January 9, 2020

North Carolina Department of Transportation
Geotechnical Unit
Mail Service Center 1592
Raleigh, North Carolina 27699-1592

Attention: Mr. Craig Haden email: cehaden@ncdot.gov

Reference: **Preliminary Site Assessment Report**
NCDOT Project I-5878, WBS Element 53078.1.1
Parcel 200-Word A Fire Ministries-Former T-Mart
511 Spring Branch Road
Dunn, Harnett County, North Carolina
S&ME Project 4305-19-161

Dear Mr. Haden:

S&ME, Inc. (S&ME) is submitting this Preliminary Site Assessment (PSA) Report to the North Carolina Department of Transportation (NCDOT). This report presents the background/project information, field activities, findings, conclusions, and recommendations. These services were performed in general accordance with S&ME Proposal No. 43-1900576 REV-01 dated August 9, 2019, and Contract Number 7000018853 dated April 12, 2018 between NCDOT and S&ME, Inc., authorized by NCDOT in its September 5,2019 Notice to Proceed Letter.

♦ Background/Project Information

Based on NCDOT's July 24, 2019, Request for Technical and Cost Proposal, the PSA was conducted within the NCDOT right-of-way (ROW) and/or easement as indicated on the preliminary plan sheets provided by NCDOT at the following property:

NCDOT Parcel No.	Property Owner	Site Address
200	Barbara B Properties, LLC	(Word A Fire Ministries-Former T-Mart) 511 Spring Branch (aka Pope Road), Dunn, NC

The property is developed with a commercial building currently occupied with Word A Fire Ministries (a church). The building was previously occupied by a gasoline/convenience store identified as T-Mart. The petroleum underground storage tanks (USTs) that the former T-Mart operated were previously removed. The former UST area is now located on the adjoining property to the northwest, which is occupied by BP I-Mart (Parcel 78), an operating gasoline/convenience store. The BP I-Mart and the former T-Mart are both listed with the same UST Facility ID No. of 0-00-000017633. Information regarding the former UST system listed for the Former T-Mart site is provided in the following table:

UST Facility ID No. 0-00-000017633

Number of Tanks	Contents	Capacity (gallons)	Date Installed	Date Removed
1	Gasoline	6,000	5/3/1951	7/21/1999
2	Gasoline	6,000	4/30/1961	7/21/1999
3	Gasoline	6,000	4/30/1961	7/21/1999
4	Gasoline	10,000	2/22/1975	7/21/1999

The property is listed with one North Carolina Department of Environmental Quality (NCDEQ) Incident (Incident #18955-T-Mart) associated with petroleum releases discovered at the site in 1998 from USTs. The USTs were removed in 1999. A groundwater treatment system was previously operated at the site. Numerous monitor wells and recovery wells identified as MW-1 through MW-8, DW-1, RW-1 and RW-2 have been installed on the site and adjacent properties. Specifically, MW-3, DW-1 and RW-1 are located on the current property boundaries within the ROW. MW-4, which was later converted to RW-2, is located on the adjoining BP I-Mart site to the north within the ROW. MW-6 through MW-8 are located across Spring Branch Road from the site within the ROW. MW-2 and MW-5 are located on the southern adjoining properties. Groundwater at the site is reported to primarily flow to the south. Free product has previously been measured in MW-3 and RW-2. Several aggressive fluid vapor recovery (AFVR) events have been performed at the site. The most recent event occurred in 2017 on MW-3. Prior to the event, 0.33 feet of free product was measured in MW-3 (*UST Closure Report* prepared by East Coast Environmental dated July 28, 1999, *Semi-Annual Groundwater Monitoring* prepared by East Coast Environmental dated November 8, 2002 and *AFVR and Groundwater Monitoring Report* prepared by Geologic Resources, Inc dated May 25, 2017). Copies of pertinent information obtained from the above referenced reports are included in **Appendix I.**

The PSA included a geophysical survey and subsequent limited soil sampling (nine soil borings up to 10 feet below ground surface (ft.-bgs)), within accessible areas of the proposed ROW/easement in preparation for construction activities. **Figure 1** shows the vicinity and site location, and **Figure 2** shows the site and boring locations. Soil sampling results are shown on **Figure 3.**

♦ Field Services

Prior to field activities, a site specific Health and Safety Plan was prepared as required by the Occupational Health and Safety Act (OSHA). Underground utilities were located and marked by the North Carolina One-Call Service. A private utility locator (East Coast Underground, LLC) was also used to locate and mark underground utilities.

♦ Geophysical Survey

On July 25, 2019, S&ME completed Time Domain Electromagnetic (TDEM) and Ground Penetrating Radar (GPR) surveys within accessible areas of the proposed ROW/easement at Parcel 200. Brief descriptions of these complementary geophysical techniques are presented in the following paragraphs.

Time Domain Electromagnetics (TDEM)

TDEM measures the electrical conductivity of subsurface materials and discriminates between moderately conductive earth materials and very conductive metallic targets within the shallow subsurface. The conductivity is determined by transmitting a time-varying magnetic pulse into the subsurface and measuring the amplitude and phase shift of the secondary magnetic field. The secondary magnetic field is created when the conductive materials become an inductor as the primary magnetic field is passed through them. TDEM data are acquired continuously at a walking pace typically along a series of parallel or perpendicular lines. The system generates audible and visual indications when metallic targets are encountered. These measurements can also be supported with a global positioning system (GPS) which is output directly into the TDEM data file.

We used a Geonics Limited EM-61 MK2 TDEM system in general accordance with ASTM D6820 "*Standard Guide for Use of the Time Domain Electromagnetic Method for Subsurface Investigation.*" Data was collected along lines spaced at approximately five feet using a Juniper® Systems Geode™ sub-meter GPS as positioning support. The approximate TDEM data collection paths are presented in **Figure 4.** Golden Software's Surfer® program was used to grid and plot the data **(Figures 5 and 6).** The TDEM data has been presented as Plots A and B in order to provide both opaque and semi-transparent views, respectively.

Ground Penetrating Radar (GPR)

GPR transmits electromagnetic waves into the subsurface from an antenna at a specific frequency and measures the time for wave reflections to be received by interfaces between materials with differing material properties (e.g. soil/metal, etc.). The intensity of the reflected GPR wave is a function of the contrast in the material properties (i.e. dielectric permittivity) at the interface, the conductivity of the material that the wave is traveling through, and the frequency of the signal.

We used a Geophysical Survey Systems, Inc. (GSSI) SIR® 4000 GPR system equipped with a 350 MHz antenna in general accordance with ASTM D6432 "*Standard Guide for Using the Surface Ground Penetrating Radar Method for Subsurface Investigation*" to further characterize anomalies/features identified during the TDEM survey.

A total of 12 GPR profiles (Lines 1 through 12) were collected for documentation (**Figure 7**). The data was post-processed using the GSSI Radan® 7 GPR software program for additional analysis.

Geophysical Findings

Responses indicative of a potential UST were not identified in the geophysical data sets collected at the site. Two anomalous features unrelated to known surficial targets were identified in the geophysical data sets (Anomalies A and B; **Figures 6 and 7**). Anomalies A and B are characterized by linear, high amplitude GPR responses about two feet in width and 15 feet in length located about two ft.-bgs. Anomaly A does not exhibit TDEM responses indicative of a buried relic metallic UST and may instead be related to an abandoned buried utility or other buried

linear structure. Anomaly B is located beneath a reinforced concrete slab, and as such, material type of this feature (i.e. metal, etc.) is unable to be determined. Given the similar dimensions as Anomaly A, Anomaly B may also be related to an abandoned buried utility or other buried linear structure. The anomalies were marked in the field using white spray paint. Example GPR profiles are presented in **Figures 8 and 9**.

♦ Soil Sampling

On October 23 and 28, 2019, Troxler Geologic, Inc. (Troxler's) drill crew utilized a track mounted Geoprobe® rig to advance nine soil borings (B-1 through B-9) and to collect soil samples within accessible areas of the proposed ROW/easement at Parcel 200. Gravel was encountered within soil boring identified as B-2, which was located within a former pump island. Therefore, an additional boring was advanced at an offset location and identified as boring B-2A. The approximate location of the soil borings are shown in **Figure 2**. A photographic log is included in **Appendix II.** Troxler's drill crew advanced the Geoprobe® borings up to a depth of approximately eight ft.-bgs. During the advancement of the soil borings, groundwater was encountered at a depth of approximately seven ft.-bgs. Soil samples were continuously collected in four-foot long disposable acetate-plastic sleeves that line the hollow stainless-steel sample probes. Soil recovered from the sleeves was classified on-site by S&ME personnel and screened with a Photoionization Detector (PID) at approximately two foot depth intervals to measure relative headspace concentrations of volatile organic compounds (VOCs).

VOC headspace readings were obtained from an aliquot of each soil sample that was placed in a re-sealable bag. Another portion of the sample was placed in a separate re-sealable bag and stored in an insulated container with ice for possible laboratory analyses. After waiting approximately 15 minutes to allow the sample to reach ambient temperature and headspace equilibrium, the PID probe was inserted into the bag to obtain a headspace reading. A summary of the PID readings and logs of the soil borings are included in **Appendix III.**

Petroleum odors and elevated PID readings were noted at borings B-1, B-2A, B-3, B-4 and B-9, which were located within the former pump island areas, starting at a depth of approximately four ft.-bgs at boring B-4 and six ft.-bgs at borings B-1, B-2A, B-3 and B-9 and extending to boring termination at eight ft-bgs. Groundwater was encountered at a depth of approximately seven ft.-bgs. Therefore, a soil sample was selected from these boring at the four to six foot depth interval. Various soil samples at varying depth intervals were selected from the remaining borings. The soil samples were placed into laboratory supplied containers and transported to RED Lab, LLC (Red Lab) in an insulated cooler with ice for analysis. A total of nine soil samples (one soil sample per boring) were analyzed by RED Lab for TPH-GRO and TPH-DRO using ultra-violet fluorescence (UVF) spectroscopy with product (fuel) identification.

Soil Analytical Results

Based upon analytical results of soil samples analyzed by RED Lab using UVP spectroscopy, TPH-GRO and TPH-DRO were reported at concentrations exceeding their respective North Carolina TPH Action Levels in borings B-1, B-2A and B-4. The highest concentrations were reported in boring B-4 at the four to six foot depth interval. TPH-GRO was reported in boring B-4 at a concentration of 3,352 milligrams per kilograms (mg/kg) which exceeds its North Carolina TPH Action Level of 50 mg/kg. TPH DRO was reported in boring B-4 at a concentration of 11,718 mg/kg which exceeds its North Carolina TPH Action Level of 100 mg/kg. TPH-GRO was also reported in boring B-9 at the four to six foot depth interval at a concentration of 48.9 mg/kg, which is slightly below its North Carolina TPH Action Level. TPH-DRO was also reported in borings B-3, B-6, B-7, B-8 and B-9, at concentrations above the

laboratory reporting limits but below its North Carolina TPH Action Level. TPH-GRO and TPH-DRO were not reported at concentrations exceeding the laboratory method reporting limits at the remaining soil samples. A summary of the soil analytical results is presented in **Table 1** and shown on **Figure 3.** A copy of the laboratory analytical report provided by RED Lab is presented in **Appendix IV.**

♦ Groundwater Sampling

During the advancement of the soil borings, groundwater was encountered at a depth of approximately seven ft.-bgs which corresponds with the groundwater depth measured in the existing monitor well MW-3 located on the site within the ROW. Approximately 0.5 inches of free product was measured in MW-3. S&ME personnel did not gauge existing monitor wells DW-1 or RW-1 also located on the site within the ROW. Based on the presence of free product, a groundwater sample was not collected. The free product thickness measured in MW-3 is presented in **Table 2** and shown on **Figure 3.**

Upon completion of the soil sampling, the soil borings were backfilled with bentonite pellets and soil cuttings. Investigative derived wastes (IDW), such as soil cuttings generated during the soil boring advancement and decontamination water, were spread on the ground in accordance with the procedures specified by NCDEQ. Used gloves and tubing were bagged and disposed off-site.

♦ Conclusion and Recommendations

Existing groundwater monitoring well identified as MW-3, DW-1 and RW-1 are located on the property within the ROW. The wells are associated with a UST release from the Former T-Mart (NCDEQ Incident # 18955), which was previously located on the property. In 2017 an AFVR was performed on MW-3. Prior to the event, 0.33 feet of product was measured in MW-3. On October 23, 2019, groundwater was measured in MW-3 at a depth of approximately seven ft.-bgs with 0.5 inches of free product.

The geophysical survey identified two anomalies (Anomalies A and B) which may be related to abandoned buried utilities or other buried linear structures. Responses indicative of a potential UST were not identified in the geophysical data sets collected at the site.

S&ME advanced nine soil borings (B-1 through B-9) to a depth of up to approximately eight ft.-bgs at the site. Petroleum odors and elevated PID readings were noted at borings B-1, B-2A, B-3, B-4 and B-9, which were located within the former pump island areas, starting at a depth of approximately four ft.-bgs at boring B-4 and six ft.-bgs at borings B-1, B-2A, B-3 and B-9 and extending to boring termination at eight ft-bgs. Selected soil samples from the soil borings were analyzed for TPH-GRO and TPH-DRO using UVF spectroscopy.

TPH-GRO and TPH-DRO were reported at concentrations exceeding their respective North Carolina TPH Action Levels in borings B-1, B-2A and B-4. The highest concentrations were reported in boring B-4 at the four to six foot depth interval. TPH-GRO was reported in boring B-4 at a concentration of 3,352 mg/kg. TPH DRO was reported in boring B-4 at a concentration of 11,718 mg/kg. TPH-GRO was also reported in boring B-9 at the four to six foot depth interval at a concentration of 48.9 mg/kg, which is slightly below its North Carolina TPH Action Level. TPH-DRO was also reported in borings B-3, B-6, B-7, B-8 and B-9, at concentrations above the laboratory reporting limits but below its North Carolina TPH Action Level. TPH-GRO and TPH-DRO were not reported at concentrations exceeding the laboratory method reporting limits at the remaining soil samples.

During the soil boring advancement, groundwater was encountered at a depth of approximately seven ft.-bgs. Due to the presence of free product in existing monitor well MW-3 located on the property within the ROW, a groundwater sample was not collected.

Based on the findings of the geophysical survey, analytical results of soil samples and the presence of free product, it is likely that during construction, NCDOT may encounter soil and groundwater impacted with petroleum at the site. Petroleum impacted soil at concentrations exceeding the North Carolina TPH Action Levels may be encountered within the vicinity of borings B-1, B-2A, B-4 and extending to B-9 where TPH concentrations are slightly below TPH Action Levels. Assuming that a section of petroleum impacted soil approximately three feet thick, 24 feet wide and 29 feet long at a depth of four to seven ft.-bgs (groundwater was encountered at a depth of seven ft.-bgs); up to 80 cubic yards of soil may be impacted within the vicinity of boring B-4 and B-9. Assuming that another section of petroleum impacted soil approximately three feet thick, 24 feet wide and 40 feet long at a depth of four to seven ft.-bgs; up to 110 cubic yards of soil may be impacted within the vicinity of borings B-1 and B-2A. Therefore, a total of approximately 190 cubic yards of petroleum impacted soil may be encountered during construction to depths of approximately four to seven ft.-bgs.

It should also be assumed that saturated petroleum impacted soil will be encountered if construction excavations extend deeper than seven ft.-bgs on the site. If construction dewatering is required, petroleum impacted groundwater must be properly disposed or treated at a licensed facility.

If petroleum stained or odorous soils are encountered during construction, these soils should be properly handled and disposed at a licensed facility. If construction dewatering is required, petroleum impacted groundwater must be properly disposed or treated at a licensed facility.

S&ME recommends maintaining an awareness level for the presence of petroleum in the soil and groundwater at the site for the safety of workers and the public.

♦ Limitations

The results of this preliminary investigation are limited to the boring locations presented herein. The results of this Preliminary Site Assessment are not all inclusive and may not represent existing conditions across the entire property. These results only reflect the current conditions at the locations sampled on the date this Preliminary Site Assessment was performed. This report has been prepared in accordance with generally accepted environmental engineering and geophysical practice for specific application to this project. The conclusions and recommendations contained in this report are based upon applicable standards of our practice in this geographic area at the time this report was prepared. No other warranty, expressed or implied, is made.

The geophysical methods used for this survey have inherent limitations. Site metallic features (e.g., reinforced concrete, utilities, etc.) and overhead transmission lines can produce a false electromagnetic response and may mask subsurface features. The depth of exploration of the GPR signal is highly site specific and is greatly limited by signal attenuation (absorption) of the subsurface materials. Signal attenuation is dependent upon the electrical conductivity of the subsurface materials. Signal attenuation is greatest in materials with relatively high electrical conductivities such as clay soils, and lowest in relatively low conductivity materials such as unsaturated sand. For this project location, the GPR data sets appear to have a maximum depth of penetration of about seven ft.-bgs.

Regardless of the thoroughness of a geophysical study, there is always a possibility that actual conditions may not match the interpretations. The results should be considered accurate only to the degree implied by the methods used and the method's limitations and data coverage. Accordingly, the possibility exists that not all features at a project site will be located due to either subsurface soil conditions or the occurrence of features outside the lateral limits and below the depth of penetration of the methods used. As with most surface geophysical methods, resolution of the subsurface will also decrease with depth. As such, the size and/or contrast of features compared to the imaged subsurface media must be significant enough to produce the anticipated response. The location and/or determination (or the lack thereof) of potential buried features is based on our review of the provided information and of the geophysical survey. Under no circumstances does S&ME assume any responsibility for damages resulting from the presence of subsurface features that may exist but were not identified by our survey.

This Preliminary Site Assessment was performed solely for NCDOT regarding the above-referenced site and assessment area. This report is provided for the sole use of NCDOT. Use of this report by any other parties will be at such party's sole risk. S&ME disclaims liability for any such use or reliance by third parties. The observations presented in this report are indicative of conditions during the time of the assessment and of the specific areas referenced.

