

# Preliminary Site Assessment

US 401 (Raeford Road) from West Hampton Oaks Drive to East of Fairway Drive in Fayetteville

Parcel 377 – Luke Nwosu Trustee Property  
3611 Raeford Road, Fayetteville, North Carolina

State Project No. U-4405

WBS Element: 39049.1.1

December 16, 2016

Terracon Project No. 70167490



**Prepared for:**

North Carolina Department of Transportation  
Raleigh, North Carolina

**Prepared by:**

Terracon Consultants, Inc.  
Raleigh, North Carolina

[terracon.com](http://terracon.com)

**Terracon**

Environmental



Facilities



Geotechnical



Materials

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Appendix B: Soil Boring Logs

Appendix C: Laboratory Analytical Reports and Chain-of-Custody Forms

December 16, 2016

North Carolina Department of Transportation  
Attention: Mr. Terry W. Fox, LG,  
GeoEnvironmental Engineering Unit  
Century Center Complex  
Building B  
1020 Birch Ridge Road  
Raleigh, North Carolina 27610

Re: Preliminary Site Assessment (PSA)  
US 401 (Raeford Road) from West Hampton Oaks Drive to East of Fairway Drive in  
Fayetteville  
Parcel 377 – Luke Nwosu Trustee Property  
3611 Raeford Road, Fayetteville, North Carolina  
State Project No. U-4405  
WBS Element: 39049.1.1

Dear Mr. Fox:

Terracon Consultants, Inc. (Terracon) is pleased to submit a Preliminary Site Assessment (PSA) report for the above referenced site. This assessment was performed in accordance with our Proposal for Preliminary Site Assessment (Terracon Proposal No. P70167490) dated September 27, 2016. This report includes the findings of the investigation, and provides our conclusions and recommendations.

Terracon appreciates the opportunity to provide these services to the North Carolina Department of Transportation. If you have any questions concerning this report or need additional information, please contact us at 919-873-2211.

Sincerely,

**Terracon Consultants, Inc.**

Prepared by:



Ethan H. Smith  
Field Geologist

Reviewed by:



Michael T. Jordan, P.G.  
Environmental Department Manager

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# PRELIMINARY SITE ASSESSMENT

US 401 (RAEFORD ROAD) FROM WEST HAMPTON OAKS DRIVE TO EAST OF FAIRWAY  
DRIVE IN FAYETTEVILLE, CUMBERLAND COUNTY, NORTH CAROLINA  
STATE PROJECT NO. U-4405  
WBS ELEMENT: 39049.1.1  
PARCEL 377 – LUKE NWOSU TRUSTEE PROPERTY  
3611 RAEFORD ROAD, FAYETTEVILLE, NORTH CAROLINA

## 1.0 INTRODUCTION

### 1.1 Site Description

<b>Site Name</b>	US 401 (Raeford Road) from West Hampton Oaks Drive to East of Fairway Drive in Fayetteville
<b>Site Location/Address</b>	3611 Raeford Road, Fayetteville, NC 28304 (Cumberland County Tax PIN: 0417-70-7669)
<b>General Site Description</b>	The site consists of a one-story commercial building that is currently operated as Carolina Heart Physicians PC/Express Discount Pharmacy. The site is further improved with a paved access drive and parking areas.

### 1.2 Site History

The site is located at 3611 Raeford Road in Fayetteville, Cumberland County, North Carolina. At the time of the Preliminary Site Assessment (PSA), the site was operating as a Carolina Heart Physicians PC/Express Discount Pharmacy. The northwest corner of the parcel was a former gas station according to a 1983 aerial photograph (NCDOT, 2016). The property does not appear on North Carolina Department of Environmental Quality (NCDEQ) – Division of Waste Management Underground Storage Tanks (USTs) Section Registered Tank Database or the NCDEQ Groundwater Incident Database. Additional details for the former USTs were not provided.

### 1.3 Scope of Work

Terracon conducted the following PSA scope of work (SOW) in accordance with Terracon's proposal for PSA (Proposal No. P70167490) dated September 27, 2016. This PSA is being completed prior to planned median improvements and lane widening along US 401 (Raeford Road) in Fayetteville, North Carolina (site). The scope of work included a geophysical investigation, collection of four soil samples, and preparation of a report documenting our investigation activities. The PSA is not intended to delineate potential impacts. The PSA was performed within the proposed right of way (ROW) as indicated by NCDOT provided plan sheets.

## **Preliminary Site Assessment**

Parcel 377 – Luke Nwosu Trustee Property ■ Fayetteville, North Carolina  
December 16, 2016 ■ Terracon Project No. 70167490



### **1.4 Standard of Care**

Terracon's services were performed in a manner consistent with generally accepted practices of the profession undertaken in similar studies in the same geographical area during the same time period. Terracon makes no warranties, either expressed or implied, regarding the findings, conclusions or recommendations. Please note that Terracon does not warrant the work of laboratories, regulatory agencies or other third parties supplying information used in the preparation of the report. These services were performed in accordance with our proposal for PSA (Terracon Proposal No. P70167490) dated September 27, 2016 and were not conducted in accordance with ASTM E1903-11.

### **1.5 Additional Scope Limitations**

Findings, conclusions and recommendations resulting from these services are based upon information derived from the on-site activities and other services performed under this scope of work; such information is subject to change over time. Certain indicators of the presence of hazardous substances, petroleum products, or other constituents may have been latent, inaccessible, unobservable, undetectable or not present during these services; thus, we cannot represent that the site is free of hazardous substances, toxic materials, petroleum products, or other latent conditions beyond those identified during this PSA. Subsurface conditions may vary from those encountered at specific borings or wells or during other surveys, tests, assessments, investigations or exploratory services; the data, interpretations, findings, and our recommendations are based solely upon data obtained at the time and within the scope of these services.

### **1.6 Reliance**

This report has been prepared for the exclusive use of the NCDOT. Authorization for use or reliance by any other party (except a governmental entity having jurisdiction over the site) is prohibited without the expressed written authorization of the client and Terracon.

## **2.0 FIELD ACTIVITIES**

The following PSA activities are presented in the order that they were conducted in the field.

**Exhibit 1** presents the topography of the site on a portion of the USGS topographic quadrangle map of Fayetteville, NC 1997. **Exhibit 2** is a site layout plan that indicates the approximate locations of the site features, soil boring locations, and analytical results.

### **2.1 Geophysical Survey**

On October 19, October 26, and November 7, 2016, Geophysical Survey Investigations, PLLC conducted a geophysical investigation at the site in an effort to determine if unknown, metallic USTs were present beneath the proposed ROW area. The geophysical investigation included an electromagnetic (EM) induction survey using a Geonics EM61-MK2A metal detection instrument and a ground penetrating radar (GPR) survey using a Geophysical Survey Systems SIR-3000 unit.

The geophysical investigation did not reveal possible or probable metallic USTs. However, anomalies were detected that were probably in response to buried lines or conduits. In addition to metal detection and GPR scans, NC One Call public utility locator identified several underground utility lines. A copy of the geophysical report is included in **Appendix A**.

### **2.2 Soil Sampling**

Based on the findings of the geophysical investigation and Terracon's site observations, Terracon provided oversight for the advancement of four soil borings (SB-46 through SB-49) along the northern and northwestern portion of Parcel 377 and within the NCDOT ROW. The borings were completed by a North Carolina Certified Well Contractor (Regional Probing Services) using a truck-mount Geoprobe® 5410 direct-push drill rig.

Soil samples were collected in 4-foot, disposable, Macro-Core® sampler tubes to document soil lithology, color, moisture content, and sensory evidence of impacts. Each soil sample was screened for organic vapors using an 11.7 eV photoionization detector (PID). The PID data were collected in order to corroborate laboratory data and assist in selection of sample intervals for laboratory analysis. PID readings from the borings were less than 0.1 parts per million (ppm).

