Solutions-IES
Industrial & Environmental Services

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December 13, 2016

Mr. Terry Fox, L.G.
North Carolina Department of Transportation
Geotechnical Engineering Unit
1589 Mail Service Center
Raleigh, North Carolina 27699-1589

Reference: **Preliminary Site Assessment**
Oland Little Property (Parcel #154)
5512 Raeford Road
Fayetteville, Cumberland County, North Carolina
State Project: U-4405
WBS Element 39049.1.1
SIES Project No. 2016.0054.NDOT

Dear Mr. Fox:

Solutions-IES, Inc., (SIES) has completed the Preliminary Site Assessment conducted at the above-referenced property. The work was performed in accordance with the Technical and Cost proposal dated September 26, 2016, and the North Carolina Department of Transportation's (NCDOT's) Notice to Proceed dated September 26, 2016. Activities associated with the assessment consisted of conducting a geophysical investigation, collecting soil samples for analysis, and reviewing applicable North Carolina Department of Environmental Quality (NCDEQ) records. The purpose of this report is to document the field activities, present the laboratory analyses, and provide recommendations regarding the property.

Location and Description

The Oland Little Property (Parcel #154) is located at 5512 Raeford Road in Fayetteville, Cumberland County, North Carolina. The property is situated on the north side of Raeford Road approximately 100 feet east of the intersection of Raeford Road and Skibo Road (**Figure 1**). The property consists of an active truck rental business (Budget Truck Rental), but NCDOT information indicated that the site was formerly a gas station in the 1980s. According to the NCDOT, aerial photography from 1983 shows a pump island in front of the building.

A concrete parking area occupies the area in front of the building and asphalt driveways enter the property from both sides of the building. A concrete pad is present in front of the building along the road frontage and is likely the former pump island (**Figure 2**). The proposed easement had not been marked at the site on the dates of the field work, but NCDOT plan sheets show that the easement encompasses the concrete pad (former pump island) but will not affect the building.

The NCDOT requested a Preliminary Site Assessment for the right-of-way and proposed easement because of a former gas station at the site. The scope of work as defined in the Request for Technical and Cost Proposal was to evaluate the site with respect to the presence of known and unknown USTs and assess where contamination exists on the right-of-way/proposed easement. An estimate of the quantity of impacted soil was to be provided, should impacted soils be encountered.

SIES reviewed the on-line NCDEQ Incident Management database and no incident number was assigned to the site. SIES also examined the UST registration database and found no tanks registered to the property address.

Geophysical Survey

Prior to SIES' mobilization to the site, Pyramid Environmental & Engineering of Greensboro, NC (Pyramid) conducted a geophysical survey to determine if USTs were present in in the right-of-way/proposed easement . The geophysical survey consisted of an electromagnetic survey using a Geonics EM61 time-domain electromagnetic induction meter to locate buried metallic objects. The instruments were used specifically to locate USTs.

A survey grid was laid out along the right-of-way/proposed easement with the X-axis oriented approximately parallel to Raeford Road and the Y-axis oriented approximately perpendicular to Raeford Road. The grid was positioned to cover the entire right-of-way/proposed easement The grid was positioned to cover the entire right-of-way/proposed easement, as shown on **Figure 2** of the geophysical survey report in **Attachment A**.

The survey lines were spaced five feet apart and magnetic data were collected continuously along each survey line with a data logger. After collection, the data were reviewed in the field with graphical computer software. No anomalies were detected that were not attributable to visible cultural features, metallic debris, underground utilities, signage, or vehicles. The data did not show evidence of metallic USTs within the right-of-way/proposed easement. For these reasons, a ground penetrating radar survey was not required to verify any unknown EM anomalies. Pyramid's detailed report of findings and interpretations is presented in **Attachment A**.

Site Assessment Activities

On October 24, 2016, SIES mobilized to the site to conduct a Geoprobe® direct-push investigation to evaluate subsurface soil conditions on the property. As directed by the NCDOT, the Geoprobe® borings were terminated at 10 feet below ground surface (ft bgs). Four direct-push holes (154-SB-1 through 154-

SB-4) were advanced throughout the right-of-way/proposed easement (**Figure 2).** The soil boring logs are included as **Attachment B**. Borings 154-SB-1 through 154-SB-4 were located to evaluate the subsurface conditions in the right-of-way/easement along Raeford Road (see photos in **Attachment C**).

Continuous sampling using a Geoprobe® resulted in generally good recovery of soil samples from the direct-push holes. Soil samples were collected and contained in four-foot long acetate sleeves inside the direct-push Macro-Core® sampler. Each of the sleeves was divided into two-foot long sections for soil sample screening. Soil from each two-foot interval was placed in a resealable plastic bag and the bag was set aside for volatilization of organic compounds from the soil to the bag headspace. A photoionization detector (PID) probe was inserted into the bag and the reading was recorded (**Table 1**).

If the PID concentrations in a boring were consistently low, one sample from the bottom interval was selected for analysis. If the PID concentrations were elevated, samples at the elevated and bottom intervals were selected for analyses. The PID results are summarized in Table 1.

The selected soil samples were submitted to an on-site mobile laboratory for analysis of total petroleum hydrocarbons (TPH) diesel range organics (DRO) and gasoline range organics (GRO) using ultraviolet fluorescence (UVF) methodology. Each boring was backfilled with bentonite and drill cuttings to the surface after completion.

The lithology encountered by the direct-push samples was generally consistent throughout the site. The ground surface was covered with about 0.5 feet of asphalt or topsoil. Below this surface cover to a depth of about eight to ten feet was a light gray clayey sand. Underlying the sand was a light gray soft clay. No bedrock or groundwater were noted in any of the borings. Hydrocarbon odors were generally noted in the material below a depth of about four feet in all borings.

According to the 1985 Geologic Map of North Carolina, the site is within of Coastal Plain Physiographic Province in North Carolina near the contact between the Cretaceous Black Creek and Middendorf Formations. The strata of the Black Creek Formation consist of gray to black clay, thin lenses of fine-grained sand and thick lenses of cross-bedded sand. The lithology may also include glauconite and fossils. In comparison, the Middendorf Formation consists of sand, sandstone, and mudstone that are laterally discontinuous. The soils observed at the site are consistent with the MIddendorf Formation as the parent material.

Analytical Results

The laboratory data are summarized in **Table 1** and the complete analytical report is presented in **Attachment D**. Ten soil samples were submitted for analysis (multiple samples were collected from borings 154-SB-1 through 154-SB-3). Of these samples, five contained detectable GRO compounds at concentrations ranging from 1.7 to 347,094 milligrams per kilogram (mg/kg) and all ten samples contained detectable DRO compounds at concentrations ranging from 0.78 to 85,827 mg/kg. The action levels are 50 mg/kg for GRO and 100 mg/kg for DRO[1]. Two soil samples had hydrocarbon concentrations above action levels: 154-SB-3-6-8 (347,094 mg/kg GRO and 85,827 mg/kg DRO) and 154-SB-3-8-10 (6,354 mg/kg GRO and 1,972 mg/kg DRO). Figure 3 shows the analytical results for the highest individual DRO and GRO in each boring (the results may be from different samples within the boring).