♦ Closing

S&ME appreciates the opportunity to provide these services to you. If you have any questions or comments regarding this report, please contact us at your convenience.

Sincerely,

S&ME, Inc.

DocuSigned by:
Jamie Honeycutt
4C890EAEC25F488...

Jamie T Honeycutt
Environmental Professional
jhoneycutt@smeinc.com

DocuSigned by:
Michael Pfeifer
861E52DDEFAF4C7...

Michael W. Pfeifer
Senior Project Manager
mpfeifer@smeinc.com

DocuSigned by:
Tom Raymond
D4B9FB5F636F4BB...

1/27/2020

Thomas P. Raymond, P.E., P.M.P.
Senior Consultant
traymond@smeinc.com

Attachments:

Table 1: Summary of Soil Sampling Results
Table 2: Summary of Groundwater Sampling Results

Figure 1: Vicinity Map
Figure 2: Site Map
Figure 3: Soil and Groundwater Constituent Map
Figure 4: TDEM Path Location Plan
Figure 5: TDEM Data Plot A
Figure 6: TDEM Data Plot B
Figure 7: Geophysical Anomaly Location Plan
Figure 8: Example GPR Data – Lines 3, 4 and 11
Figure 9: Example GPR Data – Lines 1 and 2

Appendix I: NCDEQ File Review
Appendix II: Photographs
Appendix III: Boring Logs
Appendix IV: Laboratory Analytical Reports and Chain of Custody

Tables

TABLE 1
SUMMARY OF SOIL SAMPLING RESULTS
NCDOT Project I-5878
Parcel 200 - (Word A Fire Ministries-Former T-Mart)
511 Spring Branch Road
Dunn, Harnett County, North Carolina
S&ME Project No. 4305-19-161

Analytical Method→			Total Petroleum Hydrocarbons (TPH) Gasoline Range Organics (GRO) and Diesel Range Organics (DRO) by Ultraviolet Fluorescence (UVF) Spectrometry	
Sample ID	Date	Contaminant of Concern→ / Sample Depth (ft.-bgs)	TPH-GRO	TPH-DRO
B-1	10/23/2019	4 to 6	**63.2**	**273.1**
B-2A	10/23/2019	4 to 6	**369.9**	**131.8**
B-3	10/23/2019	4 to 6	<0.88	**2.6**
B-4	10/23/2019	4 to 6	**3,352**	**11,718**
B-5	10/28/2019	4 to 6	<0.52	<0.52
B-6	10/28/2019	4 to 6	<0.5	**1.5**
B-7	10/28/2019	2 to 4	<0.54	**13.8**
B-8	10/28/2019	4 to 6	<0.53	**0.94**
B-9	10/28/2019	4 to 6	**48.9**	**20.1**
North Carolina TPH Action Levels			**50**	**100**

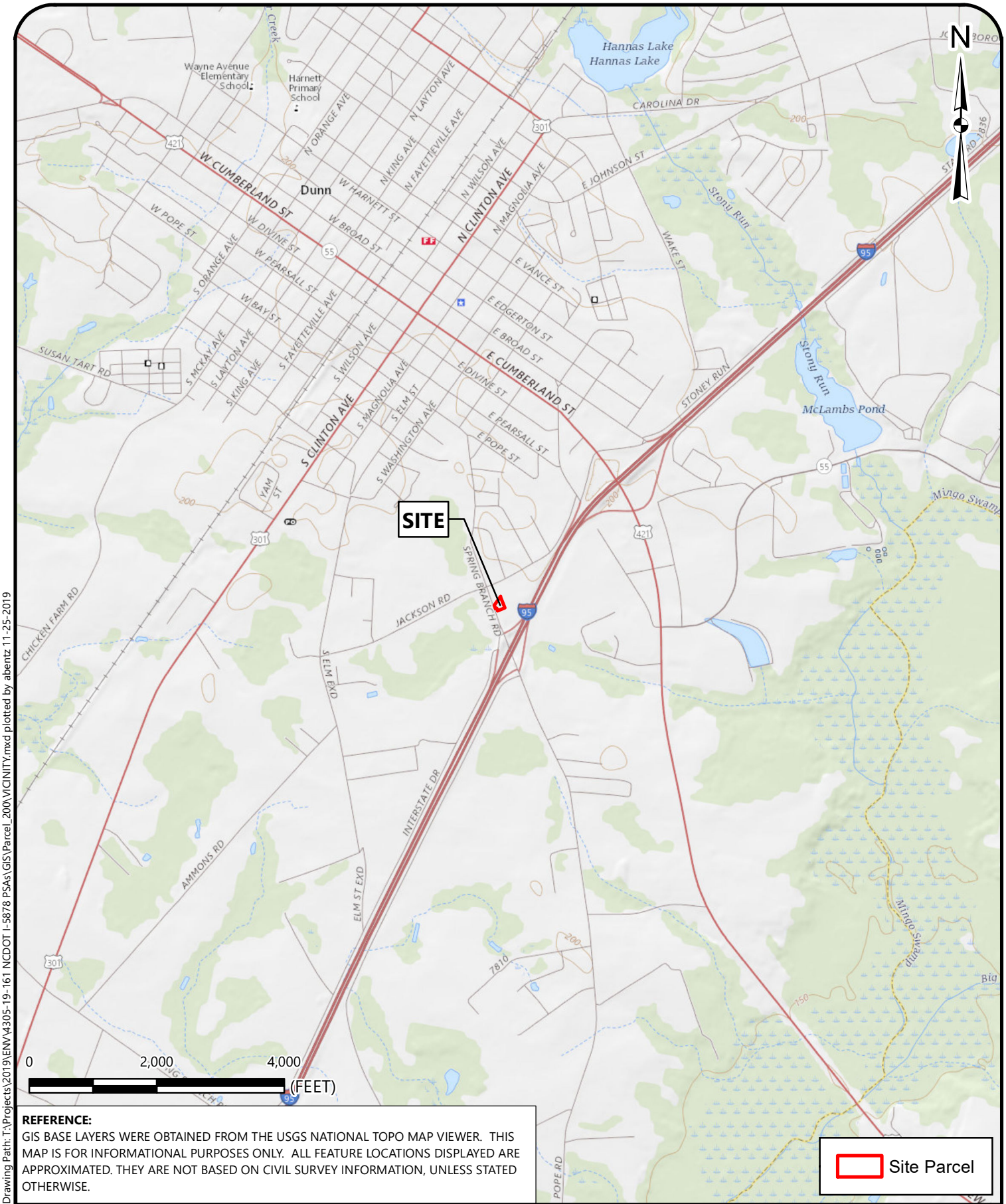
Notes:
1. UVF analysis performed by RED Lab, LLC
2. Concentrations are reported in milligrams per kilogram (mg/Kg).
3. ft.-bgs:- feet below ground surface.
4. Concentrations exceeding the laboratory's reporting limits are shown in **BOLD** fields.
5. Concentrations exceeding the North Carolina TPH Action Levels are shown in Shaded and **BOLD** fields.

TABLE 2
SUMMARY OF GROUNDWATER SAMPLING RESULTS
NCDOT Project I-5878
Parcel 200 - (Word A Fire Ministries-Former T-Mart)
511 Spring Branch Road
Dunn, Harnett County, North Carolina
S&ME Project No. 4305-19-161

Analytical Method→		Volatile Organic Compounds by EPA Method 8260	Polycyclic Aromatic Compounds (PAHs) by EPA
Sample ID	Contaminant of Concern→	Constituent Specific	Constituent Specific
	Date		
MW-3	10/23/2019	**Water Level at 7 ft-bgs with 0.5 inches of free product. No Sample Collected**	
2L Standard (µg/L)		**Not Applicable**	
GCL (µg/L)		**Not Applicable**	

Notes:
1. Groundwater Sample Not Analyzed Due to Free Product.
2. Concentrations are reported in micrograms per liter (µg/L).
3. 2L Standard: North Carolina Groundwater Quality Standards: 15A NCAC 2L.0202
4. Concentrations exceeding the laboratory's reporting limits are shown in **BOLD** fields.
5. Concentrations exceeding the 2L Standards are shown in Shaded and **BOLD** fields.
6. GCL: Gross Contamination Level.
7. J: Estimated concentration detected below the reporting limit.
8. ft.-bgs: feet below ground surface

Figures



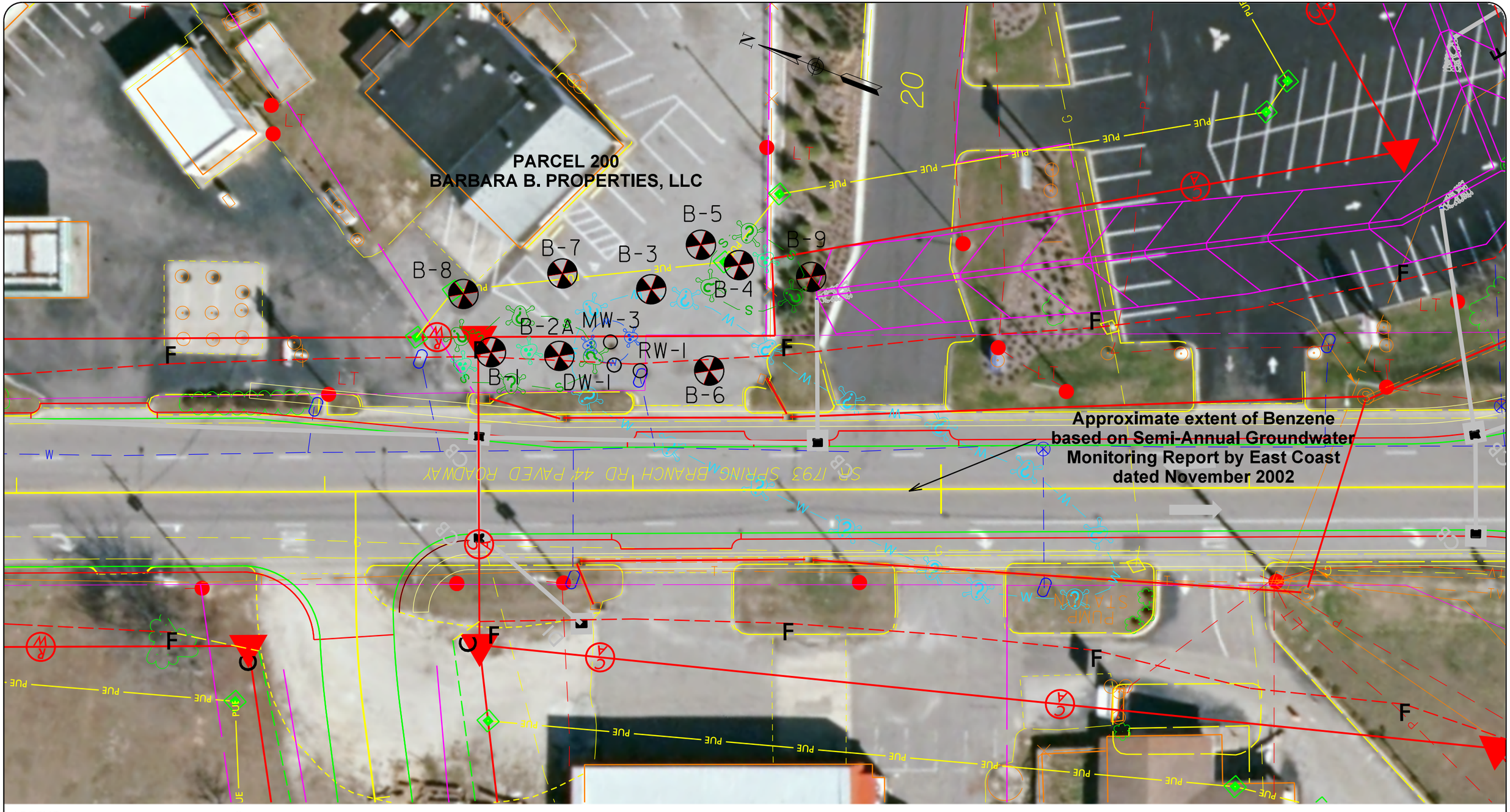
REFERENCE:
GIS BASE LAYERS WERE OBTAINED FROM THE USGS NATIONAL TOPO MAP VIEWER. THIS MAP IS FOR INFORMATIONAL PURPOSES ONLY. ALL FEATURE LOCATIONS DISPLAYED ARE APPROXIMATED. THEY ARE NOT BASED ON CIVIL SURVEY INFORMATION, UNLESS STATED OTHERWISE.

Drawing Path: T:\Projects\2019\ENV\4305-19-161 NCDOT I-5878 PSAs\GIS\Parcel_200\VICINITY.mxd plotted by abentz 11-25-2019

VICINITY MAP

NCDOT PROJECT I-5878
PARCEL NO. 200 (WORD A FIRE MINISTRIES - FORMER T-MART)
511 SPRING BRANCH RD, DUNN, HARNETT COUNTY, NORTH CAROLINA

SCALE:	FIGURE NO.
1 " = 2,000 '	1
DATE: 11-25-19	
PROJECT NUMBER 4305-19-161	



LEGEND

Geoenvironmental Boring:

Underground Storage Tank (UST): UST

Map Source: NCDOT Project I-5986B
Image Source: NC ONEMAP, Dated 2016

Existing Monitoring Well:

Known Soil Contamination:

Possible Soil Contamination: — S —

Existing Contamination Known - Water: — W —

Possible Groundwater Contamination: — W —

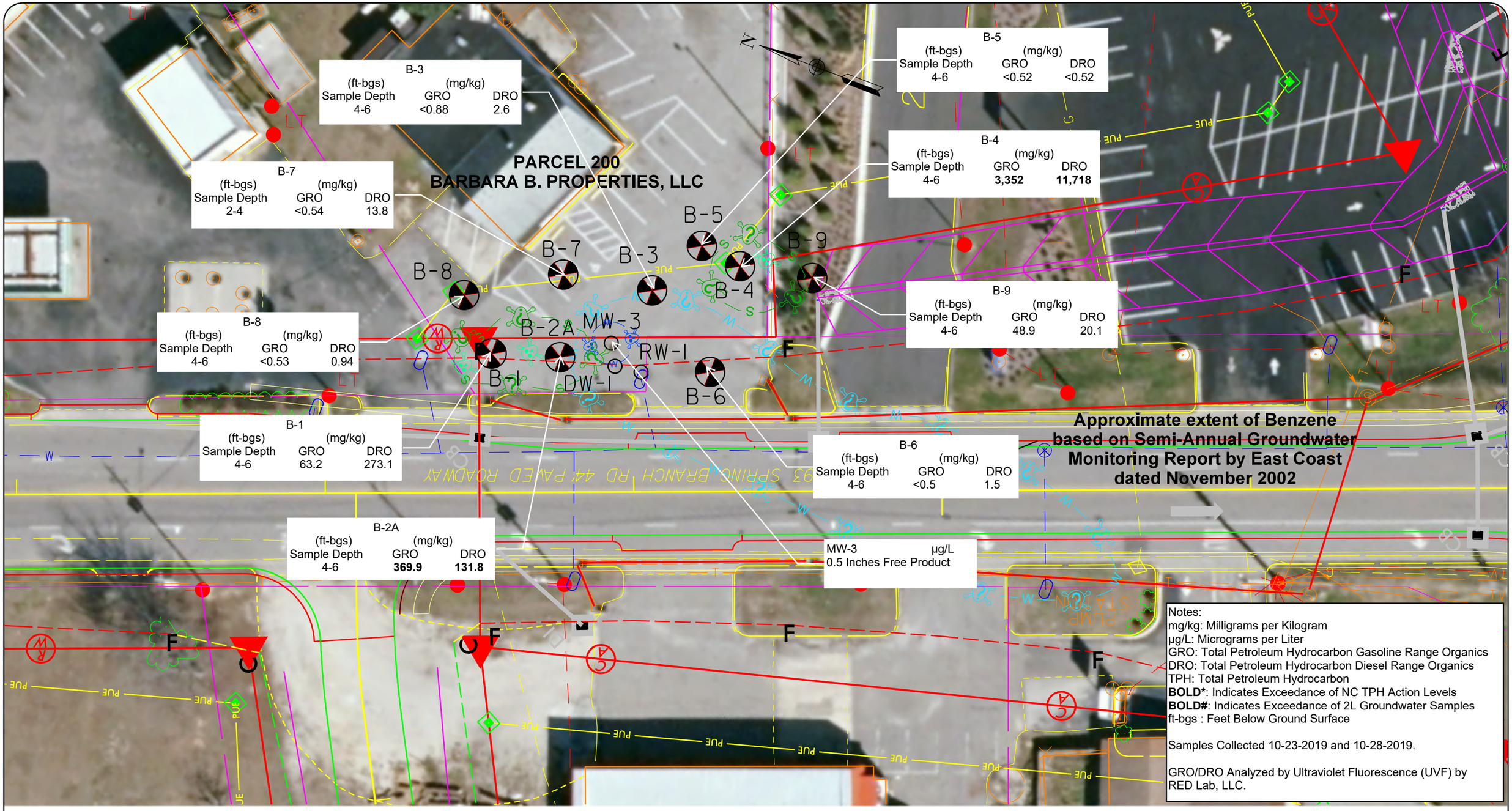
0 30 60

GRAPHIC SCALE (IN FEET)

SITE MAP

NCDOT Project: I-5878
PARCEL 200 - WORD A FIRE MINISTRIES (FORMER T-MART)
511 Spring Branch Road, Dunn, Harnett County, North Carolina

SCALE:	FIGURE NO.
1" = 20'	2
DATE:	
JAN. 2020	
PROJECT NUMBER	
4305-19-161	



Notes:
mg/kg: Milligrams per Kilogram
µg/L: Micrograms per Liter
GRO: Total Petroleum Hydrocarbon Gasoline Range Organics
DRO: Total Petroleum Hydrocarbon Diesel Range Organics
TPH: Total Petroleum Hydrocarbon
BOLD*: Indicates Exceedance of NC TPH Action Levels
BOLD#: Indicates Exceedance of 2L Groundwater Samples
ft-bgs : Feet Below Ground Surface

Samples Collected 10-23-2019 and 10-28-2019.