Based on the proposed disturbance depths and discussion with the NCDOT, each of the soil borings was advanced to a depth of approximately 15 feet below land surface (bls). Four soil samples, one from each boring, were collected from depths ranging between 5 to 15 feet bls and placed in laboratory provided sample containers and shipped to REDLAB/QROS, LLC –

## Preliminary Site Assessment

Parcel 377 – Luke Nwosu Trustee Property ■ Fayetteville, North Carolina  
December 16, 2016 ■ Terracon Project No. 70167490



Environmental Testing for analysis by UVF. Soil samples were collected in the depth interval that was most likely to be impacted.

The drilling equipment used at the site was decontaminated prior to use and between the advancement of each boring. Non-dedicated sampling equipment was decontaminated using a Liquinox®/water wash followed by a distilled water rinse. Each of the boreholes was backfilled with hydrated bentonite pellets and investigation derived waste (IDW) was containerized in a 55-gallon DOT approved drum. The drum was staged beside the dumpster north of the Dunkin Donuts located at 2628 Raeford Road, Fayetteville, NC 28303 (Dunkin Donuts contact - Matt Ellsworth [910-920-1992] for subsequent disposal by the NCDOT).

Soil generally consisted of clay and sandy clay. Groundwater was not encountered in the four borings. The soil boring logs are included in **Appendix B**. Sample locations were measured relative to site features and the locations depicted on **Exhibit 2** are approximate.

## 3.0 LABORATORY ANALYSES

Soil samples were submitted to QROS for analysis of the following:

- TPH-gasoline range organics (C<sub>5</sub>-C<sub>10</sub>) (GRO);
- TPH-diesel range organics (C<sub>10</sub>-C<sub>35</sub>) (DRO);
- Total petroleum hydrocarbons (C<sub>5</sub>-C<sub>35</sub>) (TPH);
- Benzene, toluene, ethylbenzene, and xylenes (BTEX);
- Total aromatics (C<sub>10</sub>-C<sub>35</sub>);
- 16 EPA Polycyclic Aromatic Hydrocarbons (16 EPA PAHs); and
- Benzo(a)pyrene (BaP).

Please refer to **Appendix C** for the laboratory analytical reports.

## 4.0 DATA EVALUATION

### 4.1 Soil Analytical Results

Laboratory analysis reported the following detections above the laboratory reporting limits in soil borings SB-46 through SB-49:

- TPH-GRO (C<sub>5</sub>-C<sub>10</sub>) was not detected above laboratory reporting limits;
- TPH-DRO (C<sub>10</sub>-C<sub>35</sub>) was reported between 0.2 and 1.5 milligrams per kilogram (mg/kg);
- TPH (C<sub>5</sub>-C<sub>35</sub>) was reported between 0.2 and 1.5 mg/kg;
- BTEX was not detected above laboratory reporting limits;
- Total aromatics (C<sub>10</sub>-C<sub>35</sub>) was reported from less than 0.04 to 0.93 mg/kg;

## Preliminary Site Assessment

Parcel 377 – Luke Nwosu Trustee Property ■ Fayetteville, North Carolina  
December 16, 2016 ■ Terracon Project No. 70167490



- 16 EPA PAHs was reported from less than 0.006 to 0.05 mg/kg; and
- BaP was reported from less than 0.001 to 0.004 mg/kg.

Laboratory analysis revealed that concentrations were not detected above the NCDEQ Action Levels for TPH in soil borings SB-46 through SB-49.

**Table 1** summarizes the results of the analyses of the soil samples. **Exhibit 2** depicts the boring locations and detected compounds.

## 5.0 CONCLUSIONS AND RECOMMENDATIONS

The findings of this investigation are discussed below.

- The geophysical investigation did not reveal possible or probable metallic USTs. However anomalies were detected that were probably in response to buried lines or conduits.
- Laboratory analysis reported that concentrations were not detected above the NCDEQ Action Levels for TPH in soil borings SB-46 through SB-49.
- Terracon recommends NCDOT provide a copy of the results to the owner and/or operator of the site.
- Terracon does not recommend further assessment of the ROW at this site. However, based on detections of petroleum compounds, construction workers should be alert for potential soil and/or groundwater impacts in other locations at the site.



**Preliminary Site Assessment**

Parcel 377 – Luke Nwosu Trustee Property ■ Fayetteville, North Carolina  
December 16, 2016 ■ Terracon Project No. 70167490



## **6.0 REFERENCES**

NCDOT, 2016. Revised GeoEnvironmental Report for Preliminary Site Assessments. "Hazardous Material Report." August 30, 2016.

## **TABLES**

**Table 1**  
**Summary of Soil Analytical Results**  
**Preliminary Site Assessment**  
**Parcel 377 - Luke Nwosu Trustee Property**  
**Fayetteville, Cumberland County, Virginia**  
**Terracon Project No. 70167490**

Sample ID:	SB-46	SB-47	SB-48	SB-49	Action Level	MSCC Industrial
Sample Depth (ft bls):	9-11	11-13	13-15	5-7		
GRO (C <sub>5</sub> -C <sub>10</sub> )	<0.98	<0.2	<0.18	<0.21	<b>100</b>	NE
DRO (C <sub>10</sub> -C <sub>35</sub> )	<b>1.5</b>	<b>0.2</b>	<b>0.32</b>	<0.21	<b>100</b>	NE
TPH (C <sub>5</sub> -C <sub>35</sub> )	<b>1.5</b>	<b>0.2</b>	<b>0.32</b>	<0.21	NE	NE
BTEX	<0.98	<0.2	<0.18	<0.21	NE	NE
Total Aromatics (C <sub>10</sub> -C <sub>35</sub> )	<b>0.93</b>	<0.04	<0.04	<0.04	NE	NE
16 EPA PAHs	<b>0.05</b>	<0.006	<0.006	<0.007	NE	NE
Benzo(a)pyrene	<b>0.004</b>	<0.001	<0.001	<0.001	NE	<b>0.78</b>

**Notes:**

Soil samples were collected on November 10, 2016.

Detected compounds are shown in the table.

Concentrations are reported in milligrams per kilogram (mg/kg).

ft bls - feet below land surface.

GRO - Gasoline Range Organics.

DRO - Diesel Range Organics.

TPH - Total Petroleum Hydrocarbons.

BTEX - Benzene, Toluene, Ethylbenzene, and Xylenes.

16 EPA PAHs - Environmental Protection Agency Polycyclic Aromatic Hydrocarbons (acenaphthene, acenaphthylene, antracene, benz[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[g,h,i]perylene, benzo[a]pyrene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-c,d]pyrene, naphthalene, phenanthrene, pyrene).