Contaminated Soil Volume Estimate

The UVF analytical results (**Table 1)** of the soil samples collected on October 24, 2016 indicate that two of the soil samples in boring 154-SB-3 contained DRO or GRO concentrations above the action level. Therefore, an estimate of the volume of soil requiring possible remediation was made.

To estimate the volume of soil requiring possible remediation, only the soil samples that contained a DRO and/or GRO concentration above the respective action levels were considered. The thickness of the potentially contaminated soil was estimated from the UVF results, which indicated a thickness of four feet (**Table 1**). After estimating the potential contamination geometry using field observations and experience with similar sites and geology, SIES measured the affected section on **Figure 3** by using CAD software, which indicated a total area of about 375 ft^2. Estimating a four-foot contamination thickness, this calculates to a volume of about 55 bank cubic yards.

The use of DRO and GRO concentrations to determine UST closure and immediate soil removal is a valid analytical method. However, any cleanup beyond the closure is governed by risk-based methods that are based on individual constituents and do not correlate with DRO and GRO concentrations. Because of the uncertainty associated with the differences in these analytical methods, the actual volume of contaminated soil may be higher or lower.

Conclusions and Recommendations

A Preliminary Site Assessment was conducted to evaluate the Oland Little Property (Parcel #154) located at 5512 Raeford Road in Fayetteville, Cumberland County, North Carolina. NCDEQ databases indicate

[1] NCDEQ, *Guidelines for North Carolina Action Limits for Total Petroleum Hydrocarbons (TPH)*,July 26, 2016,

that no release incidents have been reported for the site and no USTs were registered to the property address. A geophysical survey conducted at the site did not detect USTs in the investigation area. Four soil borings were advanced to evaluate the subsurface soil conditions along the right-of-way/proposed easement. Two of the analyzed soil samples detected GRO or DRO concentrations above their respective action levels. Based on the analytical results, SIES estimated approximately 55 cubic yards of potentially contaminated soil at the site.

SIES appreciates the opportunity to work with the NCDOT on this project. Because compounds were detected above the action level in the soil samples, SIES recommends that a copy of this report be submitted to the Division of Waste Management, UST Section, in the Fayetteville Regional Office. If you have any questions, please contact us at (919) 873-1060.

Sincerely,

Michael W. Branson, P.G.
Project Manager

John Palmer, P.G.
Senior Hydrogeologist

Attachments

TABLE 1
SOIL FIELD SCREENING AND ANALYTICAL RESULTS
LITTLE PROPERTY (PARCEL #154)
FAYETTEVILLE, CUMBERLAND COUNTY, NORTH CAROLINA
STATE PROJECT: U-4405
WBS ELEMENT 39049.1.1
SIES PROJECT NO. 2016.0054.NDOT

SAMPLE ID	DEPTH (ft)	PID READING (ppm)	SAMPLE ID	ANALYTICAL RESULTS (mg/kg)	
				UVF GRO	UVF DRO
	Action Level (mg/kg)			50	100
154-SB-1	0 - 2	1.8			
	2 - 4	2.7			
	4 - 6	3.8	154-SB-1-4-6	<0.67	**1.7**
	6 - 8	5.5	154-SB-1-6-8	<0.23	**0.78**
	8 - 10	716	154-SB-1-8-10	<0.63	**31.4**
154-SB-2	0 - 2	7.4			
	2 - 4	7.8			
	4 - 6	7.9	154-SB-2-4-6	<0.77	**15.1**
	6 - 8	20.1	154-SB-2-6-8	**3.8**	**16.8**
	8 - 10	1005	154-SB-2-8-10	**11.4**	**1.3**
154-SB-3	0 - 2	1.9			
	2 - 4	50.8			
	4 - 6	7.1	154-SB-3-4-6	**1.7**	**10.5**
	6 - 8	1870	154-SB-3-6-8	**347,094**	**85,827**
	8 - 10	2933	154-SB-3-8-10	**6,352**	**1,972**
154-SB-4	0 - 2	0.0			
	2 - 4	0.0			
	4 - 6	0.1			
	6 - 8	0.0			
	8 - 10	NS	154-SB-4-8-10	<0.73	**5.2**

1) ft - feet

2) ppm - parts per million.

3) PID - photoionization ionization detector

4) mg/kg - milligrams per kilogram.

5) UVF DRO - Diesel range organics by UVF.

6) UVF GRO - Gasoline range organics by UVF.

7) Action level based upon NCDEQ memo *Guidelines for North Carolina Action Limits for Total Petroleum Hydrocarbons* - July 29, 2016.

8) Soil samples were collected on October 25, 2016.

9) NS - Not screened due to equipment malfunction.

10) **Bold** values are above the detection level. Shaded values are above the action level.

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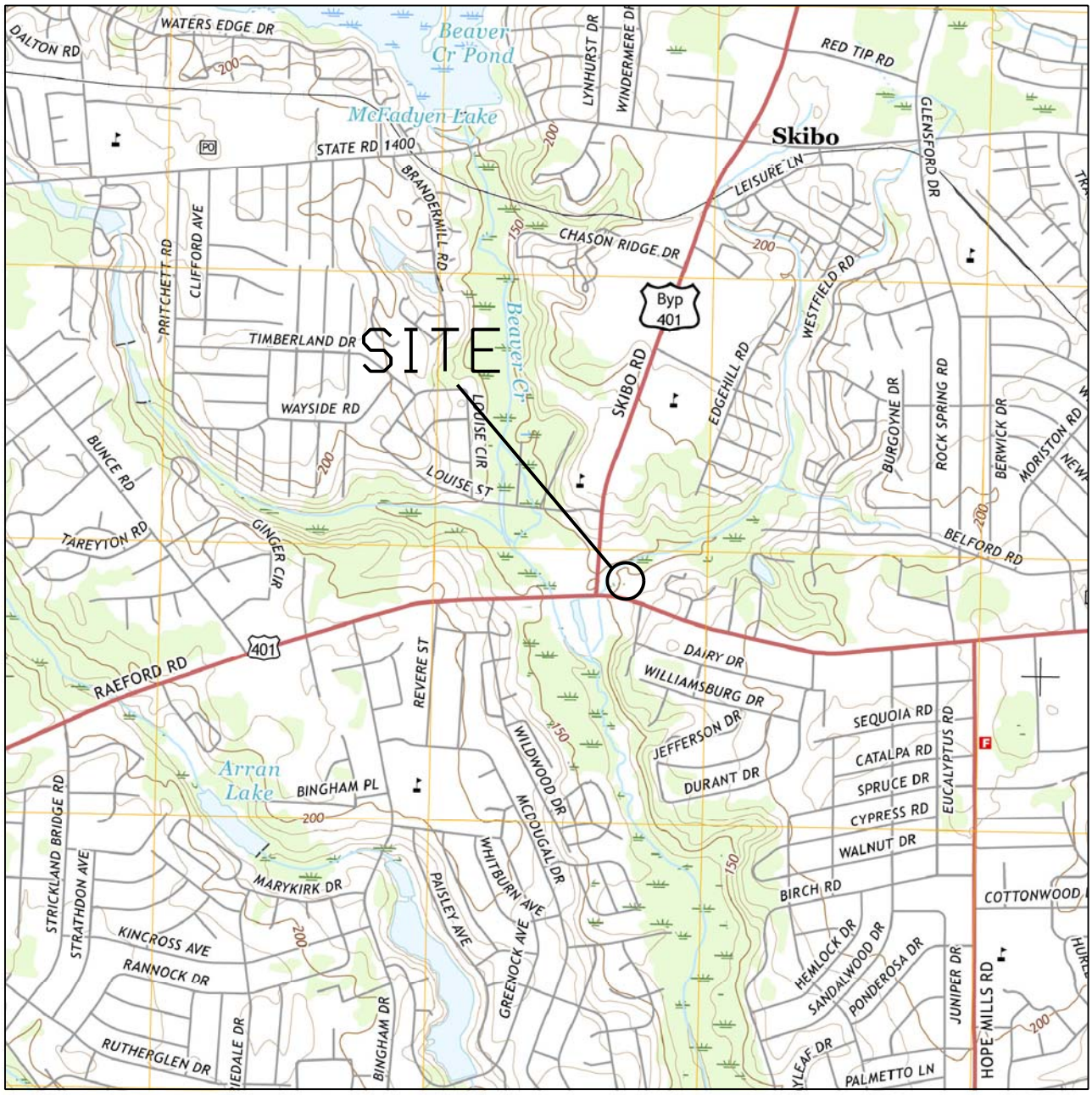
FIGURES