GRO/DRO Analyzed by Ultraviolet Fluorescence (UVF) by RED Lab, LLC.

LEGEND

Geoenvironmental Boring:
Underground Storage Tank (UST): UST

Map Source: NCDOT Project I-5986B
Image Source: NC ONEMAP, Dated 2016

Existing Monitoring Well:
Known Soil Contamination:
Possible Soil Contamination: — S —
Existing Contamination Known - Water: — W —
Possible Groundwater Contamination: — W —

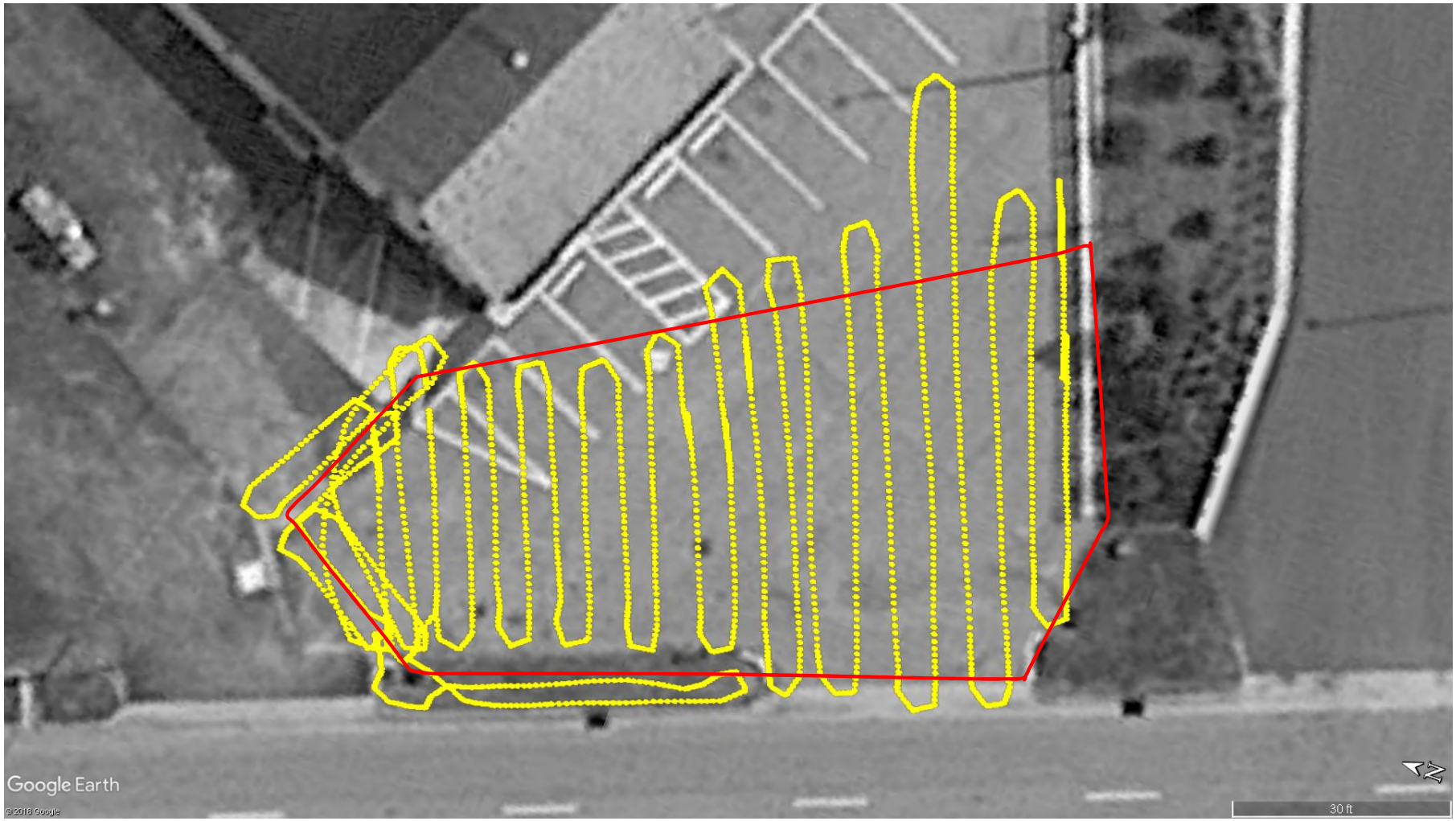
0 30 60
GRAPHIC SCALE (IN FEET)

SOIL AND GROUNDWATER CONSTITUENT MAP

NCDOT Project: I-5878
PARCEL 200 - WORD A FIRE MINISTRIES (FORMER T-MART)
511 Spring Branch Road, Dunn, Harnett County, North Carolina

SCALE:	FIGURE NO.
1" = 20'	3
DATE:	
JAN. 2020	
PROJECT NUMBER	
4305-19-161	

REFERENCE:
GOOGLE EARTH PRO AERIAL PHOTOGRAPH
(DATED MARCH 4, 2018)



LEGEND

Approximate TDEM Path

Approximate Requested Survey Area

TDEM PATH LOCATION PLAN

NCDOT PROJECT: I-5878
PARCEL #200 - (WORD A FIRE MINISTRIES-FORMER T-MART)
511 SPRING BRANCH ROAD, DUNN, HARNETT COUNTY, NORTH CAROLINA

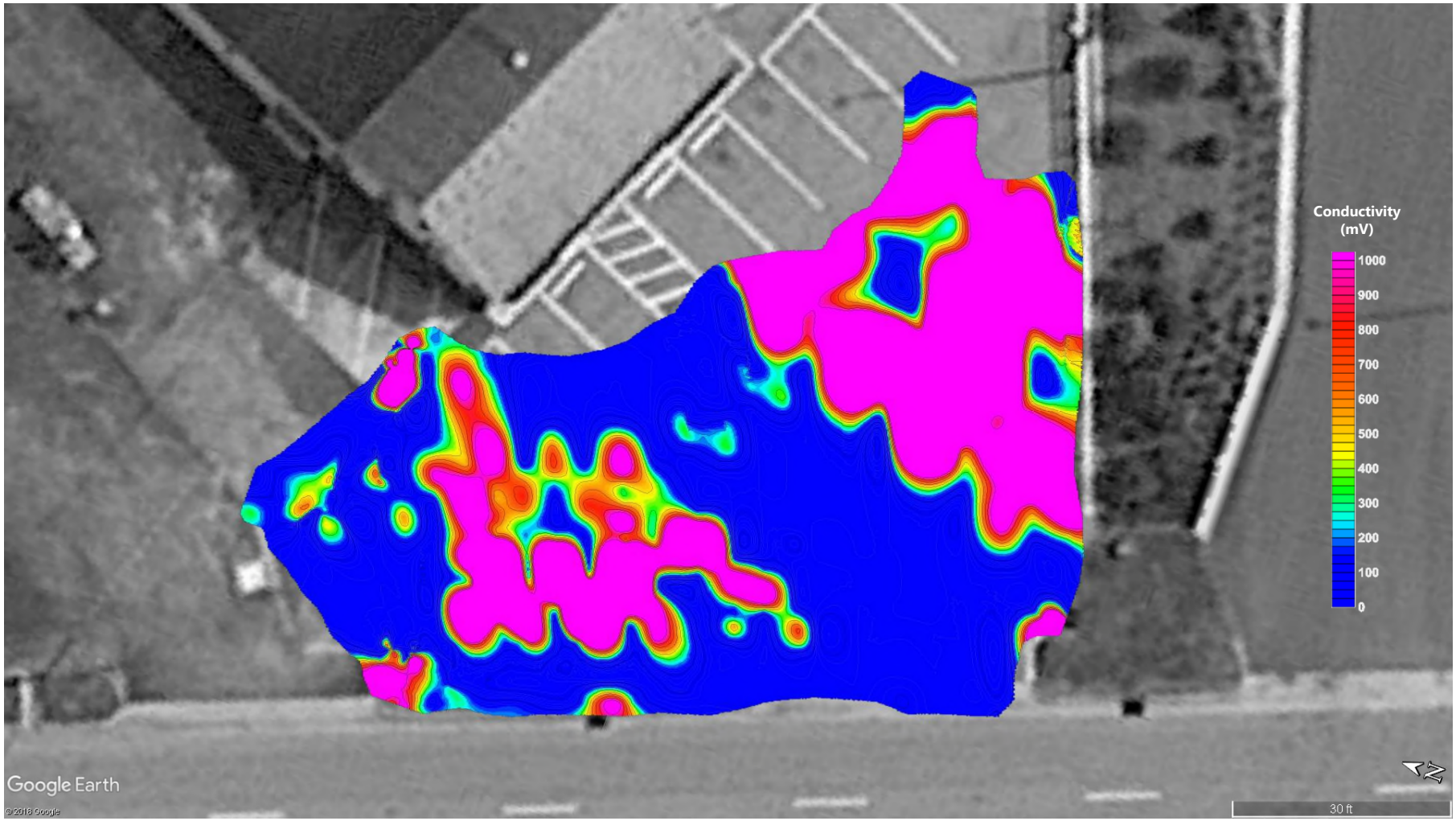
SCALE:
AS SHOWN

DATE:
11/25/2019

PROJECT NUMBER
4305-19-161

FIGURE NO.
4

REFERENCE:
GOOGLE EARTH PRO AERIAL PHOTOGRAPH
(DATED MARCH 4, 2018)



TDEM DATA PLOT A

NCDOT PROJECT: I-5878
PARCEL #200 - (WORD A FIRE MINISTRIES-FORMER T-MART)
511 SPRING BRANCH ROAD, DUNN, HARNETT COUNTY, NORTH CAROLINA

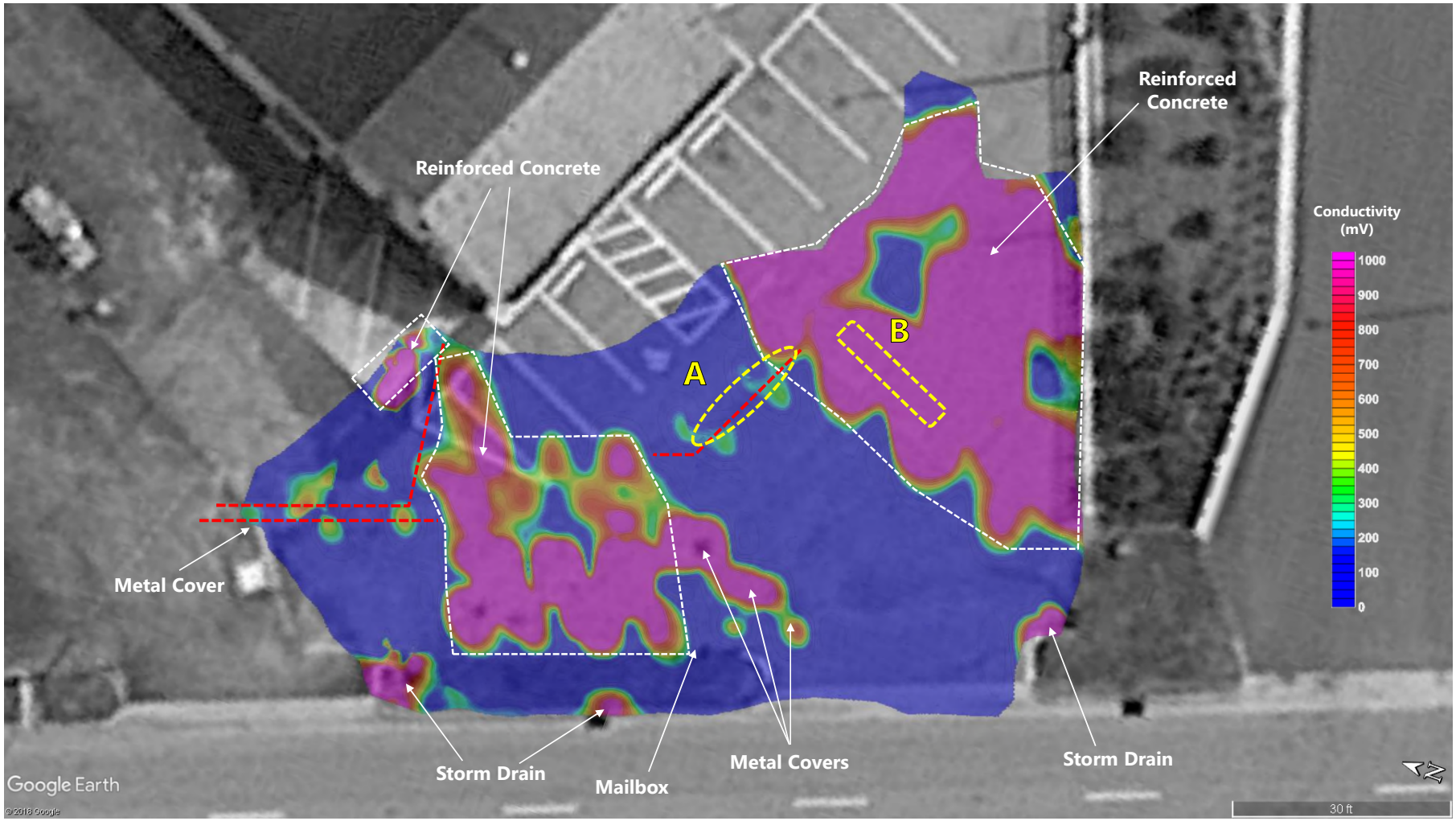
SCALE:
AS SHOWN

DATE:
11/25/2019

PROJECT NUMBER
4305-19-161

FIGURE NO.
5

REFERENCE:
GOOGLE EARTH PRO AERIAL PHOTOGRAPH
(DATED MARCH 4, 2018)



LEGEND

Approximate Location of Geophysical Anomaly

Approximate Location of Possible Utility

TDEM DATA PLOT B

NCDOT PROJECT: I-5878
PARCEL #200 - (WORD A FIRE MINISTRIES-FORMER T-MART)
511 SPRING BRANCH ROAD, DUNN, HARNETT COUNTY, NORTH CAROLINA

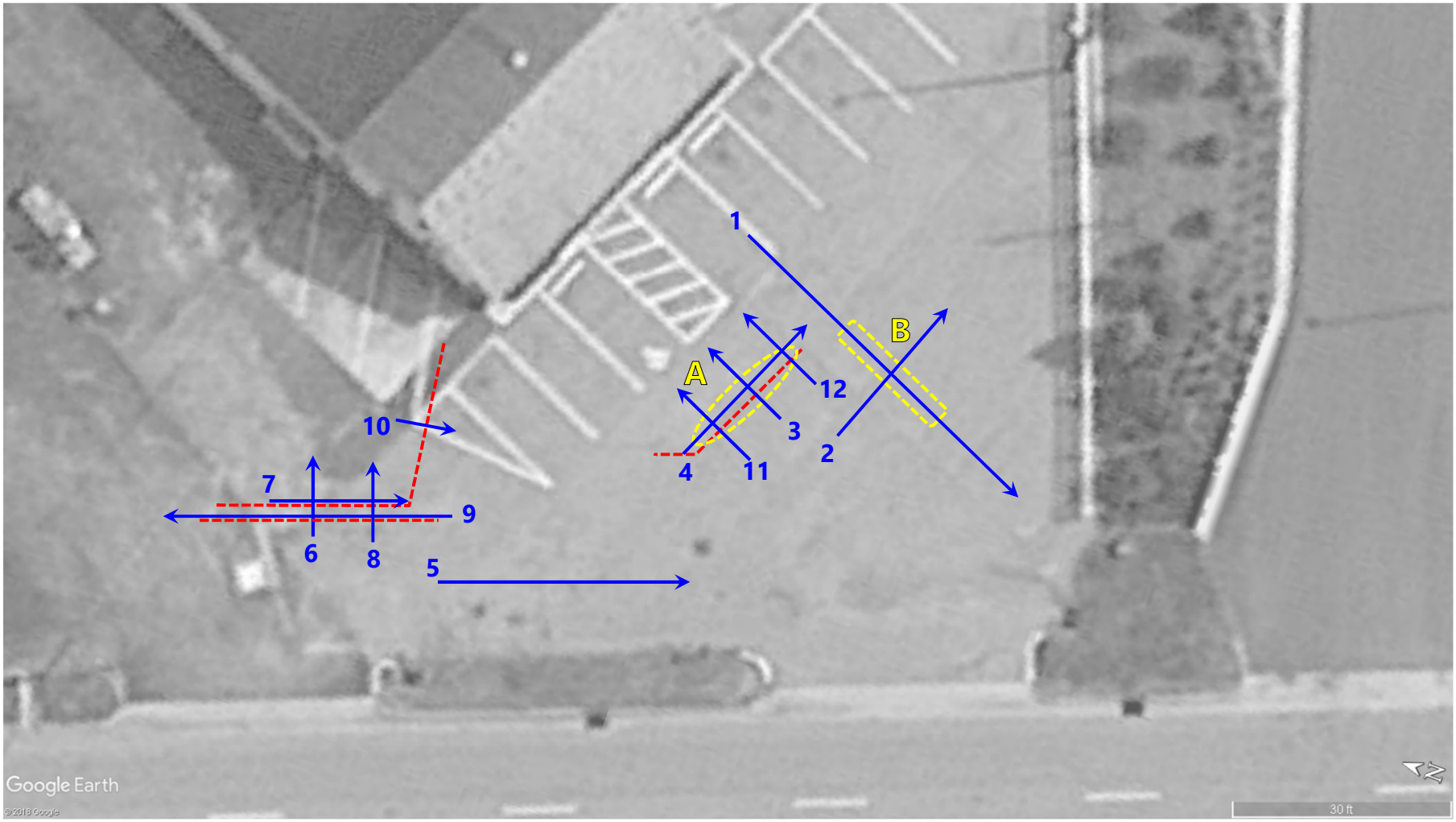
SCALE: AS SHOWN

DATE: 11/25/2019

PROJECT NUMBER 4305-19-161

FIGURE NO. **6**

REFERENCE:
GOOGLE EARTH PRO AERIAL PHOTOGRAPH
(DATED MARCH 4, 2018)