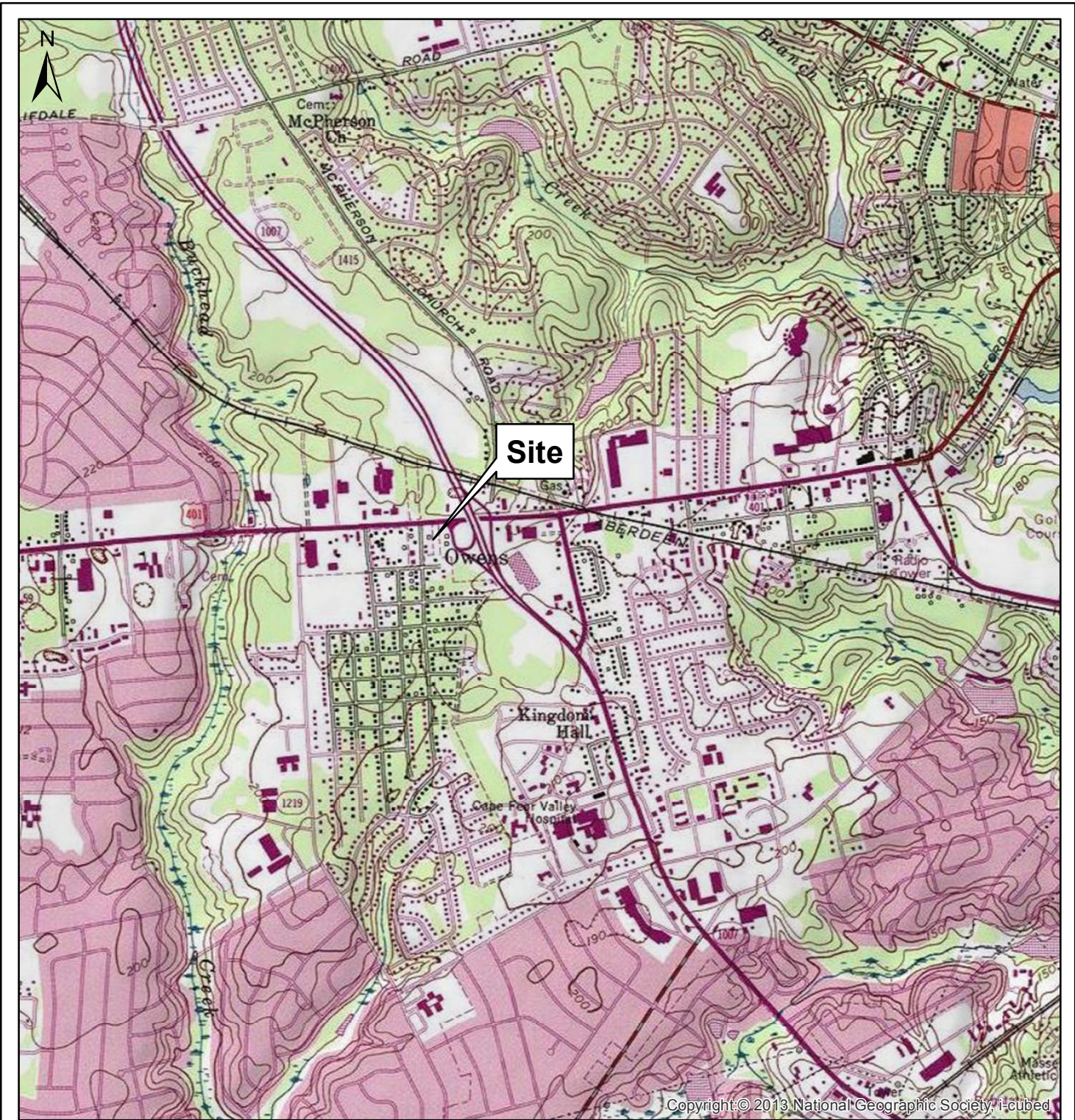
NE - Standard not established.

Detections shaded in gray exceed the North Carolina Department of Environmental Quality (NCDEQ) Action Level.

MSCC Industrial/Commercial - Maximum Soil Contaminant Concentration Levels Industrial/Commercial soil cleanup levels.

Bold: Constituent concentration reported above the method detection limit.

## **EXHIBITS**



USGS TOPOGRAPHIC MAP  
 FAYETTEVILLE, NC QUADRANGLE  
 1997

Project Number: 70167490
Scale: 1:24,000
Drawn By: EHS
Checked By: MTJ
Date Drawn: 11/21/16



2401 Brentwood Road, Suite 107 Raleigh, NC 27604  
 Phone: (919) 873-2211 Fax: (919) 873-9555

<b>Topographic Vicinity Map</b>
<b>U-4405</b>
<b>Parcel 377 - Luke Nwsu Trustee Property</b>
<b>3611 Raeford Road</b>
<b>Fayetteville, Cumberland County, NC</b>

EXHIBIT NO.
<b>1</b>

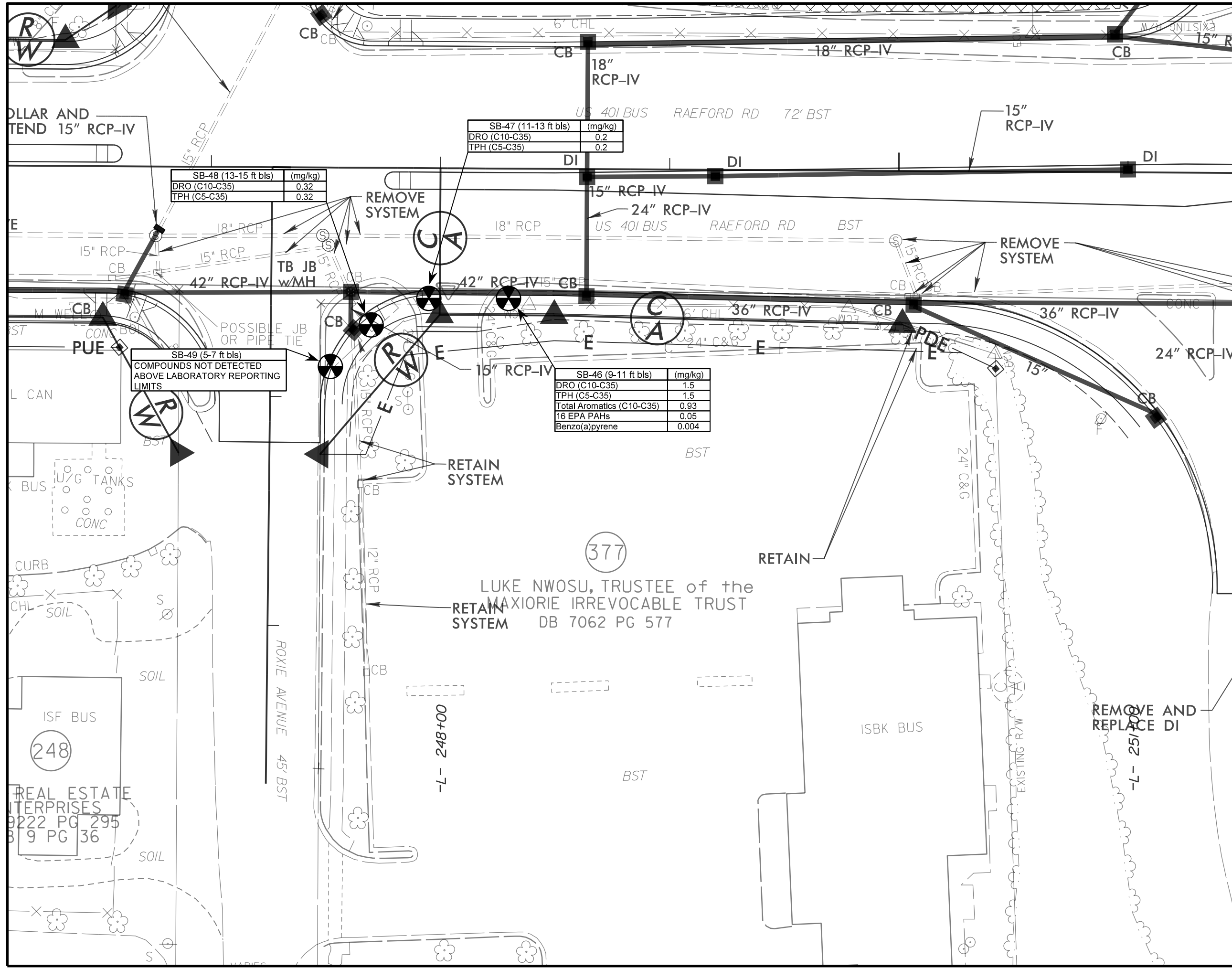
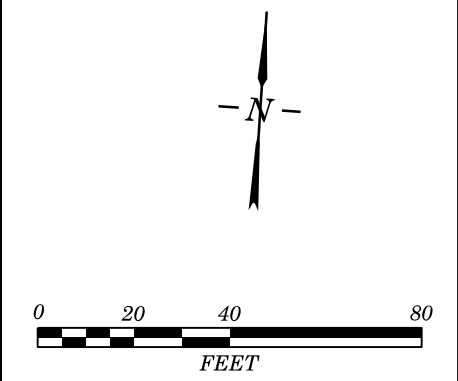
**SITE DIAGRAM WITH BORING LOCATIONS AND ANALYTICAL DATA**