SCALE 1:24,000

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

SOURCE: U.S. GEOLOGICAL SURVEY 7.5 MIN QUADRANGLE: FAYETTEVILLE, NC (2016)

PROJECT NUMBER 2016.0054.NDOT
CHECKED BY JEP
PROJECT MANAGER MWB
DATE NOVEMBER 2016
FILE FAYETTEVILLE PSAS

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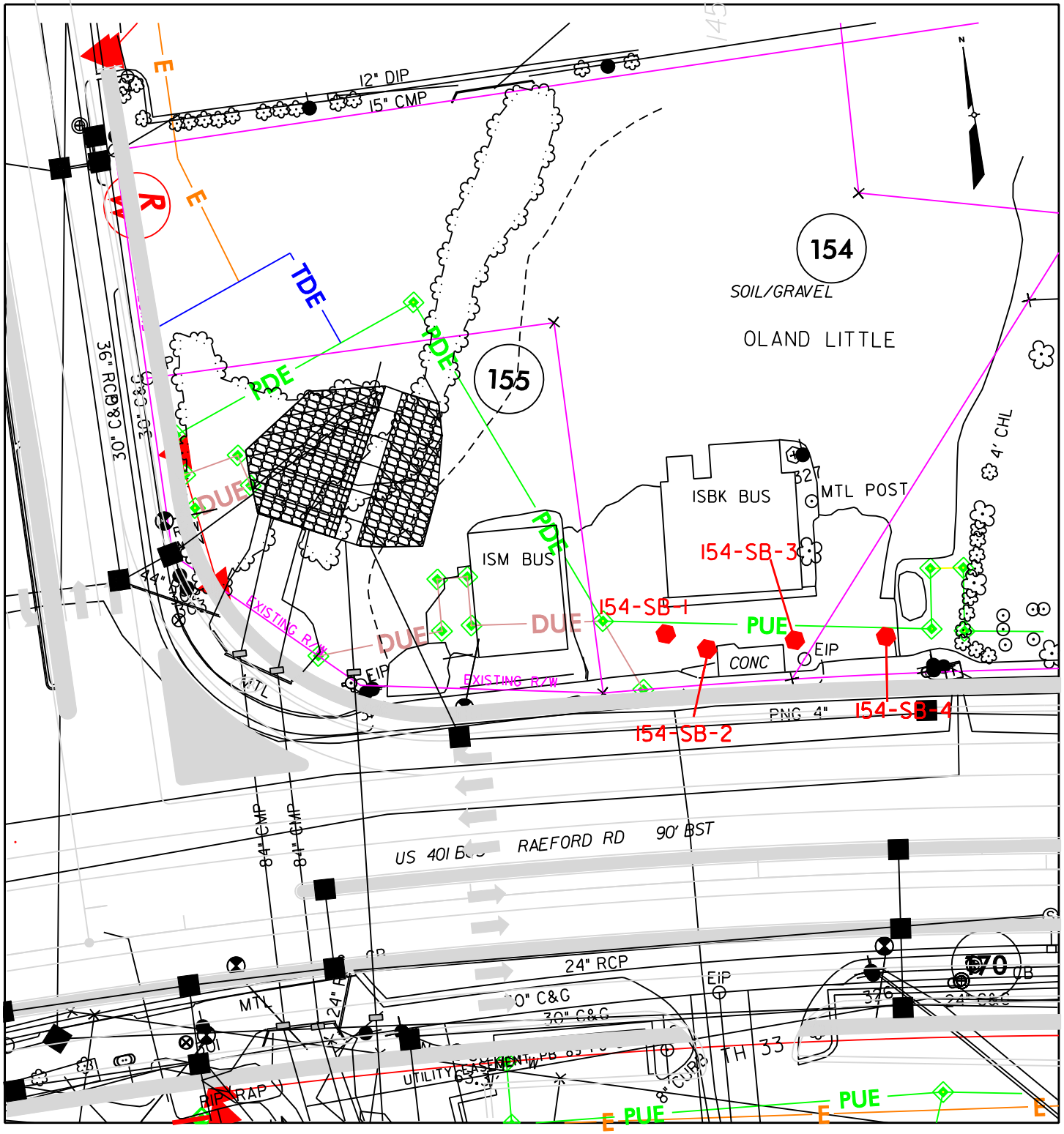
VICINITY MAP

LITTLE PROPERTY (PARCEL #154)
FAYETTEVILLE, CUMBERLAND COUNTY NORTH CAROLINA

FIGURE 1



PROJECT NUMBER 2016.0054.NDOT
DRAFTER MWB
CHECKED BY JEP
PROJECT MANAGER MWB
DATE NOVEMBER 2016
FAYETTEVILLE PSAS
FILE

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SITE MAP

LITTLE PROPERTY (PARCEL #154)