LEGEND

Approximate Location of Geophysical Anomaly

Approximate Location of Possible Utility

Approximate Location of GPR Profile

GEOPHYSICAL ANOMALY LOCATION PLAN

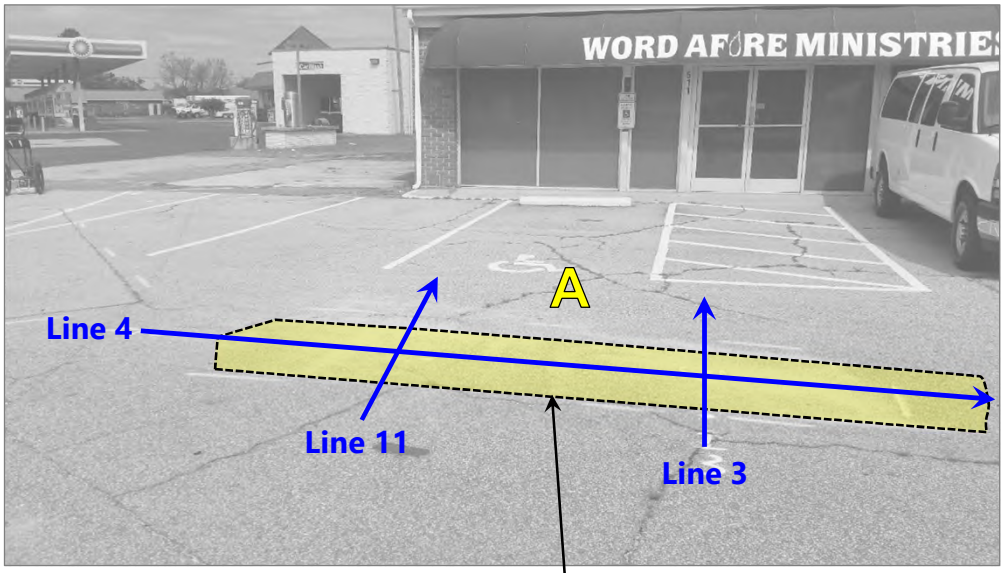
NCDOT PROJECT: I-5878
PARCEL #200 - (WORD A FIRE MINISTRIES-FORMER T-MART)
511 SPRING BRANCH ROAD, DUNN, HARNETT COUNTY, NORTH CAROLINA

SCALE:
AS SHOWN

DATE:
11/25/2019

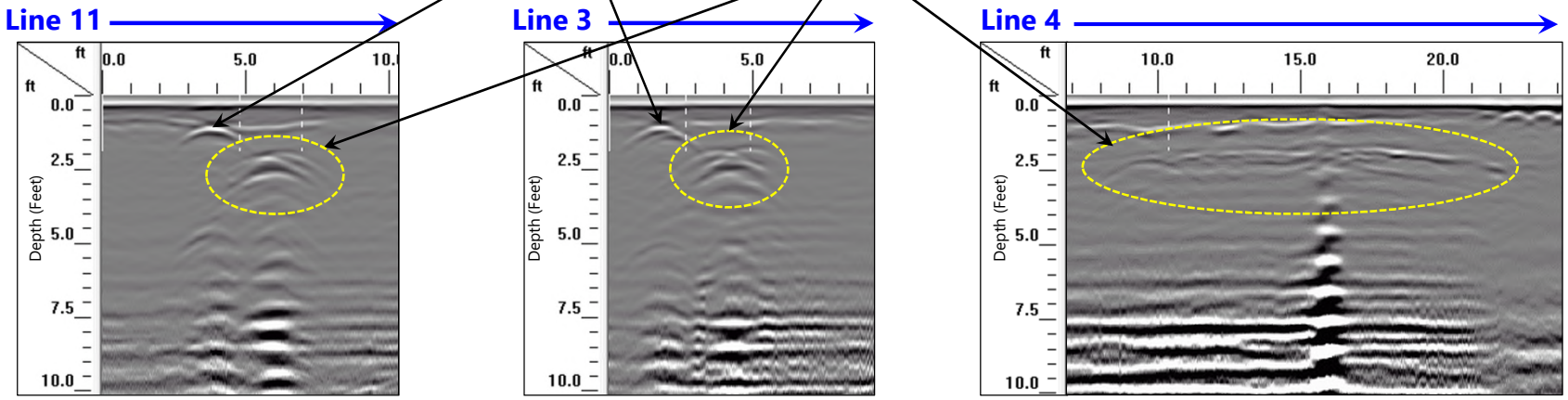
PROJECT NUMBER
4305-19-161

FIGURE NO.
7



Probable Utility

Anomaly A



Approximate Location of Possible Utility

Note: Presented GPR profile depths are based on an assumed average dielectric and should be considered approximate

EXAMPLE GPR DATA – LINES 3, 4, AND 11

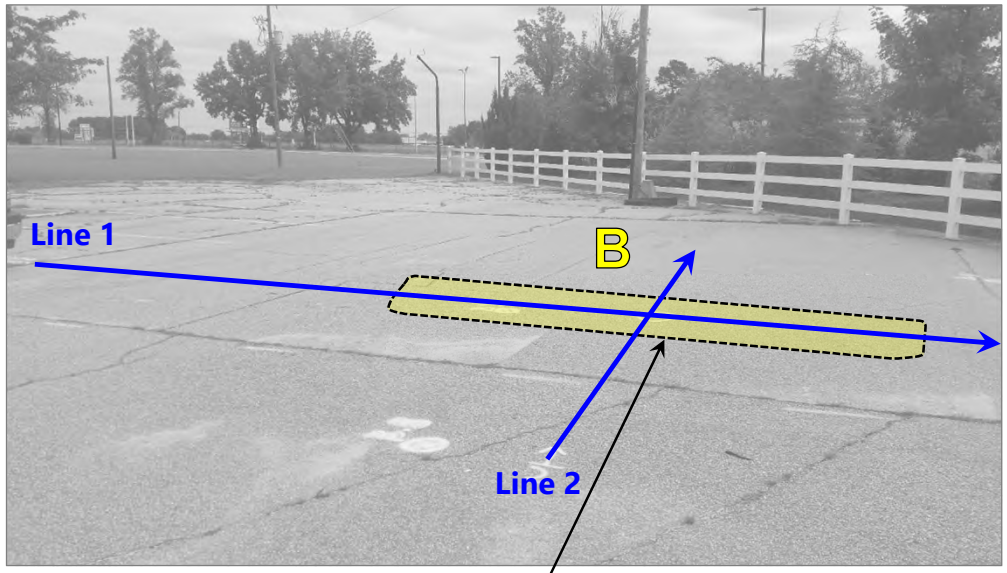
NCDOT PROJECT: I-5878
PARCEL #200 - (WORD A FIRE MINISTRIES-FORMER T-MART)
511 SPRING BRANCH ROAD, DUNN, HARNETT COUNTY, NORTH CAROLINA

SCALE: AS SHOWN

DATE: 11/25/2019

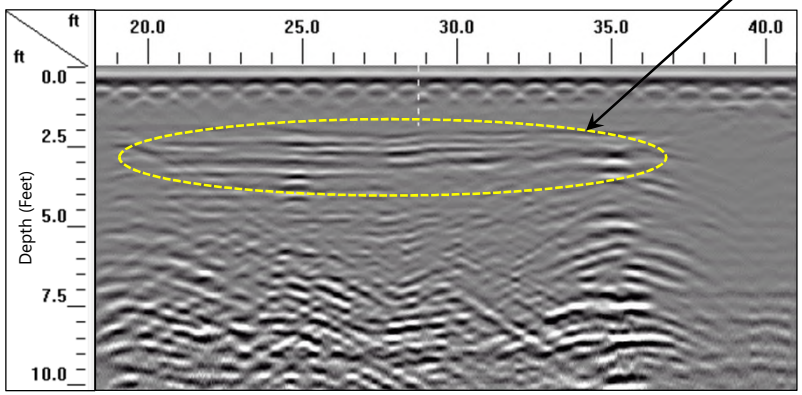
PROJECT NUMBER 4305-19-161

FIGURE NO. **8**

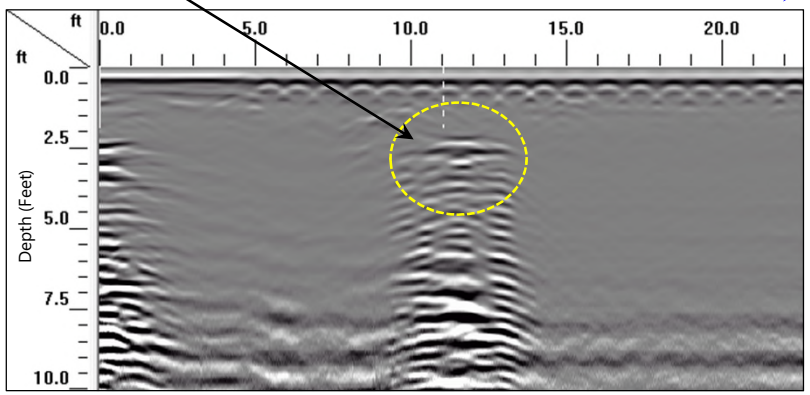


Anomaly B

Line 1



Line 2



Note: Presented GPR profile depths are based on an assumed average dielectric and should be considered approximate

EXAMPLE GPR DATA – LINES 1 AND 2

NCDOT PROJECT: I-5878
PARCEL #200 - (WORD A FIRE MINISTRIES-FORMER T-MART)
511 SPRING BRANCH ROAD, DUNN, HARNETT COUNTY, NORTH CAROLINA

SCALE:
AS SHOWN

DATE:
11/25/2019

PROJECT NUMBER
4305-19-161

FIGURE NO.
9

Appendix I – NCDEQ File Review

EAST COAST
Environmental, P.A.

REPORT FOR
PERMANENT CLOSURE AND CHANGE IN SERVICE OF UST SYSTEMS
(NCAC TITLE 15A, SUBCHAPTER 2N, SECTION .0802)
at
T-Mart AMOCO
511 SPRING BRANCH ROAD
DUNN, HARNETT COUNTY, NORTH CAROLINA

Facility I.D. 0-017633

ECE Project # 9930

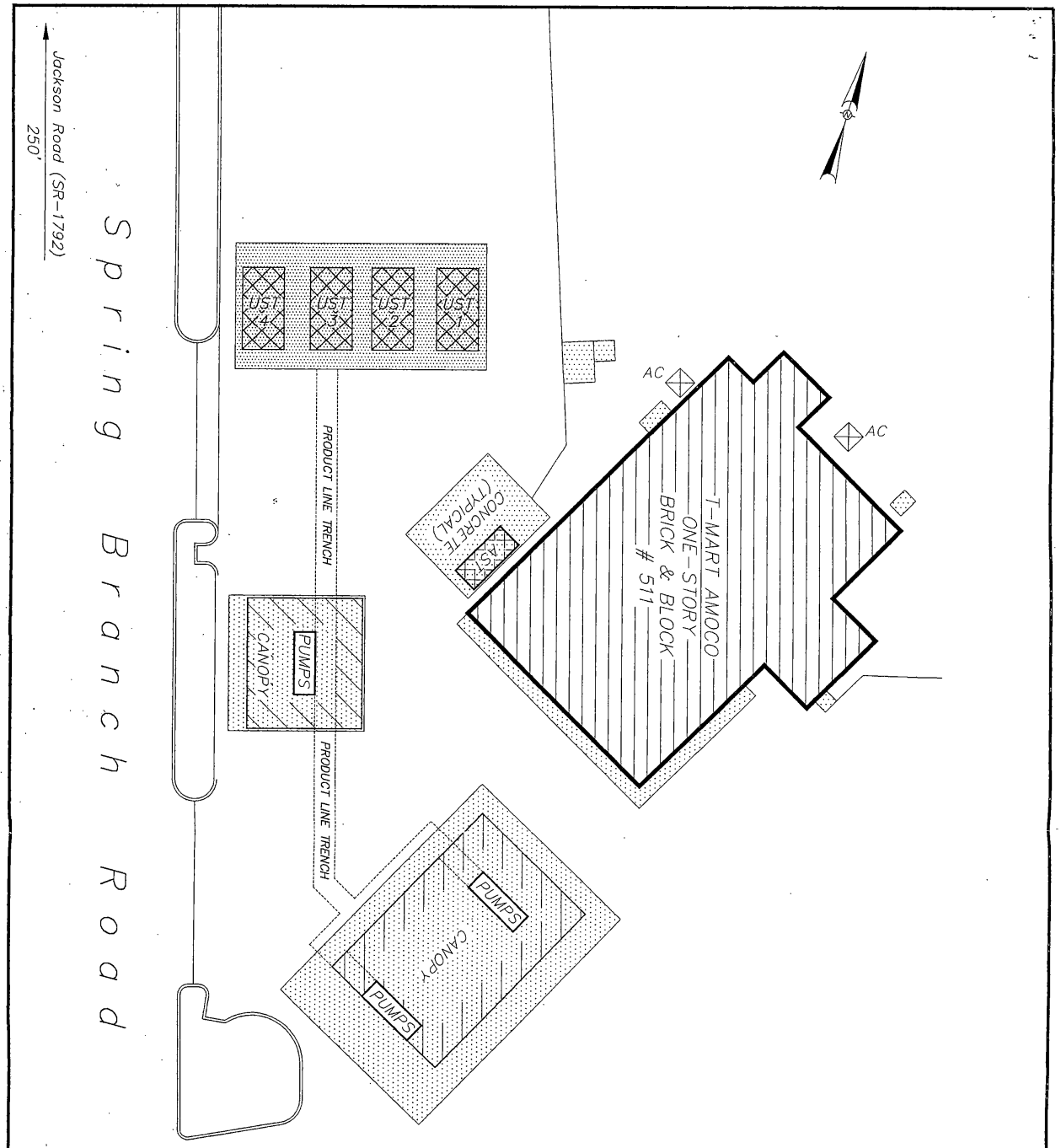
July 28, 1999

Prepared for:

T-Mart Food Stores
510 W. Broad Street
P.O. Box 1369
Dunn, North Carolina 28334
(910) 892-5331

Prepared By:

East Coast Environmental, P.A.
3535 South Wilmington Street
Suite 208
Raleigh, North Carolina 27603
(919) 772-0268



GRAPHIC SCALE
0 10 20 30 40
1"=20'

TITLE: FIGURE 2
SITE MAP WITH UST SYSTEM LOCATIONS SHOWN
T-Mart Amoco
Spring Branch Road
Dunn, Harnett County, North Carolina

East Coast
Environmental, P.A.
3535 South Wilmington Street, Suite 208
Raleigh, North Carolina 27603
(919) 772-0288 FAX:(919) 772-0488

CAD FILE:	PREP. BY:	REV. BY:	DATE:	PROJECT NO.
UST.DWG	KBB	TRW	07/26/99	9833

EAST COAST
Environmental, P.A.

REPORT FOR SEMI-ANNUAL GROUNDWATER MONITORING
T-MART AMOCO (FORMER SUN TOWEL SHOP)
511 SPRING BRANCH ROAD
DUNN, HARNETT COUNTY, NORTH CAROLINA

FACILITY I.D. # 0-017633
NCDENR-DWQ GROUNDWATER INCIDENT # 18955
SITE RISK CLASSIFICATION: HIGH
LAND USE CATEGORY: RESIDENTIAL

November 8, 2002

Responsible Party:
Holt Oil Company
P.O. Box 53157
Fayetteville, North Carolina 28305
(910) 483-5137

Current Property Owner:
T.C. Godwin
P.O. Box 1369
Dunn, North Carolina 28335
(910) 892-9278

Consultant:
East Coast Environmental, P.A.
3709 Junction Blvd.
Raleigh, North Carolina 27603
(919) 772-0268

Release Discovery Date: February 6, 1998
Cause of Release: Leaking Commercial Gasoline UST System
UST Size and Contents: (1) 6,000-gallon gasoline UST System
Latitude: 35° 15' 36", Longitude: 78° 36' 18"

2.0 CONCLUSIONS AND RECOMMENDATIONS

Based on analytical data for the October 23, 2002 groundwater sampling event only benzene and MTBE were present in samples collected from monitoring wells at levels in excess of their *Maximum Allowable Concentration(s)* defined by the *2L Standards*. The area encompassed by the total BTEX plume in the surficial aquifer measured approximately 12,642-square feet, or 0.29-acre. This area of BTEX was centered on wells MW-2, MW-3 and MW-7.

Free product in the form of gasoline has been consistently measured in monitoring wells MW-3 and MW-4 since they were installed during July 1998. The most recent free product measurement for MW-3 made on October 8, 2002 determined the presence of 14-inches of free product as measured with an oil/water interface probe and confirmed with a bailer.

Analytical data for sample obtained from the Wood drinking water well located across Spring Branch Road and analyzed by EPA 524.2 detected MTBE at a level of 1.7 ug/l in the sample collected on October 23, 2002. It should be noted that MTBE was also detected in the Wood supply well during the March 2002 semiannual sampling event at a level of 0.88-ug/l. This data indicates that the Wood supply well may be impacted by petroleum products. However, the source of the MTBE cannot be determined at this time due to the fact that other potential contaminant source(s) are located in close proximity to the Site. Also present in the Wood supply well sample was chloroform, detected at a level of 4.3-ug/l. The level of chloroform in the sample exceeds the *Maximum Allowable Concentration* for this compound of 0.00019 ug/l defined by the *2L Standards,* however, ECE attributes this compound to either laboratory cross-contamination or well chlorination by the owner in an effort to keep it free of bacterial contamination.

Data for samples retained from the remaining monitoring wells imply that the plume has migrated to off-Site locations at low levels. Groundwater hydraulic gradient movement appears to remain consistent with past gauging events at the Site, and continues to flow to the south.