PARCEL 377 - LUKE NWOSU TRUSTEE PROPERTY  
3611 RAEFORD ROAD  
FAYETTEVILLE, CUMBERLAND COUNTY

**LEGEND**

- PROPERTY LINE
- - - EXISTING RIGHT OF WAY LINE
- PROPOSED RIGHT OF WAY LINE WITH IRON PIN AND CAP MARKER
- PROPOSED EDGE OF TRAVEL
- E- PROPOSED CONSTRUCTION EASEMENT
- PUE- PROPOSED PERMANENT UTILITY EASEMENT
- PROPOSED DRAINAGE PIPING
- PROPOSED CATCH BASIN
- F- / -C- PROPOSED CUT / FILL LINE
- ⊗ BORING LOCATION

**NOTES:**  
SOIL SAMPLES WERE COLLECTED ON NOVEMBER 10, 2016  
DETECTED COMPOUNDS ARE SHOWN IN TABLE  
SOIL CONCENTRATIONS ARE REPORTED IN MILLIGRAMS PER KILOGRAM (mg/kg)  
ft bls - FEET BELOW LAND SURFACE  
GRO - (C5-C10) GASOLINE RANGE ORGANICS  
DRO - (C10-C35) DIESEL RANGE ORGANICS  
TPH - (C5-C35) TOTAL PETROLEUM HYDROCARBONS  
16 EPA PAHs - ENVIRONMENTAL PROTECTION AGENCY POLYCYCLIC AROMATIC HYDROCARBONS



**APPENDIX A**

**GEOPHYSICAL SURVEY REPORT**

**Terracon Consultants, Inc.**

**GEOPHYSICAL INVESTIGATION  
TO LOCATE METALLIC USTS**

**Waterville Equities I LLC Property  
(Parcel 332) 2605 Raeford Road  
Fayetteville, North Carolina**



November 11, 2016

Geophysical Survey Investigations, PLLC Project No. 2016-37



4 Willimantic Drive, Greensboro, NC 27455  
Office Tel: (336) 286-9718  
denilm@bellsouth.net



**Terracon Consultants, Inc.**  
**GEOPHYSICAL INVESTIGATION**  
**TO LOCATE METALLIC USTs**  
**Waterville Equities I LLC Property**  
**(Parcel 332) 2605 Raeford Road**  
**Fayetteville, North Carolina**

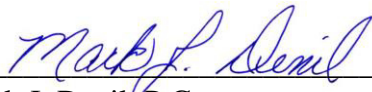
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FIGURES

- Figure 1            Geophysical Equipment & Site Photographs  
Figure 2            EM61-MK2A Metal Detection – Early Time Gate Results  
Figure 3            EM61-MK2A Metal Detection – Differential Results

Report prepared for:    Stephen J. Kerlin, PG  
                                 Terracon Consultants, Inc.  
                                 2401 Brentwood Road, Suite 107  
                                 Raleigh, North Carolina 27604

Prepared by:              
                                 Mark J. Denil, P.G.  
                                 Geophysical Survey Investigations, PLLC

## **1.0 INTRODUCTION**

Geophysical Survey Investigations, PLLC (GSI) conducted an electromagnetic (EM) metal detection survey, ground penetrating radar (GPR) scanning and utility line clearance search for Terracon Consultants, Inc. on October 19, October 26 and November 7, 2016 across a portion of the Waterville Equities I LLC property (Parcel 332) located at 2605 Raeford Road in Fayetteville, North Carolina. The geophysical investigation was performed as part of the North Carolina Department of Transportation (NCDOT) preliminary site assessment for State Project U-4405 (WBS Element 39049.1.1) US 401 (Raeford Road) from West of SR-1409 to US 401 Business (Robeson Street).

The geophysical investigation was conducted to determine if buried, metallic, underground, storage tanks (USTs) are present beneath the proposed Right-of-Way (ROW) and PUE areas of the site. The perimeter of the ROW/PUE area is shown as a red polygon in the aerial photograph presented in **Figure 1**. Presently, a Rite Aid Pharmacy store operates on this property.

Terracon representative Mr. Stephen Kerlin, PG provided guidance and site maps to Geophysical Survey Investigations, PLLC personnel prior to conducting the geophysical field work. The geophysical survey area at Parcel 332 has a maximum length and width of 215 feet and 70 feet, respectively. Please note that the ROW and PUE areas at this site were not marked or the survey markers were not visible at the time the geophysical investigation was conducted.

## **2.0 FIELD METHODOLOGY**

The EM investigation was performed across the geophysical survey area (proposed ROW and PUE areas) using a Geonics EM61-MK2A metal detection instrument with a Trimble AG-114 GPS unit. EM61 metal detection data and GPS coordinates were digitally collected in latitude and longitude geodetic format (NAD83) using a Juniper data recorder at approximately 1.0 foot intervals along survey lines spaced approximately five feet apart. The Trackmaker NAV61MK2 software program was used with the data recorder to view the relative positions of the survey lines in real time during data acquisition.

According to the instrument specifications, the EM61-MK2A can detect a metal drum down to a maximum depth of approximately 8 to 10 feet. Objects less than one foot in size can be detected to a maximum depth of 4 or 5 feet. The EM61 and GPS data were downloaded to a computer and processed in the field using the Trackmaker61MK2 and Surfer for Windows software programs. GPS coordinates were converted during data processing to Universal Transverse Mercator (UTM) coordinates (in feet) which are used as location control in this report.

GPR scans were performed along northerly-southerly and easterly-westerly directions spaced primarily 3 to 5 feet apart across selected EM61 differential anomalies and areas containing steel reinforced concrete using the Geophysical Survey Systems SIR-3000 unit equipped with a 400 MHz antenna. GPR data were viewed in real time in a continuous mode using a vertical scan of 512 samples, at a sampling rate of 48 scans per second. A 70 MHz high pass filter and an 800 MHz low pass filter were used during data acquisition with the 400 MHz antenna. GPR data were viewed to a maximum investigating depth of approximately 5.0 feet based on an estimated two-way travel time of 8.0 nanoseconds per foot.

Following the UST investigation, areas around the proposed Terracon soil borings were scanned with the GPR unit and a DitchWitch 910 utility locator for buried utility line clearance and no further discussion regarding the utility clearance work will be made in this report. Photographs of the geophysical equipment used for the investigation and of the site are presented in Figure 1.

### **3.0 DISCUSSION OF RESULTS**

Contour plots of the EM61 early time gate results and the EM61 differential results are presented in **Figures 2 and 3**, respectively. The early time gate results represent the most sensitive component of the EM61 instrument and detect metal objects regardless of size. The early time gate response can be used to delineate metallic conduits or utility lines, small, isolated, metal objects and areas containing insignificant metal debris. The differential results are obtained from the difference between the early time gate channel and late time gate channel of the EM61 instrument. The differential results focus on the larger metal objects such as drums and UST-size objects and ignore the smaller, insignificant, metal objects or debris.