FAYETTEVILLE, CUMBERLAND COUNTY, NORTH CAROLINA

FIGURE 2

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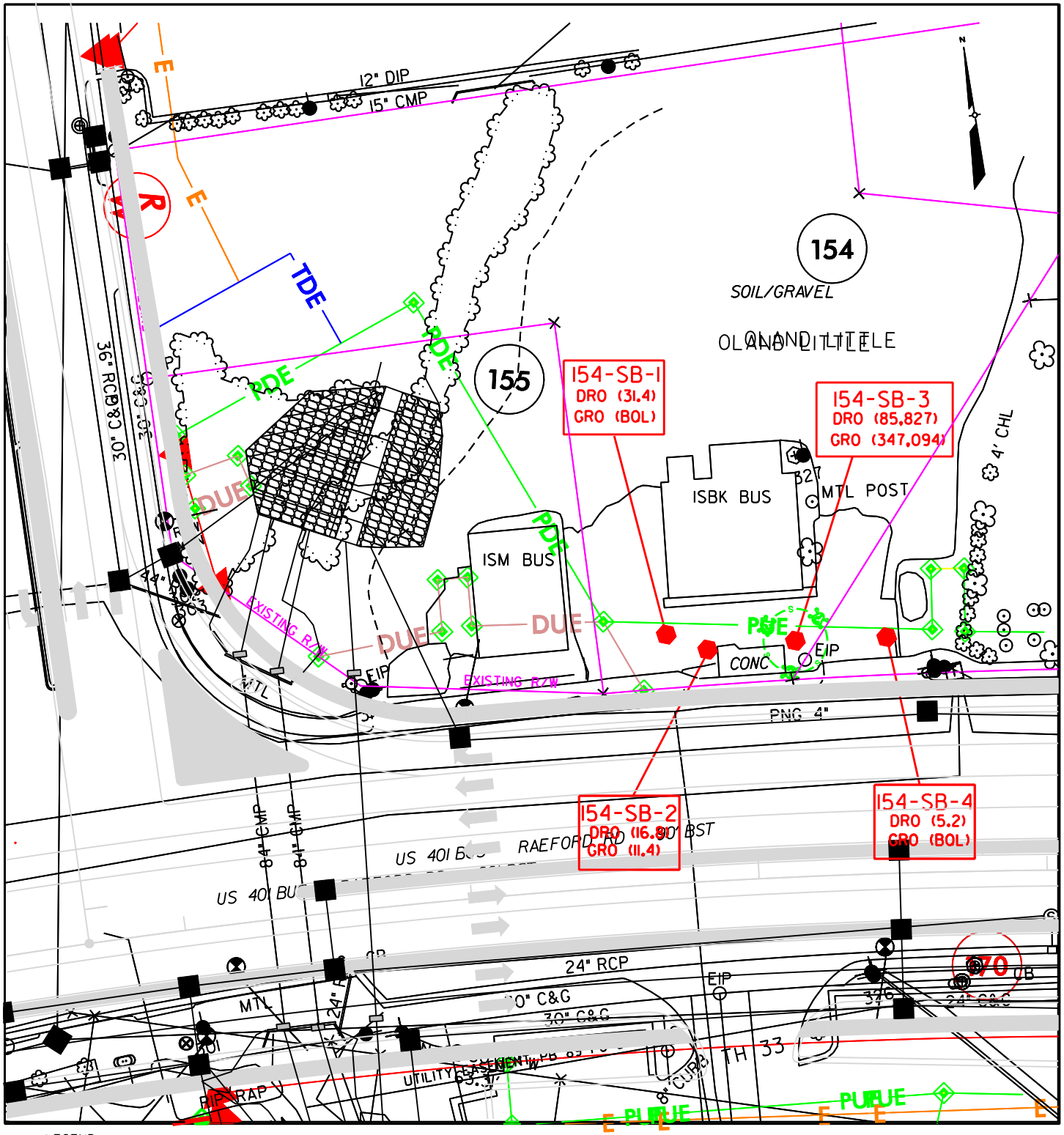

LEGEND

154-SB-1 — SOIL SAMPLE LOCATION AND IDENTIFICATION

DRO (123) — TPH AS DIESEL FUEL IN MG/KG

GRO (123) — TPH AS GASOLINE IN MG/KG

BQL — BELOW QUANTITATION LIMIT

ESTIMATED EXTENT OF CONTAMINATED SOIL (DRO>100 MG/KG OR GRO>50 MG/KG)

0 25 50
GRAPHIC SCALE (FEET)

PROJECT NUMBER 2016.0054.NDOT
DRAFTER MWB
CHECKED BY JEP
PROJECT MANAGER MWB
DATE NOVEMBER 2016
FAYETTEVILLE PSAS
FILE

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ANALYTICAL RESULTS MAP

LITTLE PROPERTY (PARCEL #154)

FAYETTEVILLE, CUMBERLAND COUNTY, NORTH CAROLINA

FIGURE 3

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ATTACHMENT A

PYRAMID GEOPHYSICAL SERVICES
(PROJECT 2016-265)

GEOPHYSICAL SURVEY

METALLIC UST INVESTIGATION:
PARCEL 154 – OLAND B. LITTLE
NCDOT PROJECT U-4405

5512 RAEFORD RD., FAYETTEVILLE, CUMBERLAND COUNTY, NC

NOVEMBER 4, 2016

Report prepared for: **Mike Branson**
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1101 Nowell Road
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Prepared by: _____
Eric C. Cross, P.G.
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Reviewed by: _____
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C257: GEOLOGY C1251: ENGINEERING

GEOPHYSICAL INVESTIGATION REPORT
Parcel 154 – 5512 Raeford Road
Fayetteville, Cumberland County, North Carolina

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Figure 1 – Parcel 154 Geophysical Survey Boundaries and Site Photographs
Figure 2 – Parcel 154 EM61 Results Contour Map

LIST OF ACRONYMS

CADD	Computer Assisted Drafting and Design
DF	Dual Frequency
EM	Electromagnetic
GPR	Ground Penetrating Radar
GPS	Global Positioning System
NCDOT	North Carolina Department of Transportation
ROW	Right-of-Way
SVE	Soil Vapor Extraction
UST	Underground Storage Tank

EXECUTIVE SUMMARY

Project Description: Pyramid Environmental conducted a geophysical investigation for Solutions, IES (Solutions) at Parcel 154, located at 5512 Raeford Road, Fayetteville, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project U-4405). Solutions directed Pyramid as to the geophysical survey boundaries at the project site, which were designed to extend from the existing edge of pavement to the proposed ROW lines and/or easement lines within the property, whichever distance was greater. Conducted from October 12-17, 2016, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

Geophysical Results: All EM anomalies were directly attributed to visible cultural features and known utilities. A GPR survey was not required. Collectively, the geophysical data did not show any evidence of unknown metallic USTs at Parcel 154.

INTRODUCTION

Pyramid Environmental conducted a geophysical investigation for Solutions, IES (Solutions) at Parcel 154, located at 5512 Raeford Road, Fayetteville, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project U-4405). Solutions directed Pyramid as to the geophysical survey boundaries at the project site, which were designed to extend from the existing edge of pavement to the proposed ROW lines and/or easement lines within the property, whichever distance was greater. Conducted from October 12-17, 2016, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

The site included a commercial building surrounded by concrete parking space, gravel drives and grassy medians. Aerial photographs showing the survey area boundaries and ground-level photographs are shown in **Figure 1**.