While the dissolved phase contaminant plume appears to be under control or declining throughout most of the off Site monitoring areas, free phase petroleum product continues to collect in on-Site well MW-3 in relatively large amounts (14-inches in the most recent gauging event). Therefore, ECE is recommending that MW-3 be converted to a recovery well for use with the currently operating DPE system as displayed in **Figure 8**. This could be accomplished inexpensively by installing a manhole cover around MW-3, trenching approximately 15-feet to a nearby header pipe that currently serves recovery well RW-2 and installing a short piece of header pipe from MW-3 to the existing header pipe. The total cost including labor and materials would be on the order of $4,000.00. Including MW-3 as part of the DPE recovery system would allow for removal of the stubborn pocket of product in this area that is not being recovered by the DPE system in its current configuration and should result in a more efficient cleanup over time.

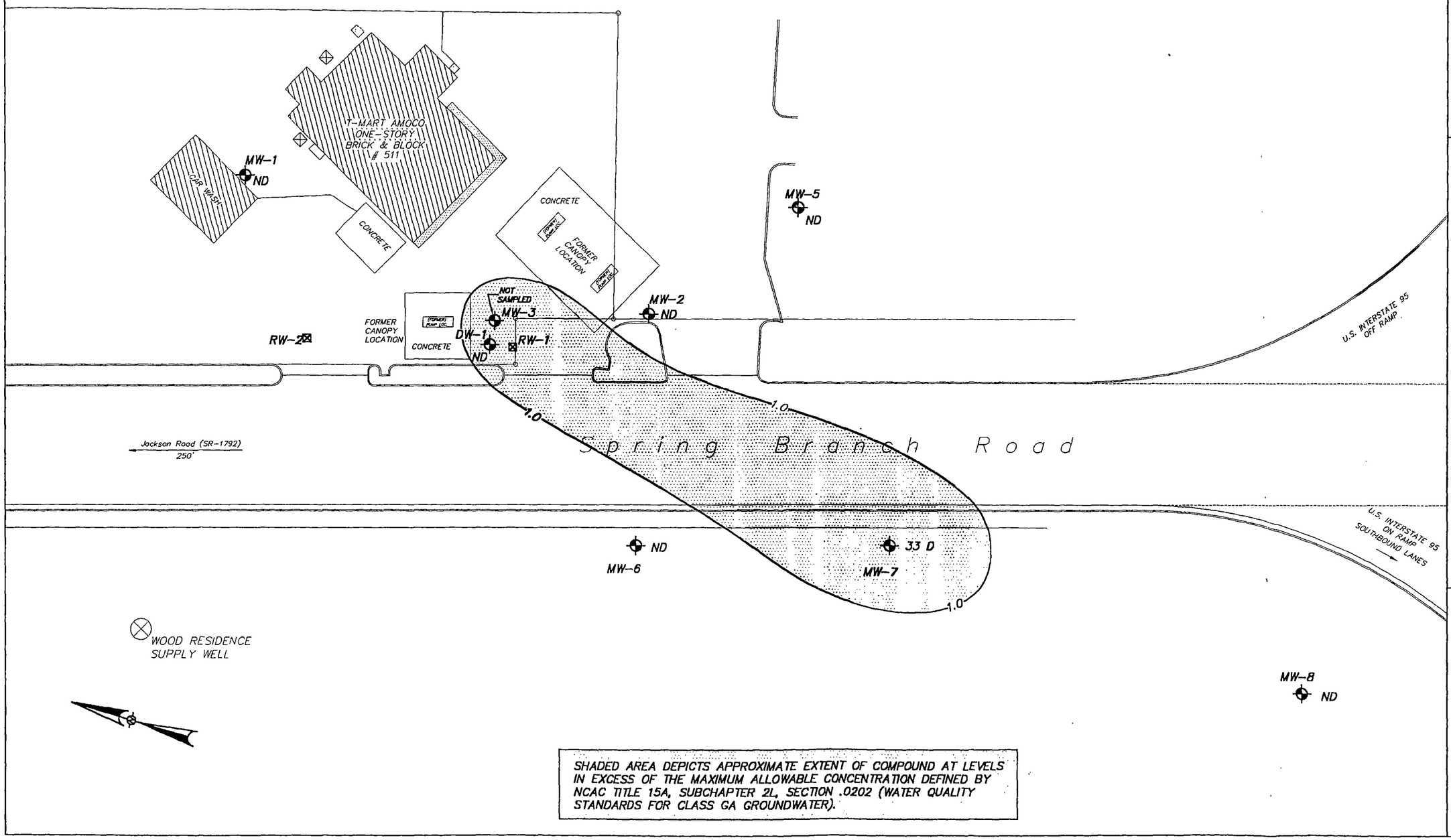
Finally, based on: 1) the analytical results for samples collected from monitoring wells during the October 2002 sampling; 3) there is a nearby water supply well in use; 3) and the continued presence of free product in MW-3, the groundwater cleanup needs to continue into the foreseeable future.

ECE recommends that a copy of this document be submitted to the *North Carolina Department of Environment and Natural Resources, Division of Water Quality, Fayetteville Regional Office* to the attention of Mr. James Brown.

Respectfully Submitted,
East Coast Environmental, P.A.

Thomas R. Will, P.G. #1164
President

E:\ECE\Projects/tmartl\Monitor\gwater\October-2002/Mon10-2002.doc



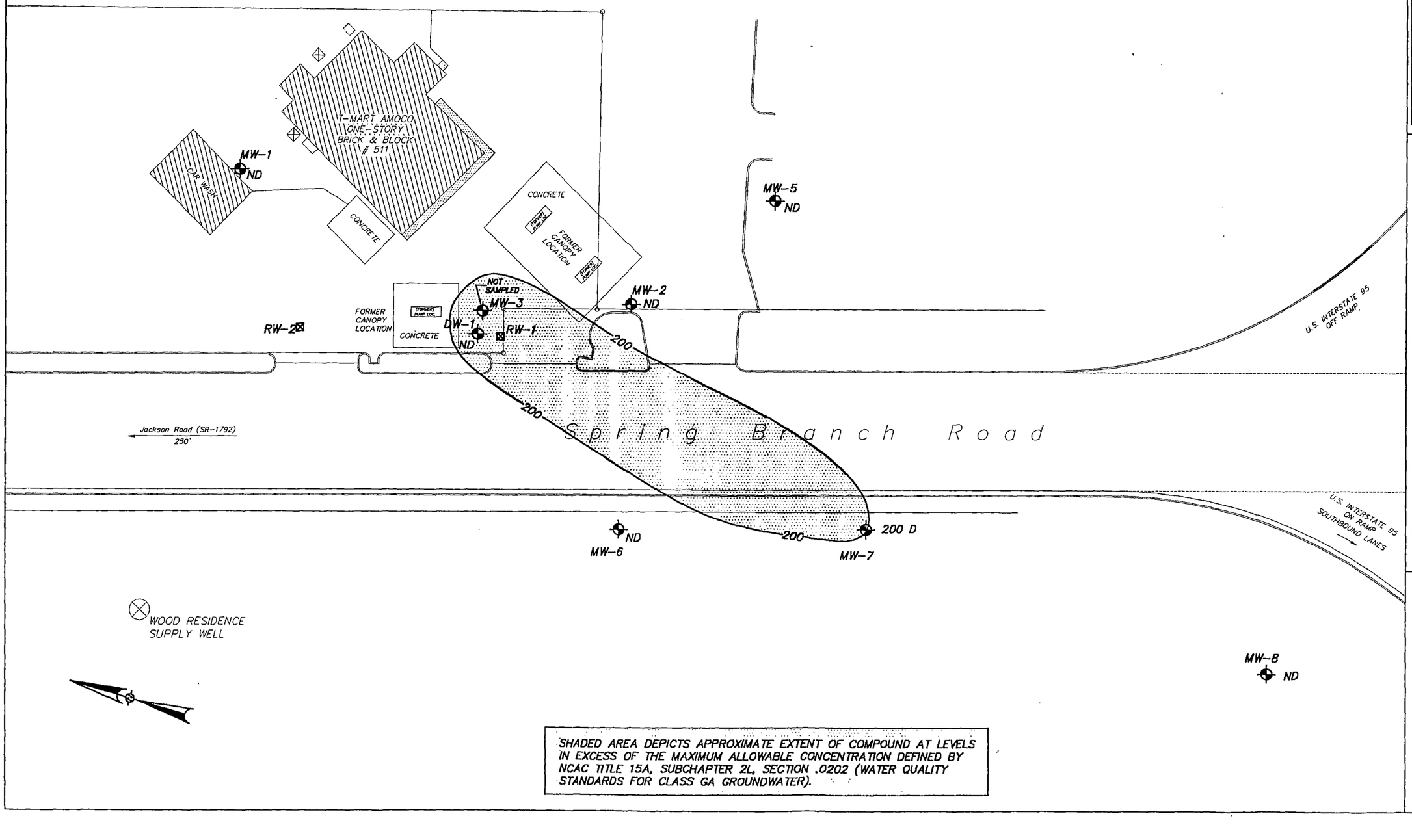
East Coast Environmental, P.A.
3709 Junction Boulevard
Raleigh, North Carolina 27603
(919) 772-0288 Fax (919) 772-0468

TITLE: FIGURE 3
BENZENE ISOCONCENTRATION MAP (ug/l) - October 23, 2002
Former T-Mart Amoco
Spring Branch Road
Dunn, Harnett County, North Carolina

REV. BY:	DATE:	PROJECT NO.
TRW	11/04/02	9833

CAD FILE:	PREP. BY:
GW10-2002	KBB

SCALE: AS SHOWN

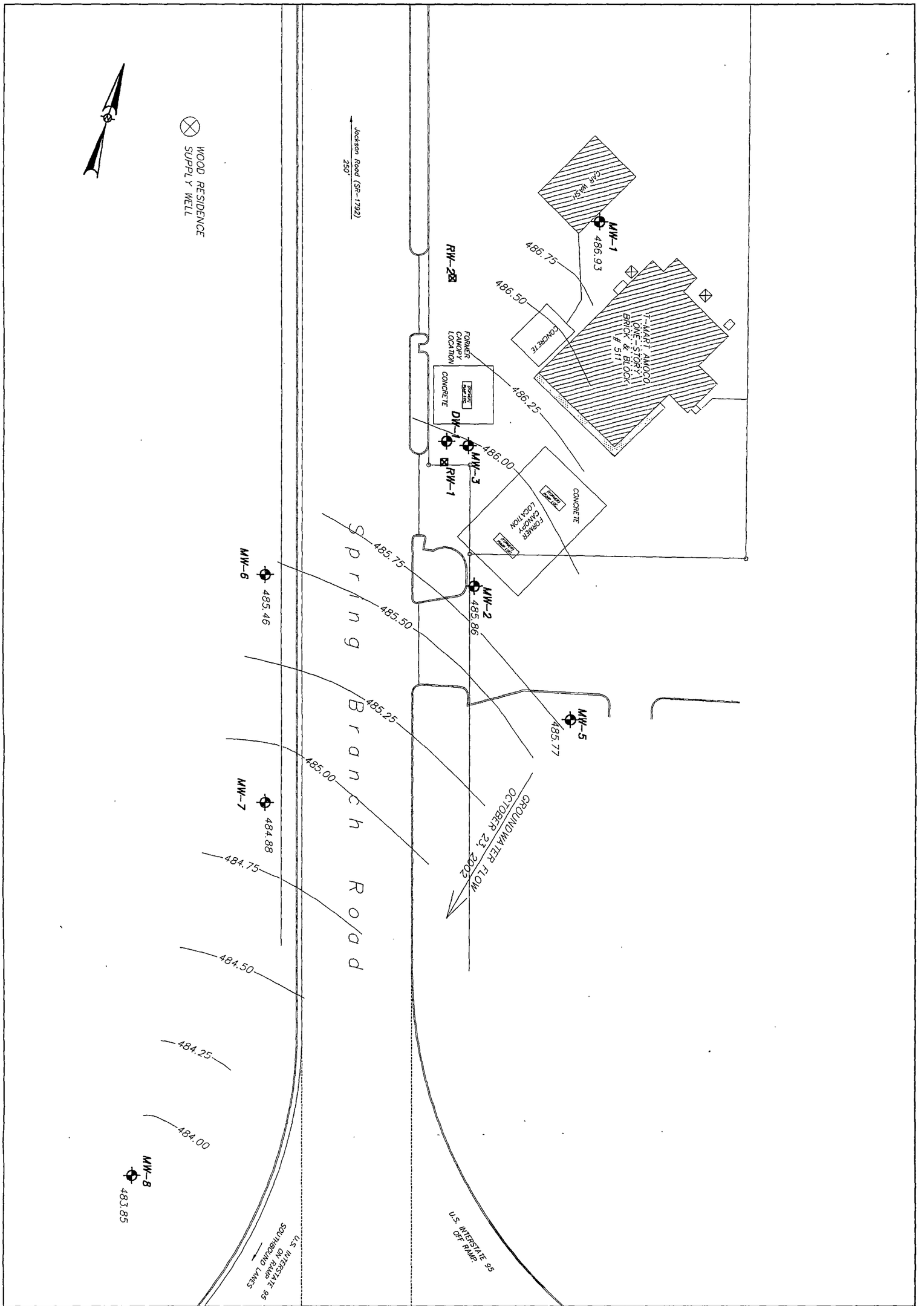


East Coast Environmental, P.A.
3709 Junction Boulevard
Raleigh, North Carolina 27603
(919) 772-0258 Fax (919) 772-0468

TITLE: FIGURE 4
MTBE ISOCONCENTRATION MAP (ug/l) - October 23, 2002
Former T-Mart Amoco
Spring Branch Road
Dunn, Harnett County, North Carolina

DATE:	PROJECT NO.
11/04/02	9833

REV. BY:	PREP. BY:	CAD FILE:	SCALE:
TRW	KBB	GW10-2002	AS SHOWN



GRAPHIC SCALE
0 20 40 60 80
1"=40'

TITLE: FIGURE 6
GROUNDWATER HYDRAULIC GRADIENT MAP (ft) 10/23/02
Former T-Mart Amoco
Spring Branch Road
Dunn, Harnett County, North Carolina

East Coast Environmental, P.A.
3709 Junction Boulevard
Raleigh, North Carolina 27603
(919) 772-0268 Fax: (919) 772-0468

SCALE: AS SHOWN	CAD FILE: GR10-2002	PREP. BY: KBB	REV. BY: TRW	DATE: 10-25-02	PROJECT NO. 9833

Table 1
Summary of Analytical Data – Groundwater
EPA Method 8260
T-Mart AMOCO
511 Spring Branch Road
Dunn, NC

Analytical Method >			8260	8260	8260	8260	8260	8260	8260	8260	8260	8260	8260	8260	8260
Contaminant of Concern >															
Well ID	Sample ID	Date Collected (m/dd/yy)	Benzene	MTBE	Chloroform	1,2-dichloroetnane	Ethylbenzene	Isopropylbenzene	Naphthalene	n-propylbenzene	Toluene	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	Total Xylenes	Sec-Butylbenzene
MW-1	MW-1	10/23/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-2	MW-2	10/23/02	ND	ND	ND	ND	4.0	ND	3.0	ND	8.0	6.0	2.0	23	ND
MW-5	MW-5	10/23/02	ND	ND	**0.8**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-6	MW-6	10/23/02	ND	1.0	**3.0**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-7	MW-7	10/23/02	**33 D**	**200 D**	ND	ND	21	3.0	9.0	4.0	3.0	30 D	5.0	30 D	0.7
MW-8	MW-8	10/23/02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
DW-1	DW-1	10/23/02	ND	130 D	ND	ND	ND	ND	ND	ND	0.7	ND	ND	ND	ND
2L Standard (ug/l)			**1**	**200**	**.00019**	**0.38**	**29**	**70**	**21**	**70**	**1000**	**350**	**350**	**530**	**70**
GCL (ug/l)			**5,000**	**200000**	**190**	**380**	**29000**	**NRS**	**15500**	**30000**	**257500**	**28500**	**28500**	**87500**	**8500**

Results are in ug/l
Bold Results indicate exceedence of 2L Standards
Bold and shaded results indicate exceedence of GCL

Table 1
Summary of Analytical Data – Groundwater
MADEP-VPH
T-Mart AMOCO
511 Spring Branch Road
Dunn, NC

Analytical Method >			MADEP-VPH	MADEP-VPH	MADEP-VPH			
Contaminant of Concern >								
Well ID	Sample ID	Date Collected (m/dd/yy)	C5-C8 Aliphatics	C9-C12 Aliphatics	C9-C10 Aromatics			
MW-1	MW-1	10/23/02	ND	ND	ND			
MW-2	MW-2	10/23/02	ND	ND	ND			
MW-5	MW-5	10/23/02	ND	ND	ND			
MW-6	MW-6	10/23/02	ND	ND	ND			
MW-7	MW-7	10/23/02	ND	ND	**180**			
MW-8	MW-8	10/23/02	ND	ND	ND			
DW-1	DW-1	10/23/02	ND	ND	ND			
2L Standard (ug/l)			**420**	**4,200**	**210**			
GCL (ug/l)			**NRS**	**NRS**	**NRS**			

Results are in ug/l
Bold Results indicate exceedence of 2L Standards
Bold and shaded results indicate exceedence of GCL