The linear, EM61 early time gate anomalies intersecting UTM coordinates 2262877-E 12730032-N, 2262902-E 12730018-N, 2262927-E 12730016-N, 2262955-E 12730025-N, 2262979-E 12730029-N, 2263016-E 12729995-N, and 2263067-E 12729995-N are probably in response to buried lines or conduits.

GPR data suggest the EM61 differential anomalies centered near coordinates 2262968-E 12730023-N, 2262975-E 12730029-N and 2262989-E 12730030-N are in response to portions of buried conduits or miscellaneous metal objects. The remaining EM61 anomalies are probably in response to utility line-related objects, known surface objects, buried miscellaneous objects, or portions of conduits. The EM61 and GPR investigation suggests the proposed ROW/PUE area does not contain metallic USTs. Please refer to Figures 2 and 3 for additional (detailed) information regarding the geophysical findings at this site.

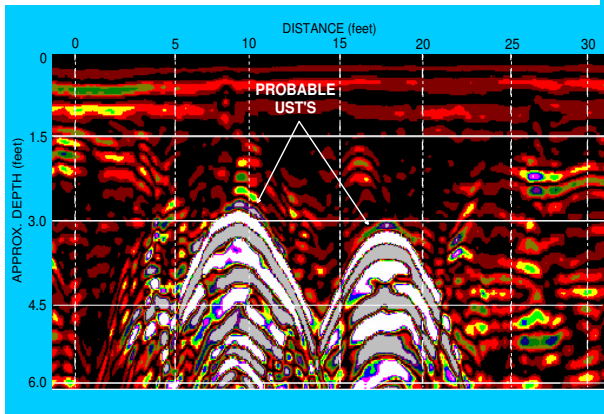
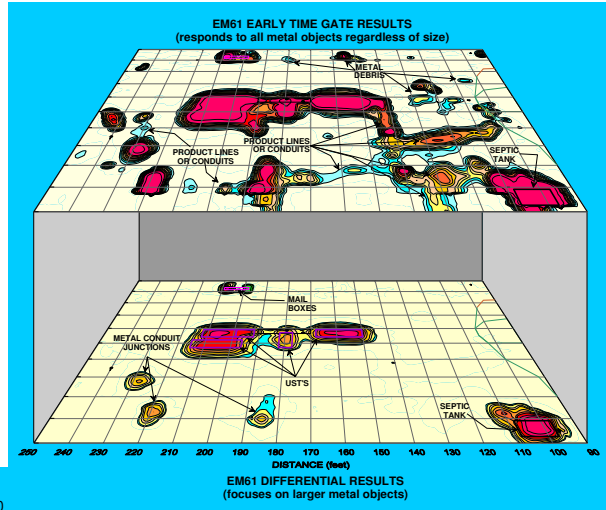
#### **4.0 SUMMARY & CONCLUSIONS**

Our evaluation of the EM61 and GPR data collected across the geophysical survey area at the Waterville Equities I LLC property (Parcel 332) located at 2605 Raeford Road in Fayetteville, North Carolina provides the following summary and conclusions:

- The combination of EM61 and GPR surveys provided reliable results for the detection of metallic USTs across the survey area within the depth interval of 0 to 6 feet.
- The linear, EM61 early time gate anomalies intersecting UTM coordinates 2262877-E 12730032-N, 2262902-E 12730018-N, 2262927-E 12730016-N, 2262955-E 12730025-N, 2262979-E 12730029-N, 2263016-E 12729995-N, and 2263067-E 12729995-N are probably in response to buried lines or conduits.
- The EM61 and GPR investigation suggests the proposed ROW/PUE area does not contain metallic USTs.

## 5.0 LIMITATIONS

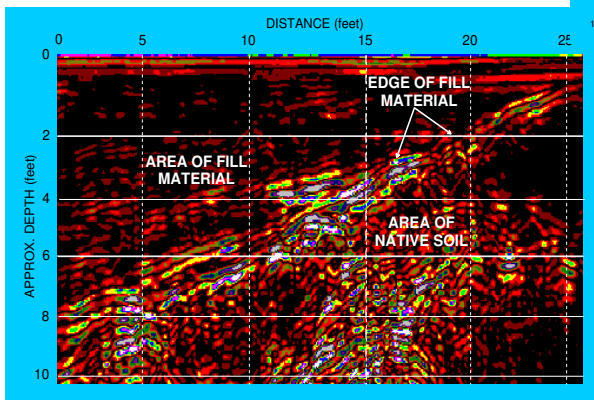
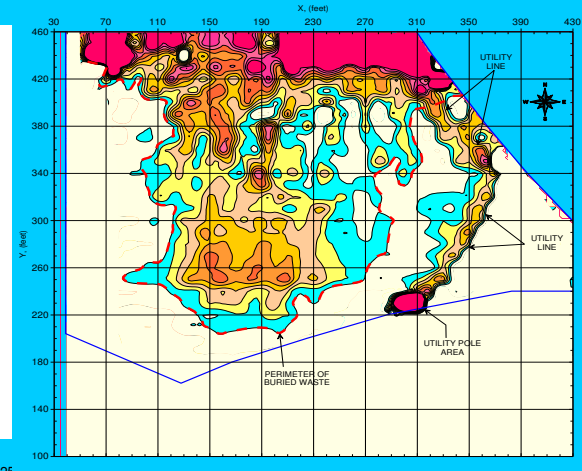
EM61 and GPR surveys have been performed and this report prepared for Terracon Consultants, Inc. in accordance with generally accepted guidelines for EM61 and GPR surveys. It is generally recognized that the results of the geophysical surveys are non-unique and may not represent actual subsurface conditions. Some of the EM61 and GPR anomalies interpreted as possible/probable USTs, utility lines, conduits, steel reinforced concrete, or miscellaneous, metal debris may be attributed to other surface or subsurface features and/or interference from cultural features.



## REPORT FIGURES

(on the following pages)

Figures shown on this page are for  
esthetic purposes only and are not  
related to the site discussed in this report