FIELD METHODOLOGY

The geophysical investigation consisted of an electromagnetic (EM) induction-metal detection survey. Pyramid collected the EM data using a Geonics EM61 metal detector integrated with a Trimble AG-114 GPS antenna. The integrated GPS system allows the location of the instrument to be recorded in real-time during data collection, resulting in an EM data set that is geo-referenced and can be overlain on aerial photographs and CADD drawings. A boundary grid was established around the perimeter of the site with marks every 10 feet to maintain orientation of the instrument throughout the survey and assure complete coverage of the area.

According to the instrument specifications, the EM61 can detect a metal drum down to a maximum depth of approximately 8 feet. Smaller objects (1-foot or less in size) can be detected to a maximum depth of 4 to 5 feet. The EM61 data were digitally collected at approximately 0.8 foot intervals along north-south trending or east-west trending, generally

parallel survey lines spaced five feet apart. The data were downloaded to a computer and reviewed in the field and office using the Geonics NAV61 and Surfer for Windows Version 11.0 software programs.

GPR data were not required at this property due to all EM anomalies being directly attributed to visible cultural features at the ground surface or known utilities (see Discussion of Results below).

Pyramid's classifications of USTs for the purposes of this report are based directly on the geophysical UST ratings provided by the NCDOT. These ratings are as follows:

Geophysical Surveys for Underground Storage Tanks
on NCDOT Projects

High Confidence	Intermediate Confidence	Low Confidence	No Confidence
Known UST Active tank - spatial location, orientation, and approximate depth determined by geophysics.	**Probable UST** Sufficient geophysical data from both magnetic and radar surveys that is characteristic of a tank. Interpretation may be supported by physical evidence such as fill/vent pipe, metal cover plate, asphalt/concrete patch, etc.	**Possible UST** Sufficient geophysical data from either magnetic or radar surveys that is characteristic of a tank. Additional data is not sufficient enough to confirm or deny the presence of a UST.	Anomaly noted but not characteristic of a UST. Should be noted in the text and may be called out in the figures at the geophysicist's discretion.

DISCUSSION OF RESULTS

Discussion of EM Results

A contour plot of the EM61 results obtained across the survey area at the property is presented in **Figure 2**. Each EM anomaly is numbered for reference in the figure. The following table presents the list of EM anomalies and the cause of the metallic response, if known:

LIST OF METALLIC ANOMALIES IDENTIFIED BY EM SURVEY

Metallic Anomaly #	Cause of Anomaly	Investigated with GPR
1	Sign Pole	
2	Windows, Doors and Suspected Utility	
3	Metal Fence	
4	Telephone Pole and Phone Box	
5	Guy Wire	
6	Water Utility	

All of the EM anomalies recorded by the survey are directly attributed to visible cultural features such as signs, utility poles, building structures, guy wires, and utilities. For this reason, a GPR survey was not required to verify any unknown anomalies.

Collectively, the geophysical data did not show any evidence of unknown metallic USTs at Parcel 154.

SUMMARY & CONCLUSIONS

Pyramid's evaluation of the EM61 data collected at Parcel 154 in Fayetteville, Cumberland County, North Carolina, provides the following summary and conclusions:

- The EM61 survey provided reliable results for the detection of metallic USTs within the accessible portions of the geophysical survey area.
- All EM anomalies were directly attributed to visible cultural features and known utilities. A GPR survey was not required.
- Collectively, the geophysical data did not show any evidence of unknown metallic USTs at Parcel 154.

LIMITATIONS

Geophysical surveys have been performed and this report was prepared for Solutions, IES in accordance with generally accepted guidelines for EM61 surveys. It is generally recognized that the results of the EM61 surveys are non-unique and may not represent actual subsurface conditions. The EM61 results obtained for this project have not conclusively determined the definitive presence or absence of metallic USTs, but the evidence collected is sufficient to result in the conclusions made in this report. Additionally, it should be understood that areas containing extensive vegetation, reinforced concrete, or other restrictions to the accessibility of the geophysical instruments could not be fully investigated.

N↑

APPROXIMATE BOUNDARIES OF GEOPHYSICAL SURVEY AREA

View of Survey Area
(Facing Approximately West)

View of Survey Area
(Facing Approximately East)

TITLE
PARCEL 154 - GEOPHYSICAL SURVEY
BOUNDARIES AND SITE PHOTOGRAPHS

PROJECT
5512 RAEFORD ROAD
FAYETTEVILLE, NORTH CAROLINA
NCDOT PROJECT U-4405

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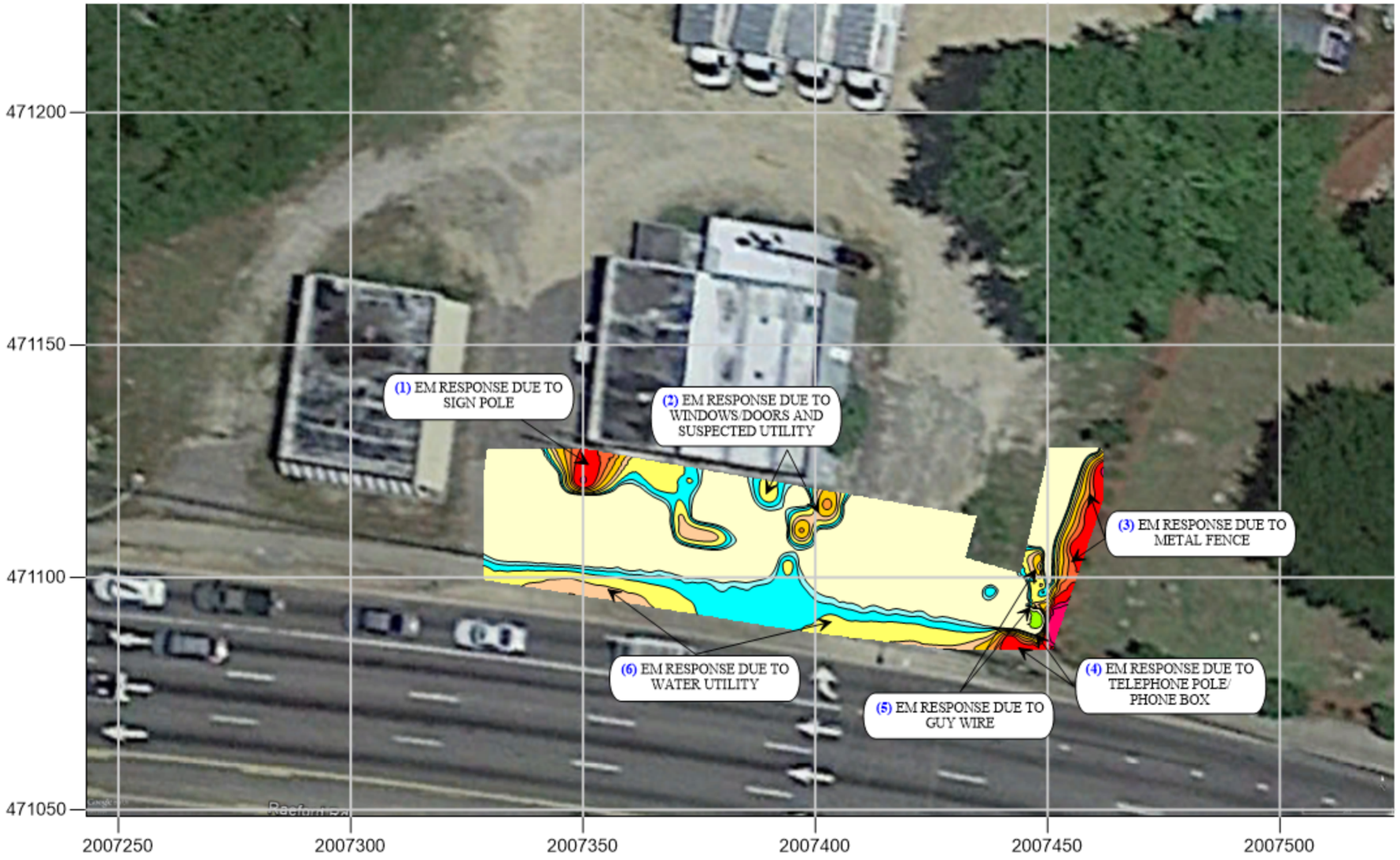
License # C1251 Eng. / License # C257 Geology