Table 2
T-Mart Amoco
Historical Summary of Analytical Data

Analyte	Well #	7/27/98 (ug/l)	11/12/98 (ug/l)	7/12/99 (ug/l)	1/17/01 (ug/l)	8/23/01 (ug/l)	3/2/02 (ug/l)	10/23/02 (ug/l)	2L Stand. (ug/l)
EPA-8260									
Benzene	MW-1	nd	ns	nd	nd	nd	nd	nd	1
Toluene	MW-1	nd	ns	nd	nd	nd	nd	nd	1000
Naphthalene	MW-1	nd	ns	nd	0.9	nd	nd	nd	21
Ethylbenzene	MW-1	nd	ns	nd	nd	nd	nd	nd	29
Xylene (Total)	MW-1	nd	ns	nd	nd	nd	nd	nd	530
1,2,4-Trimethylbenzene	MW-1	nd	ns	nd	nd	nd	nd	nd	350
1,3,5-Trimethylbenzene	MW-1	nd	ns	nd	nd	nd	nd	nd	350
n-Propylbenzene	MW-1	nd	ns	nd	nd	nd	nd	nd	70
MTBE	MW-1	nd	ns	0.7	1	nd	nd	nd	200
IPE	MW-1	nd	ns	nd	nd	nd	nd	nd	70
EDB	MW-1	nd	ns	na	na	na	nd	nd	0.0004
Lead	MW-1	nd	ns	na	na	na	na	na	15
Total BTEX	MW-1	nd	ns	nd	nd	nd	nd	nd	
Total BTEX + MTBE (ppb)	MW-1	nd	ns	0.7	1	nd	nd	nd	
Mass. VPH Method									
C5-C8 Aliphatics	MW-1	bql	ns	nd	nd	nd	nd	nd	420
C9-C12 Aliphatics	MW-1	bql	ns	nd	nd	nd	nd	nd	4200
C9-C10 Aromatics	MW-1	bql	ns	nd	nd	nd	nd	nd	210

bdl = below method detection limit.
bql = below quantitation limit.
na = not analyzed.
nrs = no reported standard.
nd=not detected

D = "Result Based on Sample Dilution"
E = "Estimated Concentration"

Table 2
T-Mart Amoco
Historical Summary of Analytical Data

Analyte	Well #	7/27/98 (ug/l)	11/12/98 (ug/l)	7/12/99 (ug/l)	1/17/01 (ug/l)	8/23/01 (ug/l)	3/2/02 (ug/l)	10/23/02 (ug/l)	2L Stand. (ug/l)
EPA-8260									
Benzene	MW-2	740	ns	1200	4	53	nd	nd	1
Toluene	MW-2	1800	ns	2000	15	310	39	8	1000
Naphthalene	MW-2	270	ns	460	nd	96	20	3	21
Ethylbenzene	MW-2	590	ns	840	22	210	40	4	29
Xylene (Total)	MW-2	2600	ns	3900	75	1100	210	23	530
1,2,4-Trimethylbenzene	MW-2	830	ns	960	nd	290	84	6	350
1,3,5-Trimethylbenzene	MW-2	220	ns	840	nd	91	28	2	350
n-Propylbenzene	MW-2	110	ns	nd	7	40	10	nd	70
MTBE	MW-2	1600	ns	2200	nd	13	13	nd	200
IPE	MW-2	nd	ns	nd	nd	nd	nd	nd	70
EDB	MW-2	0.84	ns	na	na	na	nd	nd	0.0004
Lead	MW-2	11.7	ns	na	na	na	nd	nd	15
Total BTEX	MW-2	5730	ns	7940	116	1673	289	35	
Total BTEX + MTBE (ppb)	MW-2	7330	ns	10140	116	1686	302	35	
Mass. VPH Method									
C5-C8 Aliphatics	MW-2	3000	ns	1300	360	660	410	nd	420
C9-C12 Aliphatics	MW-2	6000	ns	6900	89	1400	nd	nd	4200
C9-C10 Aromatics	MW-2	2100	ns	3900	170	1200	320	nd	210

bdl = below method detection limit.
bql = below quantitation limit.
na = not analyzed.
nrs = no reported standard.
nd=not detected

D = "Result Based on Sample Dilution"
E = "Estimated Concentration"

Table 2
T-Mart Amoco
Historical Summary of Analytical Data

Analyte	Well #	7/27/98 (ug/l)	11/12/98 (ug/l)	7/12/99 (ug/l)	1/17/01 (ug/l)	8/23/01 (ug/l)	3/2/02 (ug/l)	10/23/02 (ug/l)	2L Stand. (ug/l)
EPA-8260									
Benzene	MW-3	ns	ns	ns	ns	ns	ns	ns	1
Toluene	MW-3	ns	ns	ns	ns	ns	ns	ns	1000
Naphthalene	MW-3	ns	ns	ns	ns	ns	ns	ns	21
Ethylbenzene	MW-3	ns	ns	ns	ns	ns	ns	ns	29
Xylene (Total)	MW-3	ns	ns	ns	ns	ns	ns	ns	530
1,2,4-Trimethylbenzene	MW-3	ns	ns	ns	ns	ns	ns	ns	350
1,3,5-Trimethylbenzene	MW-3	ns	ns	ns	ns	ns	ns	ns	350
n-Propylbenzene	MW-3	ns	ns	ns	ns	ns	ns	ns	70
MTBE	MW-3	ns	ns	ns	ns	ns	ns	ns	200
IPE	MW-3	ns	ns	ns	ns	ns	ns	ns	70
EDB	MW-3	ns	ns	ns	na	na	ns	ns	0.0004
Lead	MW-3	ns	ns	ns	na	na	na	na	15
Total BTEX	MW-3	ns	ns	ns	ns	ns	ns	ns	
Total BTEX + MTBE (ppb)	MW-3	ns	ns	ns	ns	ns	ns	ns	
Mass. VPH Method									
C5-C8 Aliphatics	MW-3	ns	ns	ns	ns	ns	ns	ns	420
C9-C12 Aliphatics	MW-3	ns	ns	ns	ns	ns	ns	ns	4200
C9-C10 Aromatics	MW-3	ns	ns	ns	ns	ns	ns	ns	210

bdl = below method detection limit.
bql = below quantitation limit.
na = not analyzed.
nrs = no reported standard.
nd=not detected

D = "Result Based on Sample Dilution"
E = "Estimated Concentration"

Table 2
T-Mart Amoco
Historical Summary of Analytical Data

Analyte	Well #	7/27/98 (ug/l)	11/12/98 (ug/l)	7/12/99 (ug/l)	1/17/01 (ug/l)	8/23/01 (ug/l)	3/2/02 (ug/l)	10/23/02 (ug/l)	2L Stand. (ug/l)
EPA-8260									
Benzene	MW-5	ns	nd	nd	nd	nd	nd	nd	1
Toluene	MW-5	ns	nd	nd	nd	nd	nd	nd	1000
Naphthalene	MW-5	ns	nd	nd	nd	nd	nd	nd	21
Ethylbenzene	MW-5	ns	nd	nd	nd	nd	nd	nd	29
Xylene (Total)	MW-5	ns	nd	nd	nd	nd	nd	nd	530
1,2,4-Trimethylbenzene	MW-5	ns	nd	nd	nd	nd	nd	nd	350
1,3,5-Trimethylbenzene	MW-5	ns	nd	nd	nd	nd	nd	nd	350
n-Propylbenzene	MW-5	ns	nd	nd	nd	nd	nd	nd	70
MTBE	MW-5	ns	nd	nd	nd	nd	nd	nd	200
IPE	MW-5	ns	nd	nd	nd	nd	nd	nd	70
EDB	MW-5	ns	nd	na	na	na	nd	nd	0.0004
Lead	MW-5	ns	nd	na	na	na	na	na	15
Total BTEX	MW-5	ns	nd	nd	nd	nd	nd	nd	
Total BTEX + MTBE (ppb)	MW-5	ns	nd	nd	nd	nd	nd	nd	
Mass. VPH Method									
C5-C8 Aliphatics	MW-5	ns	nd	nd	nd	nd	nd	nd	420
C9-C12 Aliphatics	MW-5	ns	nd	nd	nd	nd	nd	nd	4200
C9-C10 Aromatics	MW-5	ns	nd	nd	nd	nd	nd	nd	210

bdl = below method detection limit.
bql = below quantitation limit.
na = not analyzed.
nrs = no reported standard.
nd=not detected

D = "Result Based on Sample Dilution"
E = "Estimated Concentration"

Table 2
T-Mart Amoco
Historical Summary of Analytical Data

Analyte	Well #	7/27/98 (ug/l)	11/12/98 (ug/l)	7/12/99 (ug/l)	1/17/01 (ug/l)	8/23/01 (ug/l)	3/2/02 (ug/l)	10/23/02 (ug/l)	2L Stand. (ug/l)
EPA-8260									
Benzene	MW-6	ns	nd	nd	nd	nd	nd	nd	1
Toluene	MW-6	ns	nd	nd	nd	nd	nd	nd	1000
Naphthalene	MW-6	ns	nd	nd	nd	nd	nd	nd	21
Ethylbenzene	MW-6	ns	nd	nd	nd	nd	nd	nd	29
Xylene (Total)	MW-6	ns	nd	nd	nd	nd	nd	nd	530
1,2,4-Trimethylbenzene	MW-6	ns	nd	nd	nd	nd	nd	nd	350
1,3,5-Trimethylbenzene	MW-6	ns	nd	nd	nd	nd	nd	nd	350
n-Propylbenzene	MW-6	ns	nd	nd	nd	nd	nd	nd	70
MTBE	MW-6	ns	nd	400	8	210	4	1	200
IPE	MW-6	ns	nd	nd	nd	nd	nd	nd	70
EDB	MW-6	ns	nd	na	na	na	nd	nd	0.0004
Lead	MW-6	ns	nd	na	na	na	na	na	15
Total BTEX	MW-6	ns	nd	nd	nd	nd	nd	nd	
Total BTEX + MTBE (ppb)	MW-6	ns	nd	400	8	210	4	1	
Mass. VPH Method									
C5-C8 Aliphatics	MW-6	ns	nd	nd	nd	nd	nd	nd	420
C9-C12 Aliphatics	MW-6	ns	nd	nd	nd	nd	nd	nd	4200
C9-C10 Aromatics	MW-6	ns	nd	nd	nd	nd	nd	nd	210

bdl = below method detection limit.
bql = below quantitation limit.
na = not analyzed.
nrs = no reported standard.
nd=not detected

D = "Result Based on Sample Dilution"
E = "Estimated Concentration"

Table 2
T-Mart Amoco
Historical Summary of Analytical Data

Analyte	Well #	7/27/98 (ug/l)	11/12/98 (ug/l)	7/12/99 (ug/l)	1/17/01 (ug/l)	8/23/01 (ug/l)	3/2/02 (ug/l)	10/23/02 (ug/l)	2L Stand. (ug/l)
EPA-8260									
Benzene	MW-7	ns	420	690	520 D	72	13	33 D	1
Toluene	MW-7	ns	nd	nd	28 E	nd	2	3	1000
Naphthalene	MW-7	ns	100	190	120 D	nd	4	9	21
Ethylbenzene	MW-7	ns	340	250	280 D	45	10	21	29
Xylene (Total)	MW-7	ns	820	830	700 D	46	18	30 D	530
1,2,4-Trimethylbenzene	MW-7	ns	400	280	350 D	29	12	30 D	350
1,3,5-Trimethylbenzene	MW-7	ns	nd	nd	350 D	nd	7	5	350
n-Propylbenzene	MW-7	ns	nd	nd	68 D	nd	3	4	70
MTBE	MW-7	ns	1300	2400	2500 D	380	75	200 D	200
IPE	MW-7	ns	nd	nd	5	nd	nd	nd	70
EDB	MW-7	ns	nd	na	na	na	nd	nd	0.0004
Lead	MW-7	ns	60	na	na	na	na	na	15
Total BTEX	MW-7	ns	1160	1770	1528	163	43	87	
Total BTEX + MTBE (ppb)	MW-7	ns	2460	4170	4028	543	118	287	
Mass. VPH Method									
C5-C8 Aliphatics	MW-7	ns	4180	nd	850	120	160	nd	420
C9-C12 Aliphatics	MW-7	ns	5410	2400	190	54	nd	nd	4200
C9-C10 Aromatics	MW-7	ns	2080	1300	640	170	130	180	210

bdl = below method detection limit.
bql = below quantitation limit.
na = not analyzed.
nrs = no reported standard.
nd=not detected

D = "Result Based on Sample Dilution"
E = "Estimated Concentration"

Table 2
T-Mart Amoco
Historical Summary of Analytical Data

Analyte	Well #	7/27/98 (ug/l)	11/12/98 (ug/l)	7/12/99 (ug/l)	1/17/01 (ug/l)	8/23/01 (ug/l)	3/2/02 (ug/l)	10/23/02 (ug/l)	2L Stand. (ug/l)
EPA-8260									
Benzene	MW-8	ns	nd	nd	nd	nd	nd	nd	1
Toluene	MW-8	ns	nd	nd	nd	nd	nd	nd	1000
Naphthalene	MW-8	ns	nd	nd	nd	nd	nd	nd	21
Ethylbenzene	MW-8	ns	nd	nd	nd	nd	nd	nd	29
Xylene (Total)	MW-8	ns	nd	nd	nd	nd	nd	nd	530
1,2,4-Trimethylbenzene	MW-8	ns	nd	nd	nd	nd	nd	nd	350
1,3,5-Trimethylbenzene	MW-8	ns	nd	nd	nd	nd	nd	nd	350
n-Propylbenzene	MW-8	ns	nd	nd	nd	nd	nd	nd	70
MTBE	MW-8	ns	nd	nd	nd	nd	nd	nd	200
IPE	MW-8	ns	nd	nd	nd	nd	nd	nd	70
EDB	MW-8	ns	nd	na	na	na	nd	nd	0.0004
Lead	MW-8	ns	nd	na	na	na	na	na	15
Total BTEX	MW-8	ns	nd	nd	nd	nd	nd	nd	
Total BTEX + MTBE (ppb)	MW-8	ns	nd	nd	nd	nd	nd	nd	
Mass. VPH Method									
C5-C8 Aliphatics	MW-8	ns	nd	nd	nd	nd	nd	nd	420
C9-C12 Aliphatics	MW-8	ns	nd	nd	nd	nd	nd	nd	4200
C9-C10 Aromatics	MW-8	ns	nd	nd	nd	nd	nd	nd	210

bdl = below method detection limit.
bql = below quantitation limit.
na = not analyzed.
nrs = no reported standard.
nd=not detected

D = "Result Based on Sample Dilution"
E = "Estimated Concentration"

Table 2
T-Mart Amoco
Historical Summary of Analytical Data

Analyte	Well #	7/27/98 (ug/l)	11/12/98 (ug/l)	7/12/99 (ug/l)	1/17/01 (ug/l)	8/23/01 (ug/l)	3/2/02 (ug/l)	10/23/02 (ug/l)	2L Stand. (ug/l)
EPA-8260									
Benzene	DW-1	400	nd	160	2	27	nd	nd	1
Toluene	DW-1	2600	nd	nd	5 D	86	nd	0.7	1000
Naphthalene	DW-1	210	nd	nd	nd	10	nd	nd	21
Ethylbenzene	DW-1	770	nd	nd	0.9	13	nd	nd	29
Xylene (Total)	DW-1	4400	62	nd	5	92	nd	nd	530
1,2,4-Trimethylbenzene	DW-1	1500	nd	nd	0.7	41	nd	nd	350
1,3,5-Trimethylbenzene	DW-1	430	nd	nd	0.9	12	nd	nd	350
n-Propylbenzene	DW-1	210	nd	nd	nd	nd	nd	nd	70
MTBE	DW-1	1400	800	2200	76 D	130	18	130 D	200
IPE	DW-1	nd	nd	nd	nd	nd	nd	nd	70
EDB	DW-1	nd	nd	na	na	na	nd	nd	0.0004
Lead	DW-1	nd	nd	na	na	na	na	na	15
Total BTEX	DW-1	8170	62	160	12.9	218	nd	0.7	
Total BTEX + MTBE (ppb)	DW-1	9570	862	2360	88.9	348	18	130.7	
Mass. VPH Method									
C5-C8 Aliphatics	DW-1	13000	887	nd	nd	86	nd	nd	420
C9-C12 Aliphatics	DW-1	11100	579	1300	nd	110	nd	nd	4200
C9-C10 Aromatics	DW-1	4600	174	660	nd	170	nd	nd	210

bdl = below method detection limit.
bql = below quantitation limit.
na = not analyzed.
nrs = no reported standard.
nd=not detected

D = "Result Based on Sample Dilution"
E = "Estimated Concentration"

AGGRESSIVE FLUID-VAPOR RECOVERY AND GROUND WATER MONITORING REPORT
T-MART AMOCO
MARCH-APRIL 2017
511 SPRING BRANCH ROAD
DUNN, HARNETT COUNTY
NORTH CAROLINA
INCIDENT NO. 18955
RISK CLASSIFICATION/RANKING: I172D
GRI PROJECT NO. 4176

Prepared for:

Holt Oil Company
Post Office Box 53157
Fayetteville, North Carolina 28305

Prepared by:

Geological Resources, Inc.
3502 Hayes Road
Monroe, North Carolina 28110
(704) 845-4010

May 25, 2017

Holden McClenney
Project Manager

EXECUTIVE SUMMARY

T-Mart Amoco is located at 511 Spring Branch Road, Dunn, Harnett County, North Carolina. The adjoining properties are residential and commercial. Public water is available to the site and surrounding properties. The site is currently has a risk classification of intermediate due to the presence of free product.

On March 27, 2017 an Aggressive fluid/Vapor Recovery (AFVR) event was conducted on MW-3. A total of 2,785 gallons of petroleum impacted groundwater was removed during the event. Approximately 0.76 gallons of vapor phase free product were removed by the March 2017 AFVR event.

On April 26, 2017, three Type II monitoring wells and one recovery well were gauged, purged and sampled. No free product was present in any of the monitoring wells gauged. Concentrations of requested method constituents that exceeded the Maximum Allowable Concentrations specified in T15A NCAC 2L.0202 were reported in the ground water sample collected from MW-3 and RW-2. None of the reported concentrations exceeded the Gross Contamination Levels (GCLs).

Based on this information, GRI recommends that ground water monitoring should continue on a semi-annual basis to determine if free product recharges into MW-3. If free product is not observed and contaminant concentrations remain below the GCLs for two consecutive sampling events, then the site risk classification should be re-evaluated. The next sampling event is tentatively scheduled for October 2017.