**DITCHWITCH UTILITY LOCATOR**



**EM61 METAL DETECTOR**

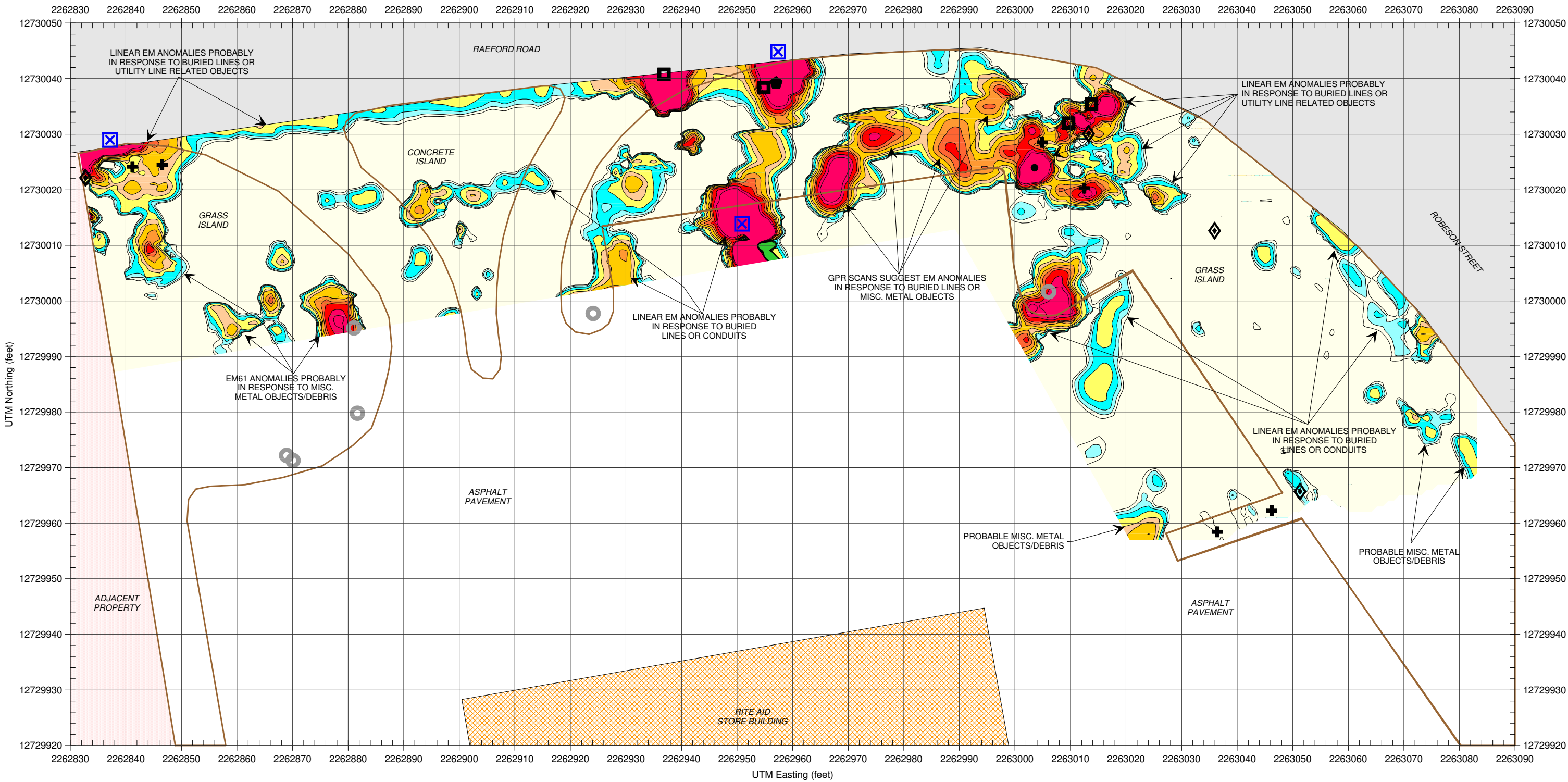


**GROUND PENETRATING RADAR UNIT**

The photographs show the DitchWitch 910 utility line locator, the Geonics EM61-MK2A metal detector and the GSSI SIR-3000 ground penetrating radar (GPR) unit that were used to conduct the geophysical investigation across the area of interest at Parcel 332.



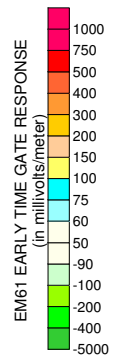
The red polygon in the aerial photograph represents the approximate perimeter of the geophysical survey area at the Waterville Equities I LLC property (Parcel 332) located along Raeford Road in Fayetteville, North Carolina.



The red polygon in the aerial photograph represents the approximate perimeter of the geophysical survey area at Parcel 332.

**LEGEND**

- SURVEY AREA: EM61 ACQUIRED ALONG LINES SPACED APPROX. 5 FEET APART
- RAEFORD ROAD OR ROBESON STREET
- MONITORING WELL COVER
- GUY WIRE
- UTILITY LINE RELATED BOXES
- METAL POLES
- STORM SEWER GRATE
- FIRE HYDRANT
- METAL SIGN
- UTILITY POLE
- CONCRETE CURBING



The contour plot shows the early time gate (most sensitive) response of the Geonics EM61-MK2A metal detection instrument in millivolts (mV). The early time gate response shows buried, metallic objects regardless of size. The EM61 survey was conducted on October 19, 2016. Ground penetrating radar (GPR) scans were conducted across selected EM61 anomalies and areas containing reinforced concrete on October 26, 2016 using a Geophysical Survey Systems SIR 3000 instrument with a 400 MHz antenna.



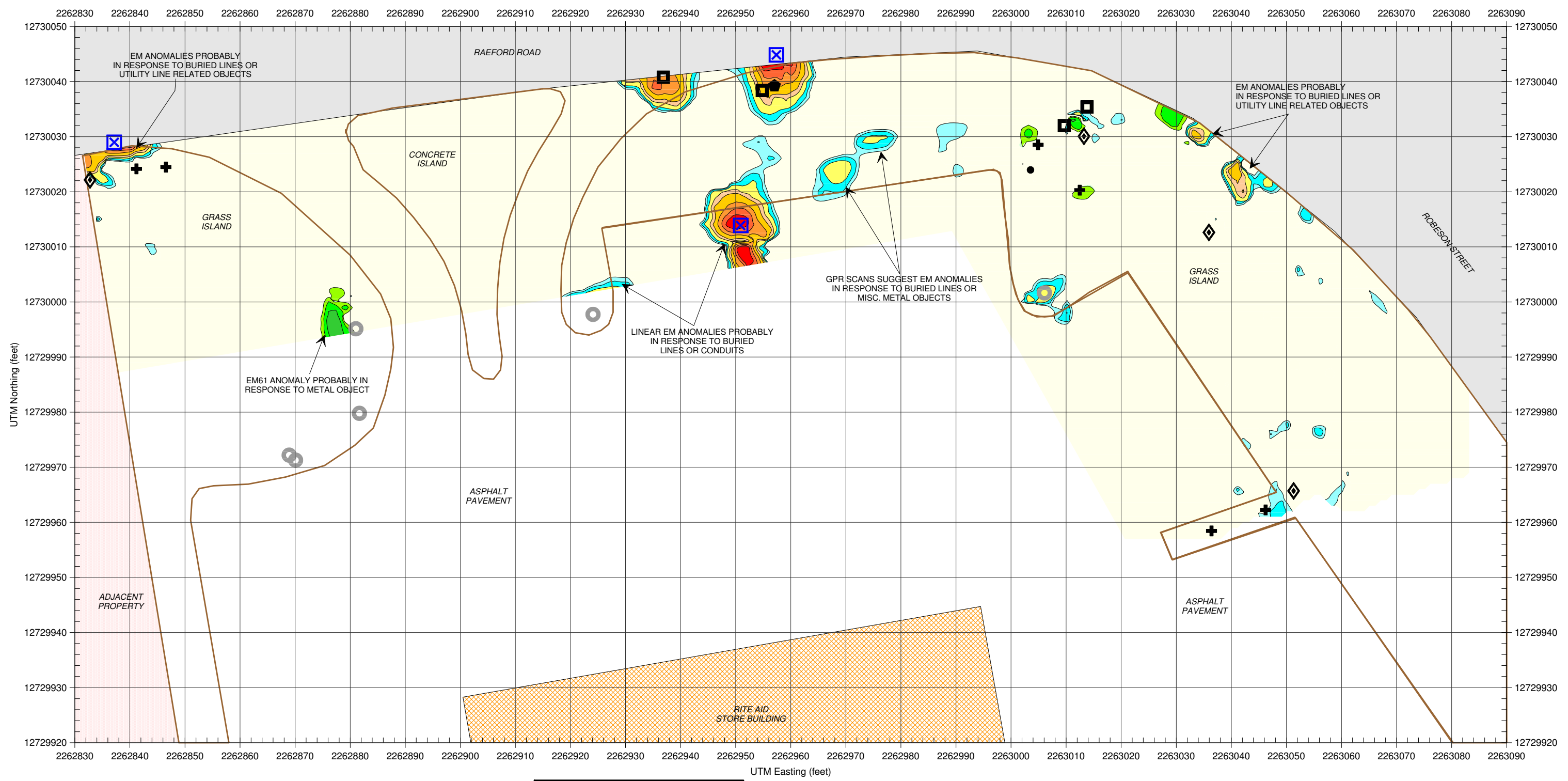
**EM61-MK2A METAL DETECTION  
(EARLY TIME GATE RESULTS)**

Terracon Consultants, Inc.  
Waterville Equities I LLC Property  
Parcel 332  
Fayetteville, North Carolina

**GEOPHYSICAL**  
SURVEY INVESTIGATIONS

11/11/16      336-286-9718      FIGURE 2

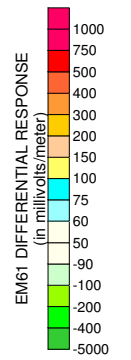




The red polygon in the aerial photograph represents the approximate perimeter of the geophysical survey area at Parcel 332.