DATE 10/31/16	CLIENT SOLUTIONS, IES
PYRAMID PROJECT #: 2016-265	**FIGURE 1**

N↑

EM61 METAL DETECTION RESULTS



NUMBERS IN BLUE (x) CORRESPOND TO ANOMALY TABLE INCLUDED IN THE REPORT

NO EVIDENCE OF UNKNOWN METALLIC USTs OBSERVED

The contour plot shows the differential results of the EM61 instrument in millivolts (mV). The differential results focus on larger metallic objects such as USTs and drums. The EM61 data were collected on October 12, 2016, using a Geonics EM61 instrument. GPR verification data were not required due to all EM anomalies being directly attributed to visible cultural features.

EM61 Metal Detection Response (millivolts)

TITLE	PARCEL 154 - EM61 RESULTS CONTOUR MAP
PROJECT	5512 RAEFORD ROAD FAYETTEVILLE, NORTH CAROLINA NCDOT PROJECT U-4405

Pyramid Geophysics

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License # C1251 Eng. / License # C257 Geology

DATE	10/31/2016	CLIENT	SOLUTIONS, IES
PYRAMID PROJECT #:	2016-265		**FIGURE 2**

ATTACHMENT B

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Log of Boring 154-SB-1

BORING LOCATION: Parcel #154, Fayetteville, NC	PROJECT NUMBER: 2016.0054.NDOT
DRILLING CONTRACTOR: Regional Probing Services	DATE STARTED: 10/24/2016 — DATE FINISHED: 10/24/2016
DRILLING METHOD: Direct Push — BOREHOLE DIAMETER: 2.25"	TOTAL DEPTH (ft bgs): 10 ft bgs — SCREEN INTERVAL (ft bgs): NA
DRILLING EQUIPMENT: Geoprobe 5410	NORTHING: NA — EASTING: NA
SAMPLING METHOD: Macro Core	INITIAL DTW: NA — FINAL DTW: NA
LOGGED BY: Samuel McIntyre — CHECKED BY:	

DEPTH (ft bgs)	SAMPLES: Sample ID and Interval	SAMPLES: Recovery	PID (ppm)	DESCRIPTION OF MATERIALS	DEPTH (ft bgs)
0				Asphalt.	0
1		100%	1.8	Light grey clayey sand. Dry.	1
2					2
3			2.7		3
4	154-SB-1-4-6				4
5		100%	3.8	Light grey clayey sand with black staining and mild hydrocarbon odors. Dry.	5
6	154-SB-1-6-8				6
7			5.5		7
8					8
9	154-SB-1-8-10	100%	716.0	Light grey soft clay with black staining and hydrocarbon odors. Dry.	9
10				End of Boring	10

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Log of Boring 154-SB-2

BORING LOCATION: Parcel #154, Fayetteville, NC	PROJECT NUMBER: 2016.0054.NDOT
DRILLING CONTRACTOR: Regional Probing Services	DATE STARTED: 10/24/2016 — DATE FINISHED: 10/24/2016
DRILLING METHOD: Direct Push — BOREHOLE DIAMETER: 2.25"	TOTAL DEPTH (ft bgs): 10 ft bgs — SCREEN INTERVAL (ft bgs): NA
DRILLING EQUIPMENT: Geoprobe 5410	NORTHING: NA — EASTING: NA
SAMPLING METHOD: Macro Core	INITIAL DTW: NA — FINAL DTW: NA
LOGGED BY: Samuel McIntyre — CHECKED BY:	

DEPTH (ft bgs)	SAMPLES: Sample ID and Interval	SAMPLES: Recovery	PID (ppm)	DESCRIPTION OF MATERIALS	DEPTH (ft bgs)
0				Asphalt.	0
1		100%	7.4	Light grey clayey sand. Dry.	1
2					2
3			7.8		3
4	154-SB-2-4-6				4
5		100%	7.9	Light grey clayey sand with black staining and mild hydrocarbon odors. Dry.	5
6	154-SB-2-6-8				6
7			20.1		7
8					8
9	154-SB-2-8-10	100%	1,005	Light grey soft clay. Dry.	9
10				End of Boring	10

Solutions-IES
Industrial & Environmental Services

Log of Boring 154-SB-3

BORING LOCATION: Parcel #154, Fayetteville, NC	PROJECT NUMBER: 2016.0054.NDOT
DRILLING CONTRACTOR: Regional Probing Services	DATE STARTED: 10/24/2016 — DATE FINISHED: 10/24/2016
DRILLING METHOD: Direct Push — BOREHOLE DIAMETER: 2.25"	TOTAL DEPTH (ft bgs): 10 ft bgs — SCREEN INTERVAL (ft bgs): NA
DRILLING EQUIPMENT: Geoprobe 5410	NORTHING: NA — EASTING: NA
SAMPLING METHOD: Macro Core	INITIAL DTW: NA — FINAL DTW: NA
LOGGED BY: Samuel McIntyre — CHECKED BY:	

