/16/10
Initial Prep Wt/Vol: 32.93 G
Prep Final Vol: 10 mL

Analyst: FX

NC Certification #481

Reviewed By: DRO.XLS

SGS North America, Inc.

Results for Total Petroleum Hydrocarbons
by GC/FID 8015

Client Sample ID: S4-5-4
Client Project ID: U-3810/NCDOT 001100
Lab Sample ID: G341-616-65A
Lab Project ID: G341-616
Report Basis: Dry Weight

Analyzed By: BAO
Date Collected: 3/9/2011 15:50
Date Received: 3/11/2010
Matrix: Soil
Solids 85.28

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.67	mg/Kg	1	03/17/10 04:12

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	86.3	86.3		70-130

Comments:

Batch Information

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

Prep Method: 5035
Initial Wt/Vol: 6.2 g
Final Volume: 5 mL

Analyst: BAO

NC Certification #481

Reviewed By: GRO.XLS

SGS North America, Inc.

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

Client Sample ID: S4-5-4
Client Project ID: U-3810/NCDOT 001100
Lab Sample ID: G341-616-65D
Lab Project ID: G341-616

Date Collected: 3/9/2011 15:50
Date Received: 3/11/2010
Matrix: Soil
Solids 85.28
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	**24.8**	7.06	mg/Kg	1	03/18/10 11:27

Surrogate Spike Results	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	36.1	90.2

Comments:

Batch Information

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

Prep batch: 16216
Prep Method: 3541
Prep Date: 03/16/10
Initial Prep Wt/Vol: 33.24 G
Prep Final Vol: 10 mL

Analyst: FA

NC Certification #481

Reviewed By:

SGS North America, Inc.

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

Client Sample ID:	S4-6-8	Analyzed By:	BAO
Client Project ID:	U-3810/NCDOT 001100	Date Collected:	3/9/2011 16:05
Lab Sample ID:	G341-616-66A	Date Received:	3/11/2010
Lab Project ID:	G341-616	Matrix:	Soil
Report Basis:	Dry Weight	Solids	82.71

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	5.20	mg/Kg	1	03/17/10 04:39

Surrogate Spike Results

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

Comments:

Batch Information

Analytical Batch:	VP031610	Prep Method:	5035
Analytical Method:	8015	Initial Wt/Vol:	6.98 g
Instrument ID:	GC4	Final Volume:	5 mL
Analyst:	BAO		

Analyst: BAO

NC Certification #481

Reviewed By: _____

GRO.XLS

SGS North America, Inc.

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

Client Sample ID: S4-6-8
Client Project ID: U-3810/NCDOT 001100
Lab Sample ID: G341-616-66D
Lab Project ID: G341-616

Date Collected: 3/9/2011 16:05
Date Received: 3/11/2010
Matrix: Soil
Solids 82.71
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.48	mg/Kg	1	03/18/10 11:55

Surrogate Spike Results	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	33.5	83.7

Comments:

Batch Information

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

Prep batch: 16216
Prep Method: 3541
Prep Date: 03/16/10
Initial Prep Wt/Vol: 32.34 G
Prep Final Vol: 10 mL

Analyst: _____

NC Certification #481

Reviewed By: _____

SGS North America, Inc.

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

Client Sample ID:	S4-7-4	Analyzed By:	BAO
Client Project ID:	U-3810/NCDOT 001100	Date Collected:	3/9/2011 16:10
Lab Sample ID:	G341-616-67A	Date Received:	3/11/2010
Lab Project ID:	G341-616	Matrix:	Soil
Report Basis:	Dry Weight	Solids	85.46

Analyte	Result	RL	Units	Dilution Factor	Date Analyzed
Gasoline Range Organics	BQL	4.82	mg/Kg	1	03/17/10 05:06

Surrogate Spike Results

	Added	Result	Recovery	Flag	Limits
BFB	100	85.9	85.9		70-130

Comments:

Batch Information

Analytical Batch:	VP031610	Prep Method:	5035
Analytical Method:	8015	Initial Wt/Vol:	7.28 g
Instrument ID:	GC4	Final Volume:	5 mL
Analyst:	BAO		

Analyst: BAO

NC Certification #481

Reviewed By:

GRO.XLS

SGS North America, Inc.

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

Client Sample ID: S4-7-4
Client Project ID: U-3810/NCDOT 001100
Lab Sample ID: G341-616-67D
Lab Project ID: G341-616

Date Collected: 3/9/2011 16:10
Date Received: 3/11/2010
Matrix: Soil
Solids 85.46
Report Basis: Dry Weight

Parameter	Result	RL	Units	Dilution Factor	Date Analyzed
Diesel Range Organics	BQL	7.02	mg/Kg	1	03/18/10 12:23

Surrogate Spike Results	Spike Added	Control Limits	Spike Result	Percent Recovery
OTP	40	40-140	36.9	92.3

Comments:

Batch Information

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

Prep batch: 16216
Prep Method: 3541
Prep Date: 03/16/10
Initial Prep Wt/Vol: 33.34 G
Prep Final Vol: 10 mL