1.0 SITE HISTORY AND CHARACTERIZATION

The T-Mart Amoco site is located at 511 Spring Branch Road in Dunn, Harnett County, North Carolina (**Figure 1**). According to the available information, a release was discovered at the site in 1998. According to the NCDEQ registered tank database, four underground storage tanks (USTs) were removed from the site in 1999. Two 10,000-gallon gasoline and one 8,000-gallon gasoline USTs were installed at the site in 1999; however they appear to be located on the adjacent property. A Comprehensive Site Assessment (CSA) was completed by East Coast Environmental, P.A. (ECE) in 1999. According to the CSA report dated February 19, 1999, eight Type II monitoring wells (MW-1 through MW-8) and one Type III monitoring well (DW-1) were installed at the site. One recovery well (RW-1) was installed at the site, and MW-4 was converted to a recovery well (RW-2) during past remediation activities. MW-5 has not been located during past assessment activities and is assumed to have been destroyed.

The site risk classification is ranked as Intermediate Risk due to the past presence of free product in MW-3, MW-4 and/or RW-2. Multiple Aggressive Fluid-Vapor Recovery (AFVR) events have been conducted at the site in order to recover free product.

Site activities prior to the June 2016 groundwater monitoring event were conducted by previous consultants. Although Geological Resources, Inc. (GRI) cannot verify the accuracy of information obtained from previous reports, for the purposes of this report, it is assumed to be correct. Please refer to previous submittals for further historical information regarding the site.

2.0 CURRENT SITE ASSESSMENT

The purpose of this report is to present the results of the AFVR event and ground water sampling activities conducted between March 27 and April 26, 2017, at the T-Mart Amoco site. The activities were conducted in accordance with GRI proposal number 17-009 which was submitted to NCDEQ on January 9, 2017, and approved as Task Authorization No. 18955-13 on January 13, 2017. The purpose of the activities was to recover free product, reduce contaminant concentrations and to obtain current ground water quality data for the site.

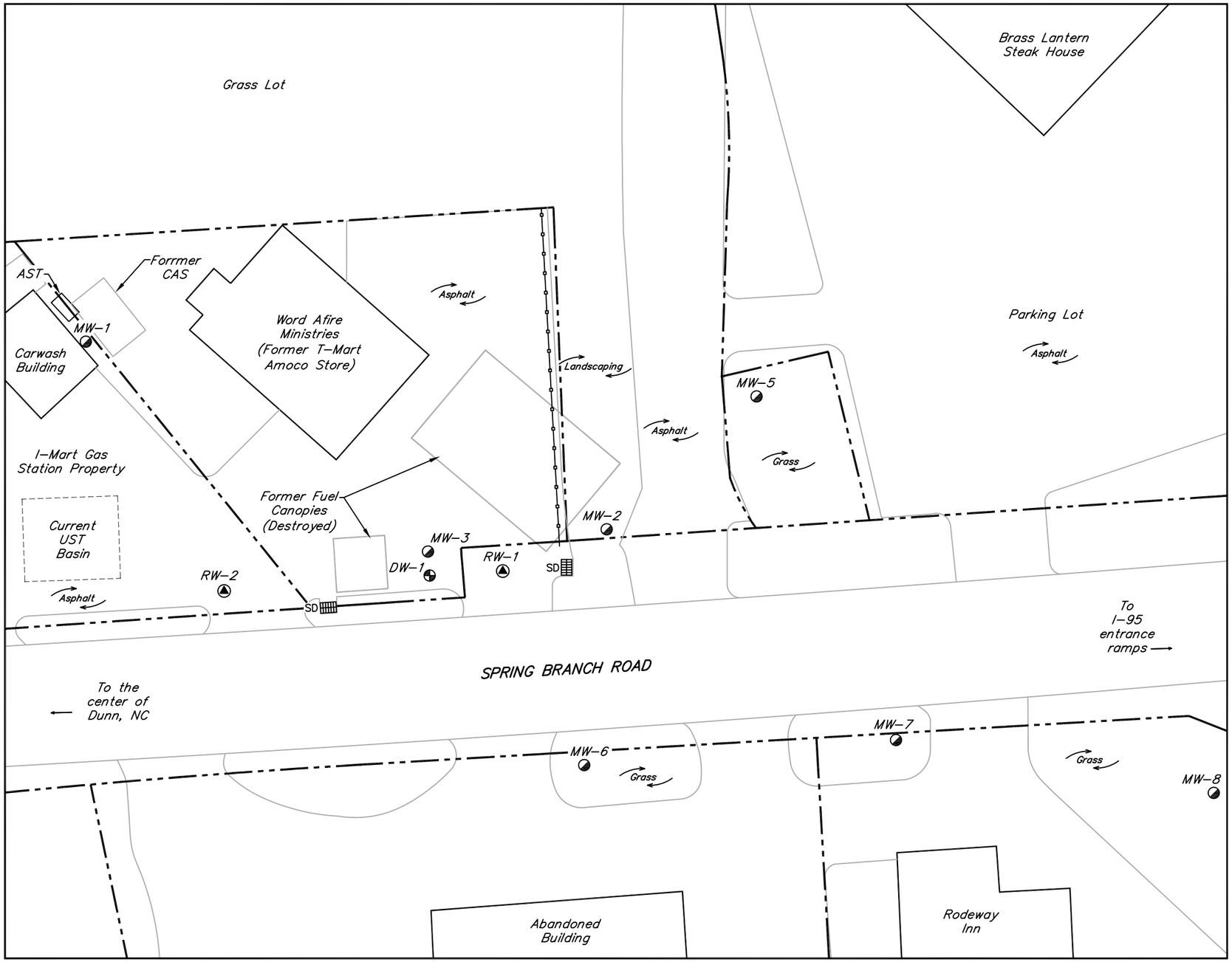
3.0 AFVR EVENT

On March 27, 2017, Hazmat Emergency Response and Remediation, Inc. (HERR) conducted an AFVR event on MW-3. The AFVR equipment included a 3,500-gallon capacity vacuum truck, flexible vacuum

LEGEND

- TYPE II MONITORING WELL
- TYPE III MONITORING WELL
- RECOVERY WELL
- PROPERTY BOUNDARY LINE
- FENCE LINE
- SD STORM DRAIN
- UNDERGROUND STORAGE TANK

Note:
1. This Site Map is based on data from the Harnett County GIS of NC and a Site Map dated October 25, 2002 that was prepared by the former consultant.
2. This site was not professionally surveyed; locations of monitoring wells are approximate.



N

Geological Resources, Inc.

0 20 40 80

(IN FEET)
1 inch = 40 ft

SITE MAP

T-Mart Amoco
Incident No. 18955
GRI Project No. 4176

511 Spring Branch Road
Dunn, Harnett County, NC

Date:	10/03/16	Drawn by:	ECH	Figure:	2

LEGEND

- TYPE II MONITORING WELL
- TYPE III MONITORING WELL
- RECOVERY WELL
- PROPERTY BOUNDARY LINE
- FENCE LINE

BENZENE
TOLUENE
ETHYLBENZENE
XYLENES
MTBE
NAPHTHALENE

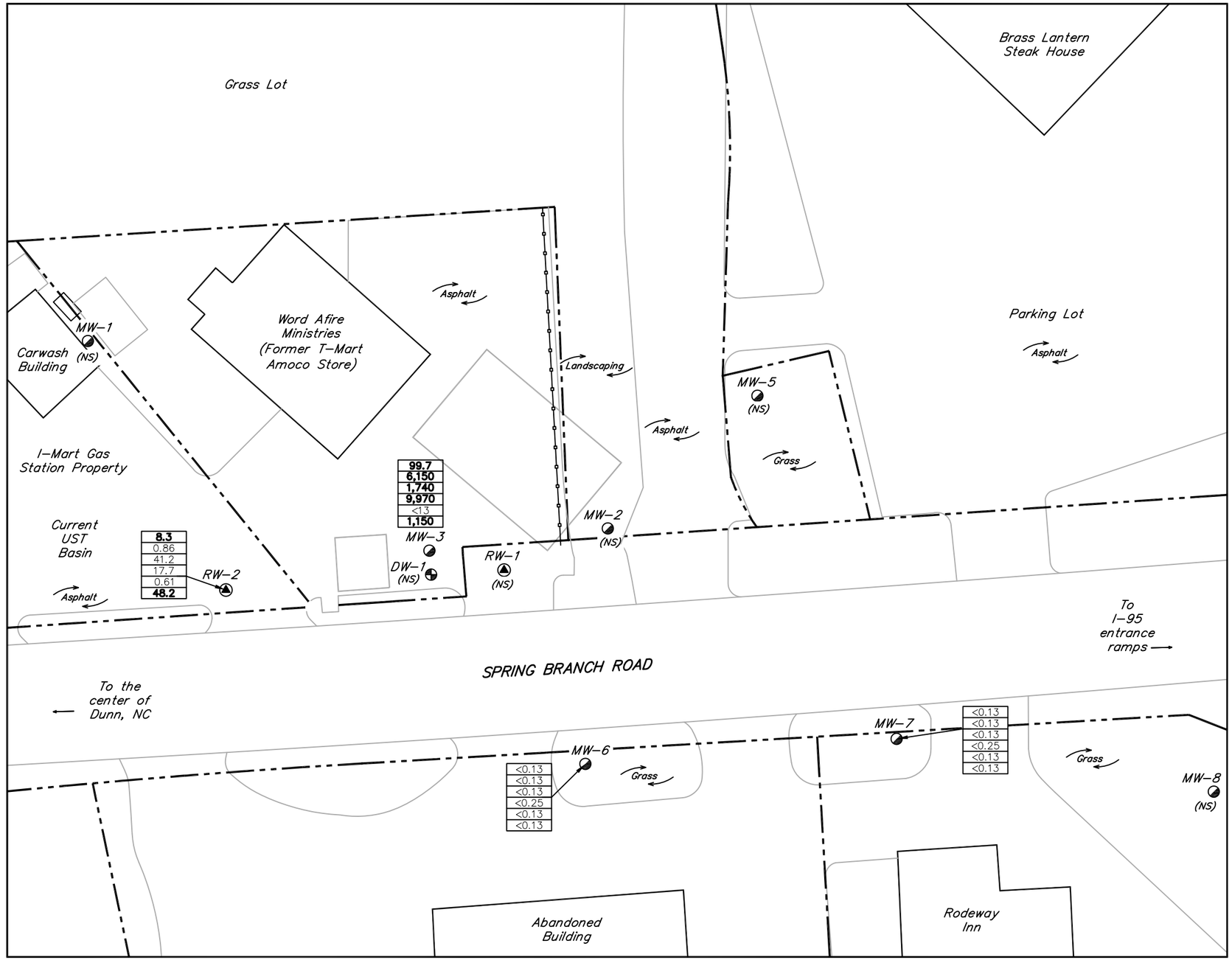
CONCENTRATIONS IN µg/L

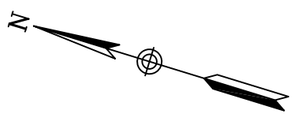
<0.13 LESS THAN THE METHOD DETECTION LIMIT SPECIFIED IN THE LABORATORY REPORT

"J" ESTIMATED VALUE

(FP) FREE PRODUCT

(NS) NOT SAMPLED





Geological Resources, Inc.

0 20 40 80

(IN FEET)
1 inch = 40 ft

GROUND WATER QUALITY MAP (04/26/17)

T-Mart Amoco
Incident No. 18955
GRI Project No. 4176

511 Spring Branch Road
Dunn, Harnett County, NC

Date:	05/10/17	Drawn by:	JRA	Figure:	4

TABLE 1
WELL CONSTRUCTION AND GAUGING INFORMATION
T-MART AMOCO (INCIDENT NO. 18955)

Date: 04/28/17 **Facility ID # :** 0-017633

Well ID	Date Installed (mm/dd/yy)	Date Water Level Measured (mm/dd/yy)	Well Casing Depth (ft. BGS)	Screened Interval (x to y ft. BGS)	Bottom of Well (ft. BGS)	Top of Casing Elevation* (ft.)	Depth to Water from Top of Casing (ft.)	Free Product Thickness** (ft.)	Ground Water Elevation (ft.)	Comments
MW-1	07/22/98	06/28/16	4	4 - 14	14	495.74	8.54	---	487.20	
MW-2	07/22/98	06/28/16	5	5 - 15	15	494.26	NM	NM	NM	Not Located
		04/26/17					NM	NM	NM	
MW-3	07/22/98	06/28/16	6	6 - 16	16	494.26	7.78	1.32	487.61	
		09/15/16					7.25	2.33	489.01	
		03/27/17					6.91	0.33	487.63	Before AFVR
		03/27/17					7.91	---	486.35	After AFVR
		04/26/17					3.32	---	490.94	
MW-4	07/22/98	06/28/16	5	5- 15	15	494.54	NM	NM	NM	Converted to RW-2
MW-5	11/09/98	06/28/16	5	5 - 19	19	493.93	NR	NR	NR	
MW-6	11/09/98	06/28/16	5	5 - 19	19	494.63	NM	NM	NM	Not Located
		04/26/17					8.59	---	486.04	
MW-7	11/09/98	06/28/16	5	5 -19	19	495.69	11.01	---	484.68	
		04/26/17					7.56	---	488.13	
MW-8	11/09/98	06/28/16	5	5 - 14	14	490.71	NR	NR	NR	
DW-1	07/22/98	06/28/16	26	26 - 30	30	494.20	7.47	---	486.73	
RW-1	NA	06/28/16	NA	NA	NA	NA	NR	NR	NR	
RW-2	NA	06/28/16	NA	NA	NA	NA	NM	NM	NM	Inaccessable
		09/15/16					4.52	---	NM	
		04/26/17					2.36	---	NM	

Notes:
- * : Reference point for elevation measurements determined by previous consultant.
- ** : If free product is present in a well, ground water elevation should be calculated by: (Top of Casing Elevation - Depth to Water) + (Free Product Thickness x 0.8581).
- ft. BGS: feet below ground surface.
- NM: Not measured.
- NR: Not requested.
- NA: Information not available.
- Top of casing and well construction information obtained from the report titled 'Semi-Annual Groundwater Monitoring Report' dated May 30, 2003 by East Coast Environmental P.A.

TABLE 2
FREE PRODUCT RECOVERY RESULTS
T-MART AMOCO (INCIDENT NO. 18955)

Date: 04/28/17 **Facilty ID#:** 0-017633

Method of Measurement: Interface probe at top-of-casing

Well ID	**Product Type** (gas, diesel, etc.)	**Date of Recovery** (mm/dd/yy)	**Free Product Recovery Method***	**Casing Diameter** (inches)	**Product Thickness before Recovery** (feet)	**Product Thickness after Recovery** (feet)	**Amount of Liquid Recovered** (gallons)	**Amount of Product Recovered** (gallons)
MW-3	Gasoline	03/27/17	AFVR	2	0.33	0.00	2,785	0.00

Notes :

- *: Bailing, Skimming, Aggressive Fluid Vapor Recovery (AFVR), Mobile Multiphase Extraction (MMPE)
- Amount of Liquid Recovered (gallons) includes Total liquids (Water and Free Product) as indicated on Disposal Manifest
- Amount of Product Recovered (in gallons) includes only the volume of free product in the tanker at the end of the event (based on Disposal Manifest and Field Notes).
- NM: Not measured.

TABLE 5
SUMMARY OF GROUND WATER SAMPLE ANALYTICAL RESULTS
T-MART AMOCO (INCIDENT NO. 18955)

Date : 05/05/17 **Facility ID #** : 0-017633

Analytical Method		**EPA Method 6200B**										
Contaminant of Concern		**Benzene**	**Toluene**	**Ethylbenzene**	**Xylenes**	**MTBE**	**Naphthalene**	**Isopropylbenzene**	**IPE**	**n-Propylbenzene**	**1,2,4-Trimethylbenzene**	**1,3,5-Trimethylbenzene**
Well ID.	**Date Collected** (mm/dd/yy)											
2L Standard (mg/l)		**1**	**600**	**600**	**500**	**20**	**6**	**70**	**70**	**70**	**400**	**400**
GCL (mg/l)		**5,000**	**260,000**	**84,500**	**85,500**	**20,000**	**6,000**	**25,000**	**70,000**	**30,000**	**28,500**	**25,000**
MW-1	06/28/16	<0.13	<0.13	<0.13	<0.31	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13
MW-2	06/28/16	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-3	06/28/16	**FP**	**FP**	**FP**	**FP**	**FP**	**FP**	**FP**	**FP**	**FP**	**FP**	**FP**
	04/26/17	**99.7**	**6,150**	**1,740**	**9,970**	<13	**1,150**	**138**	<13	**462**	**3,970**	**1,090**
MW-5	06/28/16	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
MW-6	06/28/16	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	04/26/17	<0.13	<0.13	<0.13	<0.25	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13
MW-7	06/28/16	**9.4**	2.0	7.6	8.2	1.4	**9.9**	1.7	0.17 J	2.3	5.1	1.4
	04/26/17	<0.13	<0.13	<0.13	<0.25	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13	<0.13
MW-8	06/28/16	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
DW-1	06/28/16	0.33 J	4.3	0.84	3.8	0.28 J	0.43 J	<0.13	<0.13	<0.13	0.59	0.16 J
RW-1	06/28/16	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
RW-2	06/28/16	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	04/26/17	**8.3**	0.86	41.2	17.7	0.61	**48.2**	25.7	<0.13	**120**	**549**	87.4

Notes:

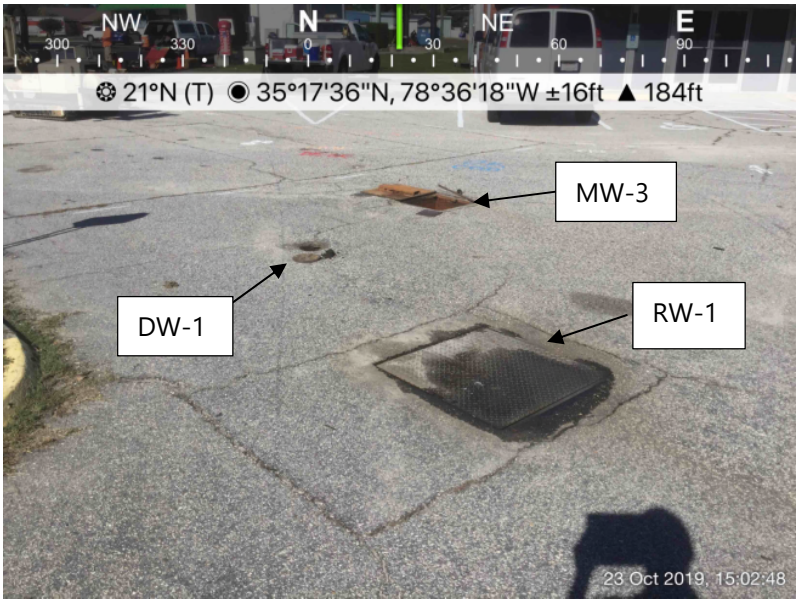
- Results reported in µg/l (micrograms per liter).
- 2L Standard: as specified in T15A NCAC 2L.0202 for salt water.
- GCL: Gross contamination level.
- NE: Standard not established.
- NS: Not sampled; Well not located, destroyed or inaccessable.
- NR: Not requested.
- < : Less than the method detection limit specified in the laboratory report.
- FP: Free product
- Concentrations in bold face type exceeded the 2L standards.
- Concentrations of n-butylbenzene (82.1 µg/l in MW-3) and o-chlorotoluene (128 µg/l in MW-3) were reported in the ground water samples collected on April 26, 2017.
- For other compounds reported which did not exceed the 2L Standards, refer to the laboratory reports.