DEPTH (ft bgs)	SAMPLES: Sample ID and Interval	SAMPLES: Recovery	PID (ppm)	DESCRIPTION OF MATERIALS	DEPTH (ft bgs)
0				Asphalt.	0
1		100%	1.9	Light grey clayey sand. Dry.	1
2					2
3			50.8		3
4	154-SB-3-4-6	100%	7.1	Light grey clayey sand with black staining and mild hydrocarbon odors. Dry.	4
5					5
6	154-SB-3-6-8				6
7			1,870		7
8	154-SB-3-8-10	100%	2,933	Light grey soft clay with black staining and hydrocarbon odors. Dry.	8
9					9
10				End of Boring	10

Solutions-IES
Industrial & Environmental Services

Log of Boring 154-SB-4

BORING LOCATION: Parcel #154, Fayetteville, NC	PROJECT NUMBER: 2016.0054.NDOT
DRILLING CONTRACTOR: Regional Probing Services	DATE STARTED: 10/25/2016 — DATE FINISHED: 10/25/2016
DRILLING METHOD: Direct Push — BOREHOLE DIAMETER: 2.25"	TOTAL DEPTH (ft bgs): 10 ft bgs — SCREEN INTERVAL (ft bgs): NA
DRILLING EQUIPMENT: Geoprobe 5410	NORTHING: NA — EASTING: NA
SAMPLING METHOD: Macro Core	INITIAL DTW: NA — FINAL DTW: NA
LOGGED BY: Samuel McIntyre — CHECKED BY:	

DEPTH (ft bgs)	SAMPLES: Sample ID and Interval	SAMPLES: Recovery	PID (ppm)	DESCRIPTION OF MATERIALS	DEPTH (ft bgs)
0				Asphalt.	0
1		100%	0.0	Light grey clayey sand. Dry.	1
2					2
3			0.0		3
4		100%			4
5			0.1		5
6				Light grey clayey sand with black staining and mild hydrocarbon odors. Dry.	6
7			0.0		7
8	154-SB-4-8-10	100%			8
9			NA		9
10				End of Boring	10

Notes: 1) NA - Not available, PID reading not collected.

ATTACHMENT C

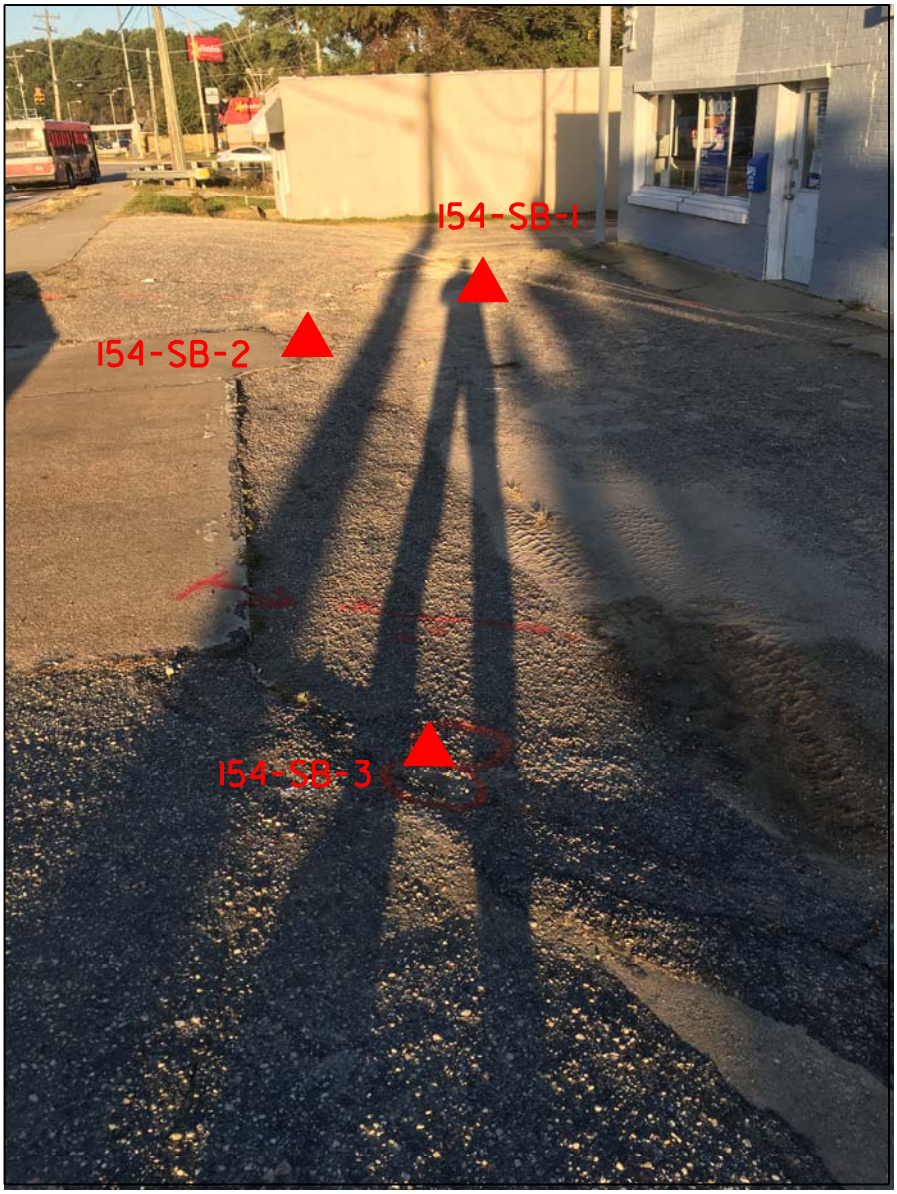


PHOTO 1- VIEW OF SOIL BORINGS LOOKING WEST

ATTACHMENT D

QED

REDLAB
RAPID ENVIRONMENTAL DIAGNOSTICS

QROS

Hydrocarbon Analysis Results

Client: NCDOT
Address: Parcel 154: 5512 Raeford Road
Fayetteville, NC

Contact:

Project: 2016.0054.NDOT

Samples taken 10/24/2016
Samples extracted 10/24/2016
Samples analysed 10/25/2016