Analyst: _____

NC Certification #481

Reviewed By: _____

SGS Environmental Services Inc.
CHAIN OF CUSTODY RECORD

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

(1)
CLIENT: GEL ENG OF NC, INC
CONTACT: ANDREW EYER PHONE NO: 919-323-8828
PROJECT: U-3810/NCDOT110 SITE/PWSID#: ONSLOW Co.
REPORTS TO: ANDREW EYER EMAIL: ade@gel.com
INVOICE TO: NCDOT QUOTE #:
WBS # 35801.1.1 P.O. #:

SGS Reference #: G341-616 page ____ of ____

(2)

LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX/ MATRIX CODE	# CONTAINERS	SAMPLE TYPE C= COMP G= GRAB MI= Multi Incremental Samples	Preservatives Used		Methanol								REMARKS/ LOC ID
							Analysis Required (3)	DRO	GRO								
45	S5-6-8	3/9/10	11:45	SO	3	G		1	2								
46	S5-7-8		12:00	SO	3	G		1	2								
47	S5-8-8		12:15	SO	3	G		1	2								
48	S5-9-8		12:35	SO	3	G		1	2								
49	S5-10-8		12:50	SO	3	G		1	2								
50	S5-11-4		13:10	SO	3	G		1	2								
51	S4-1-4		15:00	SO	3	G		1	2								
52	S4-2-4		15:10	SO	3	G		1	2								
53	S4-3-8		15:25	SO	3	G		1	2								
54	S4-4-8		15:40	SO	3	G		1	2								

(5)

Collected/Relinquished By:(1)	Date	Time	Received By:
	3/11/10	15:15	
Relinquished By: (2)	Date	Time	Received By:
Relinquished By: (3)	Date	Time	Received By:
Relinquished By: (4)	Date	Time	Received For Laboratory By:

(4)
DOD Project? YES NO
Cooler ID _____
Special Deliverable Requirements:
Requested Turnaround Time and-or Special Instructions:
Samples Received Cold? (YES) NO
Temperature °C: Cooler 2.0, 1.2, 1.2 TB 0.9
Chain of Custody Seal: (Circle) INTACT BROKEN (ABSENT)

SGS North America, Inc.

NC Certification #481

Page 227 of 230

SGS Environmental Services Inc.
CHAIN OF CUSTODY RECORD

Locations Nationwide
- Alaska
- Maryland
- New Jersey
- New York
- North Carolina
- Ohio
- West Virginia

www.us.sgs.com

(1)

CLIENT: GEL Eng. of NC, Inc.
CONTACT: Andrew Eyer PHONE NO: 919-323-8828
PROJECT: U-3810/NCDOT00110 SITE/PWSID#: Onslow Co.
REPORTS TO: Andrew Eyer EMAIL: ade@gel.com
INVOICE TO: NCDOT QUOTE #:
WBS# 35801.1.1 P.O. #:

SGS Reference #: G341-616 page ____ of ____

(2)

LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX/ MATRIX CODE	# CONTAINERS	SAMPLE TYPE C= COMP G= GRAB MI= Multi Incremental Samples	Preservatives Used		Methanol								REMARKS/ LOC ID
							Analysis Required (3)	DRO	GRO	VOCs - 8260	SVOCs - 8270						
65	SG-5-4	3/9/10	15:50	SO	3	G		1	2								
66	SG-6-8		16:05	SO	3	G		1	2								
67	SG-7-4		16:10	SO	3	G		1	2								
68	SG-1-8		16:55	SO	8	G		1	2	4	1						
69	SG-2-8		17:10	SO	8	G		1	2	4	1						
70	SG-3-8		17:15	SO	8	G		1	2	4	1						
71	SG-4-8	↓	17:40	SO	8	G		1	2	4	1						
72	SG-1-4	3/10/10	09:15	SO	8	G		1	2	4	1						
73	SG-2-4		09:35	SO	8	G		1	2	4	1						
74	SG-3-4	↓	09:50	SO	8	G		1	2	4	1						

SGS North America, Inc.

NC Certification #481

(5)

Collected/Relinquished By:(1)	Date	Time	Received By:
	3/11/10	15:15	
Relinquished By: (2)	Date	Time	Received By:
Relinquished By: (3)	Date	Time	Received By:
Relinquished By: (4)	Date	Time	Received For Laboratory By:

(4)

DOD Project? YES NO
Cooler ID _____

Special Deliverable Requirements:

Requested Turnaround Time and-or Special Instructions:

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

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

200 W. Potter Drive **Anchorage, AK 99518** Tel: (907) 562-2343 Fax: (907) 561-5301
550 Business Drive **Wilmington, NC 28405** Tel: (910) 350-1903 Fax: (910) 350-1557

White - Retained by Lab
Pink - Retained by Client

APPENDIX III

PHOTOGRAPHS SHOWING SOIL BORING LOCATIONS


S4-6
S4-5
S4-7
S4-4
S4-3
S4-2
S4-1
PINEY GREEN ROAD
2683 PINEY GREEN ROAD
PARCEL NO. 324
©2010 Google - Imagery ©2010 GeoEye, U.S. Geological Survey -


S4-4
S4-3
S4-2
S4-1


S4-5
S4-6
S4-7