**LEGEND**

- SURVEY AREA: EM61 ACQUIRED ALONG LINES SPACED APPROX. 5 FEET APART
- RAEFORD ROAD OR ROBESON STREET
- MONITORING WELL COVER
- + GUY WIRE
- UTILITY LINE RELATED BOXES
- METAL POLES
- X STORM SEWER GRATE
- ♦ FIRE HYDRANT
- ◆ METAL SIGN
- ◇ UTILITY POLE
- CONCRETE CURBING



Note: The contour plot shows the differential response between the top coil and the late time gate channel of the Geonics EM61-MK2A metal detection instrument in millivolts (mV). The differential response focuses on larger, buried, metallic objects such as drums and USTs and ignores smaller miscellaneous, buried, metal debris. The EM61 survey was conducted on October 19, 2016. Ground penetrating radar (GPR) scans were conducted across selected EM61 anomalies and areas containing reinforced concrete on October 26, 2016 using a Geophysical Survey Systems SIR 3000 unit with a 400 MHz antenna.



**EM61-MK2A METAL DETECTION  
(DIFFERENTIAL RESULTS)**

Terracon Consultants, Inc.  
Waterville Equities I LLC Property  
Parcel 332  
Fayetteville, North Carolina

**GEOPHYSICAL**  
SURVEY INVESTIGATIONS

11/11/16      336-286-9718      FIGURE 3

**APPENDIX B**

**SOIL BORING LOGS**

Lithology Log



Boring ID: SB-46

Project Number: 70167490		Start Date/Time: 11/01/16 1605		Sample Method		Drilling Method					
Site Location: Fayetteville, NC		End Date/Time: 11/01/16 1615		<input type="checkbox"/> Hand Auger	<input checked="" type="checkbox"/> DPT						
Weather: 50, Sunny		Boring Diameter: 2"		<input checked="" type="checkbox"/> Macro-Core	<input type="checkbox"/> HSA						
Logged By: EHS		Total Depth: 15 fbls		<input type="checkbox"/> Split Spoon	<input type="checkbox"/> Mud Rotary						
Drilling Sub: Regional Probing Services		Water Level: Na		<input type="checkbox"/> Shelby Tube	<input type="checkbox"/> Air Rotary						
Drill Rig: Truck Mount Geoprobe 5410		Well Installed: No		<input type="checkbox"/> Rock Core							
Depth (ft bls)	Recovery (inches)	Blow Counts (n)	PID ppm / ppb	CH <sub>4</sub>	CO <sub>2</sub>	O <sub>2</sub>	H <sub>2</sub> S	U.S.C.S	(Depth interval) Color, MAIN COMPONENT, minor component(s), structure, moisture, angularity, odor, staining	Lab Sample: ID, analysis, time	Drilling method, tooling, depth
0-1	12/12	-	<0.1					CL	(0-1) CLAY. red/tan. moist		
1-3	24/24	-	<0.1					CL	(1-3) SAA		
3-5	24/24	-	<0.1					CL	(3-5) CLAY. tan/red/gray. fat moist		
5-7	24/24	-	<0.1					CL	(5-7) SAA		
7-9	24/24	-	<0.1					CL	(7-9) SAA		
9-11	24/24	-	<0.1					SC	(9-11) SANDY CLAY. moist/red. gray/red. moist	Sample QK05 at 1620	
11-13	24/24	-	<0.1					SC	(11-13) SAA		
13-15	24/24	-	<0.1					SC	(13-15) SAA		
Boring terminated at 15 fbls											

Notes:

ppm: parts per million

ppb: parts per billion

NA= Not applicable

bls = below land surface

Lithology Log



Boring ID: SB-47

Project Number: 70167490	Start Date/Time: 11/10/16 1630	Sample Method	Drilling Method
Site Location: Fayetteville, NC	End Date/Time: 11/10/16 1640	<input type="checkbox"/> Hand Auger	<input checked="" type="checkbox"/> DPT
Weather: 50, sunny	Boring Diameter: 3"	<input checked="" type="checkbox"/> Macro-Core	<input type="checkbox"/> HSA
Logged By: EHS	Total Depth: 15 ftbs	<input type="checkbox"/> Split Spoon	<input type="checkbox"/> Mud Rotary
Drilling Sub: Regional Probing Services	Water Level: Na	<input type="checkbox"/> Shelby Tube	<input type="checkbox"/> Air Rotary
Drill Rig: Truck Mount Geoprobe 5410	Well Installed: NO		<input type="checkbox"/> Rock Core

Depth (ft bls)	Recovery (inches)	Blow Counts (n)	PID ppm/ppb	CH <sub>4</sub>	CO <sub>2</sub>	O <sub>2</sub>	H <sub>2</sub> S	U.S.C.S	(Depth interval) Color, MAIN COMPONENT, minor component(s), structure, moisture, angularity, odor, staining	Lab Sample: ID, analysis, time	Drilling method, tooling, depth
0-1	12/12	-	<0.1					CL	(0-1) CLAY. tan/red. stiff - moist		
1-3	24/24	-	<0.1					CL	( <del>1-3</del> ) C <sup>FS</sup> (1-3) SAA		
3-5	24/24	-	<0.1					CL	(3-5) SAA		
5-7	24/24	-	<0.1					CL	(5-7) SAA except mottled		
7-9	24/24	-	<0.1					CL	(7-9) SAA		
9-11	24/24	-	<0.1					SC	(9-11) SANDY CLAY red/brown/gray. moist		
11-13	24/24	-	<0.1					SC CL	(11-12) Silt (12-13) CLAY. tan/gray. fat. moist	Sample QROS at 1045	
13-15	24/24	-	<0.1					CL	(13-15) SAA		
									Boring terminated at 15 ftbs		

Notes:

ppm: parts per million      ppb: parts per billion      NA= Not applicable      bls = below land surface

Lithology Log



Boring ID: SB-48

Project Number: 70167490		Start Date/Time: 11/10/16 16:55		Sample Method		Drilling Method					
Site Location: Fayetteville, NC		End Date/Time: 11/10/16 15:17:02		<input type="checkbox"/> Hand Auger	<input checked="" type="checkbox"/> DPT						
Weather: SO, overcast		Boring Diameter: 2"		<input checked="" type="checkbox"/> Macro-Core	<input type="checkbox"/> HSA						
Logged By: EHS		Total Depth: 15 fbls		<input type="checkbox"/> Split Spoon	<input type="checkbox"/> Mud Rotary						
Drilling Sub: Regional Probing Services		Water Level: NA		<input type="checkbox"/> Shelby Tube	<input type="checkbox"/> Air Rotary						
Drill Rig: TRUCK Mount Geoprobe 5410		Well Installed: No		<input type="checkbox"/> Rock Core							
Depth (ft bls)	Recovery (inches)	Blow Counts (n)	PID ppm / ppb	CH <sub>4</sub>	CO <sub>2</sub>	O <sub>2</sub>	H <sub>2</sub> S	U.S.C.S	(Depth interval) Color, MAIN COMPONENT, minor component(s), structure, moisture, angularity, odor, staining	Lab Sample: ID, analysis, time	Drilling method, tooling, depth
0-1	12/12	-	<0.1					CL	(0-1) CLAY, orange/tan. moist		
1-3	24/24	-	<0.1					CL	(1-3) CLAY, red/gray/tan. moist		
3-5	24/24	-	<0.1					CL	(3-5) SAA		
5-7	24/24	-	<0.1					CL	(5-7) SAA		
7-9	24/24	-	<0.1					CL	(7-9) SAA		
9-11	24/24	-	<0.1					SC	(9-11) SANDY CLAY tan/red. moist		
11-13	24/24	-	<0.1					CL	(11-13) CLAY, red/orange. stiff. moist		
13-15	24/24	-	<0.1					CL	(13-15) SAA	Sample OK at 1710	
Boring terminated at 15 fbls											