Operator Candy Elliott

U04049

Matrix	Sample ID	Dilution used	BTEX (C6 - C9)	GRO (C5 - C10)	DRO (C10 - C35)	TPH (C5 - C35)	Total Aromatics (C10-C35)	16 EPA PAHs	BaP	Ratios			HC Fingerprint Match
										% light	% mid	% heavy	
s	154-SB-1-4-6	26.9	<0.67	<0.67	1.7	1.7	1.5	0.08	<0.003	0	79.2	20.8	Deg Fuel (FCM) (BO) 51.8%
s	154-SB-1-6-8*	9.2	<0.23	<0.23	0.78	0.78	0.68	0.02	<0.001	10.3	86.4	3.3	V.Deg.Diesel (FCM) (P) (BO) 69%
s	154-SB-1-8-10	25.0	#N/A	<0.63	31.4	31.4	8.2	0.33	<0.003	0	98.2	1.8	Deg.PHC (FCM) (BO) 75%
s	154-SB-2-4-6**	30.8	<0.77	<0.77	15.1	15.1	8	0.37	0.003	0	83.1	16.9	V.Deg.PHC (FCM) 55.3%
s	154-SB-2-6-8	23.5	<0.59	3.8	16.8	20.6	9.3	0.45	0.005	28.8	63.4	7.8	Deg Fuel (FCM) 65.1%
s	154-SB-2-8-10	24.4	7.5	11.4	1.3	12.7	1	0.04	<0.002	92.3	7.3	0.4	Deg Gas (FCM) (P) (BO) 53.2%
s	154-SB-3-4-6	26.9	<0.67	1.7	10.5	12.2	6.3	0.36	0.003	21	72.8	6.1	V.Deg.PHC (FCM) 85.2%
s	154-SB-3-6-8	293534.4	198429	**347094**	**85827**	432921	21530	927.2	<29.4	94.2	5.8	0	Deg Gas (FCM) 78.2%
s	154-SB-3-8-10	2377.4	<59.4	**6352**	**1972**	8324	486.5	20.3	<0.24	92.9	7	0.1	Deg Gas (FCM) 81.9%
	Initial Calibrator QC check	OK								Final FCM QC Check	OK		111.6 %

Results generated by a QED HC-1 analyser. Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values are not corrected for moisture or stone content

Fingerprints provide a tentative hydrocarbon identification. The abbreviations are:- FCM = Results calculated using Fundamental Calibration Mode : % = confidence for sample fingerprint match to library

(SBS) or (LBS) = Site Specific or Library Background Subtraction applied to result : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate present

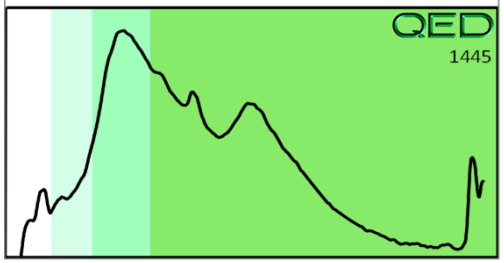
* Mislabeled in the field. The sample was originally recorded as 154-SB-2-6-8. Is is corrected here.

**Mislabeled in the field. The sample was originally recorded as 145-SB-2-4-6. It is corrected here.

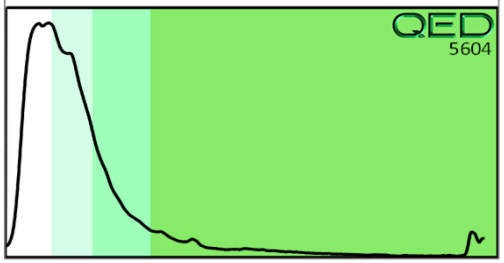
QED Hydrocarbon Fingerprints

Project: 2016.0045.NDOT 10/25/2016

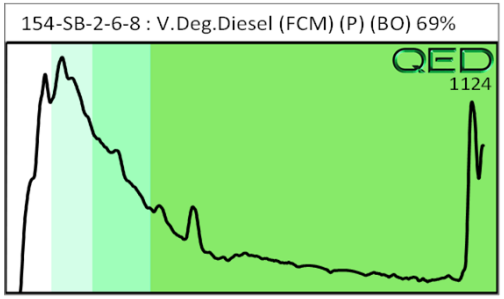
154-SB-1-4-6 : Deg Fuel (FCM) (BO) 51.8%



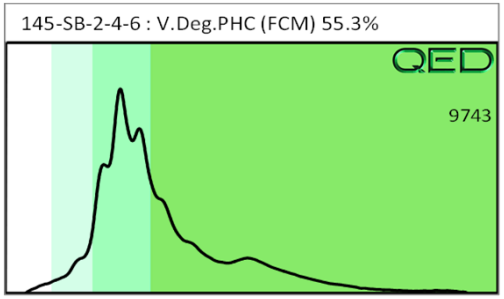
154-SB-1-8-10 : Deg.PHC (FCM) (BO) 75%



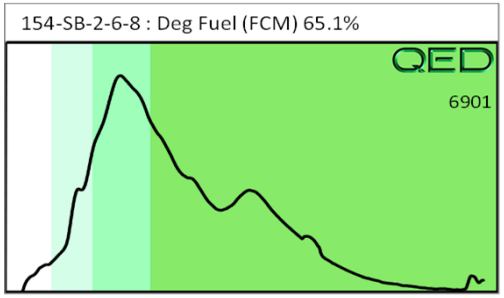
154-SB-2-6-8 : V.Deg.Diesel (FCM) (P) (BO) 69%



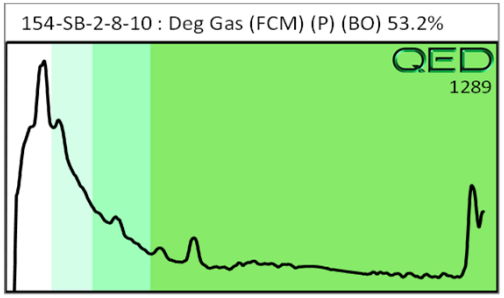
145-SB-2-4-6 : V.Deg.PHC (FCM) 55.3%

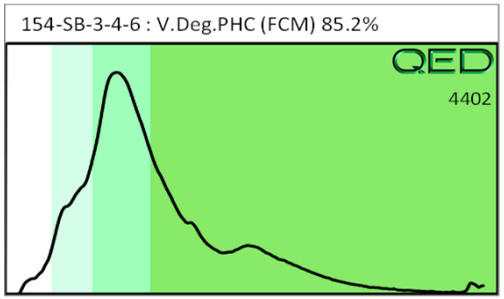


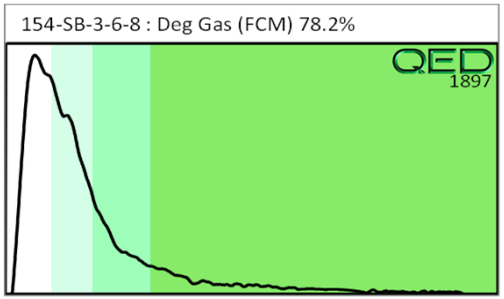
154-SB-2-6-8 : Deg Fuel (FCM) 65.1%

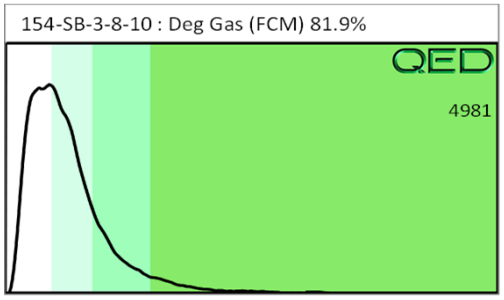


154-SB-2-8-10 : Deg Gas (FCM) (P) (BO) 53.2%




154-SB-3-4-6 : V.Deg.PHC (FCM) 85.2%
QED
4402


154-SB-3-6-8 : Deg Gas (FCM) 78.2%
QED
1897


154-SB-3-8-10 : Deg Gas (FCM) 81.9%
QED
4981