Notes:

ppm: parts per million      ppb: parts per billion      NA= Not applicable      bls = below land surface

Lithology Log



Boring ID: SB-49

Project Number: 70167490		Start Date/Time: 11/10/16 1715		Sample Method		Drilling Method					
Site Location: Fayetteville, NC		End Date/Time: 11/10/16 1725		<input type="checkbox"/> Hand Auger	X DPT						
Weather: 50, overcast		Boring Diameter: 2"		X Macro-Core	<input type="checkbox"/> HSA						
Logged By: EHS		Total Depth: 15 fbls		<input type="checkbox"/> Split Spoon	<input type="checkbox"/> Mud Rotary						
Drilling Sub: Regional Probing Services		Water Level: Na		<input type="checkbox"/> Shelby Tube	<input type="checkbox"/> Air Rotary						
Drill Rig: TRICK MOUNT Geoprobe 5410		Well Installed: No		<input type="checkbox"/> Rock Core							
Depth (ft bls)	Recovery (inches)	Blow Counts (n)	PID ppm/ppb	CH <sub>4</sub>	CO <sub>2</sub>	O <sub>2</sub>	H <sub>2</sub> S	U.S.C.S	(Depth interval) Color, MAIN COMPONENT, minor component(s), structure, moisture, angularity, odor, staining	Lab Sample: ID, analysis, time	Drilling method, tooling, depth
0-1	12/12	-	<0.1					SM	(0-1) SAND. tan/black. fine grained. moist		
1-3	24/24	-	<0.1					SM	(1-3) SAA		
3-5	24/24	-	<0.1					SM	(3-5) SAA		
5-7	24/24	-	<0.1					CL	(5-7) CLAY. orange/red. moist. S&TFF	Sample OKCS at 1730	
7-9	24/24	-	<0.1					CL	(7-9) SAA		
9-11	24/24	-	<0.1					CL	(9-11) CLAY. gray/tan/red mottled. moist		
11-13	24/24	-	<0.1					CL	(11-13) SAA		
13-15	24/24	-	<0.1					CL	(13-15) SAA		
									Boring terminated at 15 fbls		

Notes:

ppm: parts per million

ppb: parts per billion

NA= Not applicable

bls = below land surface

## **APPENDIX C**

### **LABORATORY ANALYTICAL REPORTS AND CHAIN-OF-CUSTODY FORMS**



### Hydrocarbon Analysis Results

**Client:** TERRACON  
**Address:** 2401 BRENTWOOD ROAD  
 RALEIGH NC

**Samples taken** Tuesday, November 8, 2016  
**Samples extracted** Tuesday, November 8, 2016  
**Samples analysed** Monday, November 14, 2016

**Contact:** STEVE KERLIN

**Operator** HENDRIX

**Project:** #70167490

											H09382		
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	SB-43	38.8	<0.97	<0.97	1.9	1.9	1.6	0.18	<0.004	0	65.1	34.9	Residual.PHC (FCM) (P) 55.5%
s	SB-44	49.1	<1.2	<1.2	2.8	2.8	1.3	0.07	<0.005	0	68.7	31.3	Residual.PHC (FCM) 48.9%
s	SB-45	6.2	<0.16	<0.16	<0.16	<0.16	<0.03	<0.005	<0.001	0	0	0	Residual.PHC
s	SB-46	39.4	<0.98	<0.98	1.5	1.5	0.93	0.05	0.004	0	33	67	Deg.PHC (FCM) (P) 55.5%
s	SB-47	8.0	<0.2	<0.2	0.2	0.2	<0.04	<0.006	<0.001	0	10	90	Residual.PHC (FCM) (P) (BO) 39.3%
s	SB-48	7.1	<0.18	<0.18	0.32	0.32	<0.04	<0.006	<0.001	0	0	100	Residual.PHC (FCM) (P) 50.5%
s	SB-49	8.5	<0.21	<0.21	<0.21	<0.21	<0.04	<0.007	<0.001	0	0	0	Residual.PHC
s	SB-50	9.5	<0.48	<0.24	<0.24	<0.24	<0.05	<0.008	<0.001	0	0	0	Residual.PHC
s	SB-51	47.3	<1.2	<1.2	<1.2	<1.2	<0.24	<0.04	<0.005	0	15	85	Residual.PHC (P) (BO)
s	SB-52	7.3	<0.18	<0.18	0.32	0.32	0.28	0.03	<0.001	0	51.9	48.1	Residual.PHC (FCM) (P) 39.6%
			Initial Calibrator QC check				OK	Final FCM QC Check				OK	93.9 %

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



Batch 22

Client Name: TENNCO  
 Address: 2401 Brentwood Road Raleigh, NC  
 Contact: Steve Kellin  
 Project Ref.: 70167490  
 Email: Steve.Kellin@Tennco.com  
 Phone #: (919) 802-5091  
 Collected by: Edison Smith

**RED LAB**  
 RAPID ENVIRONMENTAL DIAGNOSTICS  
 CHAIN OF CUSTODY AND ANALYTICAL  
 REQUEST FORM

RED Lab, LLC  
 5598 Marvin K Moss Lane  
 MARBIONC Bldg, Suite 2003  
 Wilmington, NC 28409

Each sample will be analyzed for  
 BTEX, GRO, DRO, TPH, PAH total  
 aromatics and Bar

Sample Collection Date/Time	TAT Requested 24 Hour	48 Hour	Matrix (S/W)	Sample ID	UVF	GC BTEX	Total Wt.	Tare Wt.	Sample Wt.
11/10 0855		✓	S	SR-33	✓		49.9	44.6	5.3
11/10 0915				SR-34			52.0	45.5	6.5
11/10 0940				SR-35			49.2	44.6	4.6
11/10 1025				SR-36			51.1	45.1	6.0
11/10 1045				SR-37			51.7	45.5	6.2
11/10 1115				SR-38			49.9	44.6	5.3
11/10 1135				SR-39			50.1	44.6	5.5
11/10 1210				SR-40			50.5	44.8	5.7
11/10 1235				SR-41			51.5	45.5	6.0
11/10 1415				SR-42			51.6	45.1	6.5
11/10 1445				SR-43			51.4	44.7	6.7
11/10 1505				SR-44			50.5	45.2	5.3
11/10 1530				SR-45			52.3	44.8	7.5
11/10 1620				SR-46			51.4	44.8	6.6
11/10 1645				SR-47			51.9	46.1	5.8
11/10 1710				SR-48			52.0	45.4	6.6
11/10 1738				SR-49			50.8	45.3	5.5
11/10 0835				SR-50			51.0	44.7	6.3
11/10 0900				SR-51			50.2	44.7	5.5
11/10 0930				SR-52			51.4	45.0	6.4

Comments:

Relinquished by: Edison Smith Date/Time: 11/16/10 10:5 Accepted by: Edison Smith Date/Time: 11.14.16 0900

Relinquished by: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Accepted by: \_\_\_\_\_ Date/Time: \_\_\_\_\_

RED Lab USE ONLY

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