Appendix II – Photographs

Date: 10/23/2019

Photographer: JTH

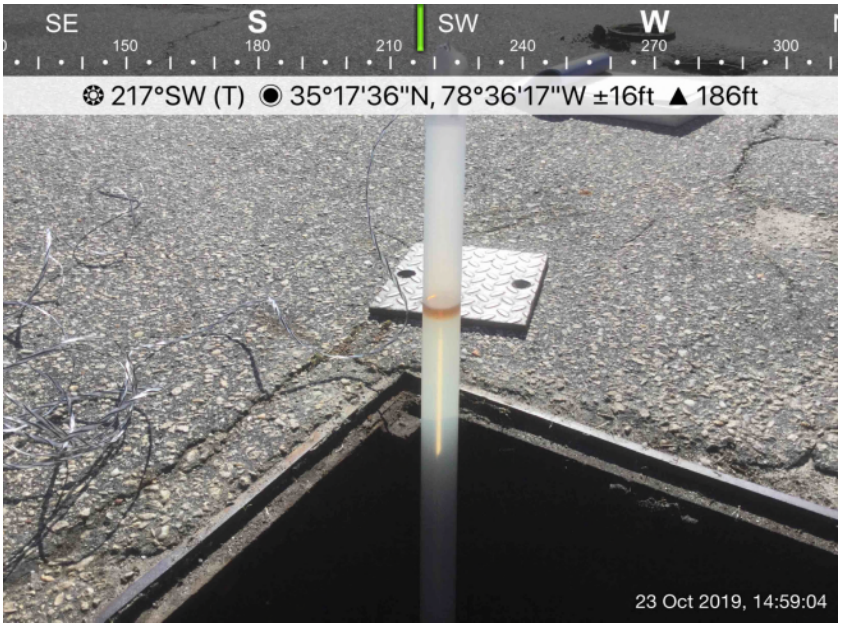
1		
	Location / Orientation	View of site looking northeast.
	Remarks	Note existing wells.



Date: 10/23/2019

Photographer: JTH

2		
	Location / Orientation	View looking north-northeast at site.
	Remarks	Note MW-3, RW-1 and DW-1 located onsite.



Date: 10/23/2019

Photographer: JTH

3	**Location / Orientation**	View of free product in MW-3
	Remarks	None

Date: 10/23/2019

Photographer: JTH

4	**Location / Orientation**	View looking north across site.
	Remarks	Note adjoining BP I-Mart to the north.

Appendix III – Boring Logs

PROJECT:	**NCDOT I-5878** Parcel 200-511 Spring Branch Rd (Word Afire Ministries-Former T-Mart), Dunn, NC S&ME Project No. 4305-19-161		**BORING LOG: B-1**
DATE DRILLED:	Wednesday, October 23, 2019	BORING DEPTH (FT):	8
DRILL RIG:	Geoprobe 54DT	WATER LEVEL:	7
DRILLER:	Troxler Geologic, Inc.	CAVE-IN DEPTH:	Not Applicable
HAMMER TYPE:	Not Applicable	LOGGED BY:	J. Honeycutt
SAMPLING METHOD:	Macro-Core Sampler	NORTHING:	
DRILLING METHOD:	Macro-Core Sampler (3-in. OD)	EASTING:	

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	SAMPLE	PID READING (PPM)	LABORATORY ANALYSES	Sample Time / 1st 6in	2nd 6in	3rd 6in	N VALUE
		Asphalt, Gravel,								
		Clayey Sand, Orange,			8.8	No				
					5.9	No				
5		Clayey Sand, Orange, Slight Petroleum Odors			211.0	Yes	1515			
		Sand, Red, Orange, Slight Petroleum Odors	▼							
		Boring Terminated at 8 Ft-BGS								
10										
15										
20										
25										
30										

PROJECT:	NCDOT I-5878 Parcel 200-511 Spring Branch Rd (Word Afire Ministries-Former T-Mart), Dunn, NC S&ME Project No. 4305-19-161		**BORING LOG: B-2A**
DATE DRILLED:	Wednesday, October 23, 2019	BORING DEPTH (FT):	8
DRILL RIG:	Geoprobe 54DT	WATER LEVEL:	7
DRILLER:	Troxler Geologic, Inc.	CAVE-IN DEPTH:	Not Applicable
HAMMER TYPE:	Not Applicable	LOGGED BY:	J. Honeycutt
SAMPLING METHOD:	Macro-Core Sampler	NORTHING:	
DRILLING METHOD:	Macro-Core Sampler (3-in. OD)	EASTING:	

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	SAMPLE	PID READING (PPM)	LABORATORY ANALYSES	Sample Time / 1st 6in	2nd 6in	3rd 6in	N VALUE
		Concrete,								
		Clayey Sand, Orange,			6.5	No				
					11.7	No				
5		Clayey Sand, Orange, Petroleum Odors			2915	Yes	1530			
		Sand, Red, Orange, Petroleum Odors	▼							
		Boring Terminated at 8 Ft-BGS								
10										
15										
20										
25										
30										

PROJECT:	**NCDOT I-5878** Parcel 200-511 Spring Branch Rd (Word Afire Ministries-Former T-Mart), Dunn, NC S&ME Project No. 4305-19-161		**BORING LOG: B-3**
DATE DRILLED:	Wednesday, October 23, 2019	BORING DEPTH (FT):	8
DRILL RIG:	Geoprobe 54DT	WATER LEVEL:	7
DRILLER:	Troxler Geologic, Inc.	CAVE-IN DEPTH:	Not Applicable
HAMMER TYPE:	Not Applicable	LOGGED BY:	J. Honeycutt
SAMPLING METHOD:	Macro-Core Sampler	NORTHING:	
DRILLING METHOD:	Macro-Core Sampler (3-in. OD)	EASTING:	

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	SAMPLE	PID READING (PPM)	LABORATORY ANALYSES	Sample Time / 1st 6in	2nd 6in	3rd 6in	N VALUE
		Concrete,								
		Clayey Sand, Orange,			52.0	No				
					47.0	No				
5		Clayey Sand, Orange, Petroleum Odors	▼		56.4	Yes	1600			
		Boring Terminated at 8 Ft-BGS								
10										
15										
20										
25										
30										

PROJECT:	**NCDOT I-5878** Parcel 200-511 Spring Branch Rd (Word Afire Ministries-Former T-Mart), Dunn, NC S&ME Project No. 4305-19-161		**BORING LOG: B-4**
DATE DRILLED:	Wednesday, October 23, 2019	BORING DEPTH (FT):	8
DRILL RIG:	Geoprobe 54DT	WATER LEVEL:	7
DRILLER:	Troxler Geologic, Inc.	CAVE-IN DEPTH:	Not Applicable
HAMMER TYPE:	Not Applicable	LOGGED BY:	J. Honeycutt
SAMPLING METHOD:	Macro-Core Sampler	NORTHING:	
DRILLING METHOD:	Macro-Core Sampler (3-in. OD)	EASTING:	

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	SAMPLE	PID READING (PPM)	LABORATORY ANALYSES	Sample Time / 1st 6in	2nd 6in	3rd 6in	N VALUE
		Concrete,								
		Clayey Sand, Orange,			19.1	No				
					16.1	No				
5		Clayey Sand, Orange, Petroleum Odors	▼		2209	Yes	1615			
		Boring Terminated at 8 Ft-BGS								
10										
15										
20										
25										
30										

PROJECT:	**NCDOT I-5878** Parcel 200-511 Spring Branch Rd (Word Afire Ministries-Former T-Mart), Dunn, NC S&ME Project No. 4305-19-161		**BORING LOG: B-5**
DATE DRILLED:	Monday, October 28, 2019	BORING DEPTH (FT):	8
DRILL RIG:	Geoprobe 54DT	WATER LEVEL:	7
DRILLER:	Troxler Geologic, Inc.	CAVE-IN DEPTH:	Not Applicable
HAMMER TYPE:	Not Applicable	LOGGED BY:	J. Honeycutt
SAMPLING METHOD:	Macro-Core Sampler	NORTHING:	
DRILLING METHOD:	Macro-Core Sampler (3-in. OD)	EASTING:	

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	SAMPLE	PID READING (PPM)	LABORATORY ANALYSES	Sample Time / 1st 6in	2nd 6in	3rd 6in	N VALUE
		Asphalt, Gravel,								
		Clayey Sand, Orange,			1.9	No				
					5.6	No				
5					6.3	Yes	1020			
		Silty Sand, Orange,	▼							
		Boring Terminated at 8 Ft-BGS								
10										
15										
20										
25										
30										

PROJECT:	**NCDOT I-5878** Parcel 200-511 Spring Branch Rd (Word Afire Ministries-Former T-Mart), Dunn, NC S&ME Project No. 4305-19-161		**BORING LOG: B-6**
DATE DRILLED:	Monday, October 28, 2019	BORING DEPTH (FT):	8
DRILL RIG:	Geoprobe 54DT	WATER LEVEL:	7
DRILLER:	Troxler Geologic, Inc.	CAVE-IN DEPTH:	Not Applicable
HAMMER TYPE:	Not Applicable	LOGGED BY:	J. Honeycutt
SAMPLING METHOD:	Macro-Core Sampler	NORTHING:	
DRILLING METHOD:	Macro-Core Sampler (3-in. OD)	EASTING:	

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	SAMPLE	PID READING (PPM)	LABORATORY ANALYSES	Sample Time / 1st 6in	2nd 6in	3rd 6in	N VALUE
		Asphalt, Gravel,								
		Clayey Sand, Orange,			6.5	No				
					7.0	No				
5					10.4	Yes	1030			
		Silty Sand, Orange,	▼							
		Boring Terminated at 8 Ft-BGS								
10										
15										
20										
25										
30										

PROJECT:	NCDOT I-5878 Parcel 200-511 Spring Branch Rd (Word Afire Ministries-Former T-Mart), Dunn, NC S&ME Project No. 4305-19-161		**BORING LOG: B-7**
DATE DRILLED:	Monday, October 28, 2019	BORING DEPTH (FT):	8
DRILL RIG:	Geoprobe 54DT	WATER LEVEL:	7
DRILLER:	Troxler Geologic, Inc.	CAVE-IN DEPTH:	Not Applicable
HAMMER TYPE:	Not Applicable	LOGGED BY:	J. Honeycutt
SAMPLING METHOD:	Macro-Core Sampler	NORTHING:	
DRILLING METHOD:	Macro-Core Sampler (3-in. OD)	EASTING:	

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	SAMPLE	PID READING (PPM)	LABORATORY ANALYSES	Sample Time / 1st 6in	2nd 6in	3rd 6in	N VALUE
		Asphalt, Gravel,								
		Clayey Sand, Orange,			14.6	No				
					39.5	Yes	1040			
5					16.5	No				
		Silty Sand, Orange,	▼							
		Boring Terminated at 8 Ft-BGS								
10										
15										
20										
25										
30										

PROJECT:	**NCDOT I-5878** Parcel 200-511 Spring Branch Rd (Word Afire Ministries-Former T-Mart), Dunn, NC S&ME Project No. 4305-19-161		**BORING LOG: B-8**
DATE DRILLED:	Monday, October 28, 2019	BORING DEPTH (FT):	8
DRILL RIG:	Geoprobe 54DT	WATER LEVEL:	7
DRILLER:	Troxler Geologic, Inc.	CAVE-IN DEPTH:	Not Applicable
HAMMER TYPE:	Not Applicable	LOGGED BY:	J. Honeycutt
SAMPLING METHOD:	Macro-Core Sampler	NORTHING:	
DRILLING METHOD:	Macro-Core Sampler (3-in. OD)	EASTING:	

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	SAMPLE	PID READING (PPM)	LABORATORY ANALYSES	Sample Time / 1st 6in	2nd 6in	3rd 6in	N VALUE
		Asphalt, Gravel,								
		Clayey Sand, Orange,			3.2	No				
					7.8	No				
5					8.7	Yes	1115			
		Silty Sand, Orange,	▼							
		Boring Terminated at 8 Ft-BGS								
10										
15										
20										
25										
30										

PROJECT:	NCDOT I-5878 Parcel 200-511 Spring Branch Rd (Word Afire Ministries-Former T-Mart), Dunn, NC S&ME Project No. 4305-19-161		**BORING LOG: B-9**
DATE DRILLED:	Monday, October 28, 2019	BORING DEPTH (FT):	8
DRILL RIG:	Hand Auger	WATER LEVEL:	7
DRILLER:	S&ME	CAVE-IN DEPTH:	Not Applicable
HAMMER TYPE:	Not Applicable	LOGGED BY:	J. Honeycutt
SAMPLING METHOD:	Hand Auger	NORTHING:	
DRILLING METHOD:	Hand Auger	EASTING:	

DEPTH (feet)	GRAPHIC LOG	MATERIAL DESCRIPTION	WATER LEVEL	SAMPLE	PID READING (PPM)	LABORATORY ANALYSES	Sample Time / 1st 6in	2nd 6in	3rd 6in	N VALUE
		Topsoil,								
		Clayey Sand, Orange,			6.3	No				
					5.5	No				
5					1106	Yes	1145			
		Silty Sand, Orange, Petroleum Odors	▼							
		Boring Terminated at 8 Ft-BGS								
10										
15										
20										
25										
30										

Appendix IV – Laboratory Analytical Reports and Chain of Custody

QED REDLAB RAPID ENVIRONMENTAL DIAGNOSTICS QROS

Hydrocarbon Analysis Results

Client: S & ME
Address: RALEIGH, NC

Samples taken Wednesday, October 23, 2019
Samples extracted Wednesday, October 23, 2019
Samples analysed Friday, October 25, 2019

Contact: JAMIE HONEYCUTT

Operator CAROLINE STEVENS

Project: NCDOT I-5878 PARCEL 200

F03640

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	B-1 (4-6')	23.0	<0.58	63.2	273.1	336.3	7.8	0.29	<0.023	99.5	0.4	0.1	Deg.Kerosene 89.1%,(FCM)
s	B-2A (4-6')	33.9	<0.85	369.9	131.8	501.7	34.8	1.3	<0.034	99.6	0.4	0.1	Deg.Fuel 77.3%,(FCM)
s	B-3 (4-6')	35.0	<0.88	<0.88	2.6	2.6	2.3	<0.28	<0.035	0	87.3	12.7	Deg Fuel 82.1%,(FCM)
s	B-4 (4-6')	684.0	<17.1	3352	11718	15070	399.5	15	<0.68	99.8	0.2	0	Deg.Kerosene 89.4%,(FCM)

Initial Calibrator QC check OK

Final FCM QC Check OK 98.8 %

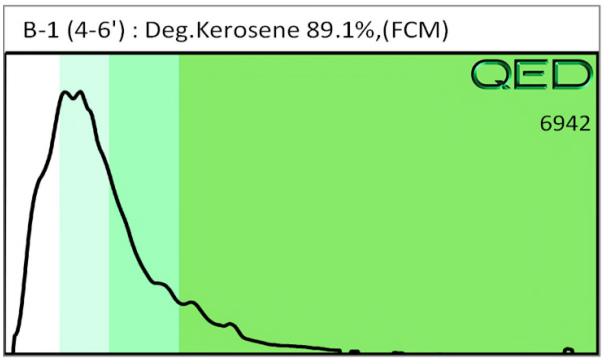
Results generated by a QED HC-1 analyser. Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values are not corrected for moisture or stone content

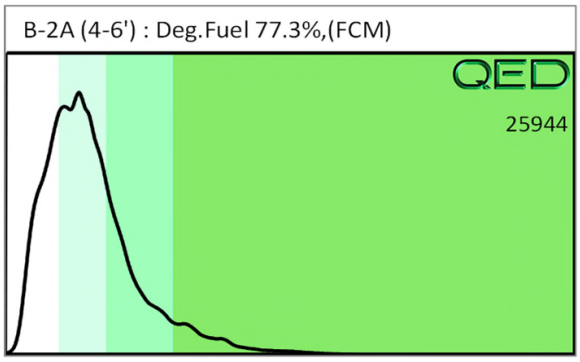
Fingerprints provide a tentative hydrocarbon identification. The abbreviations are:- FCM = Results calculated using Fundamental Calibration Mode : % = confidence for sample fingerprint match to library

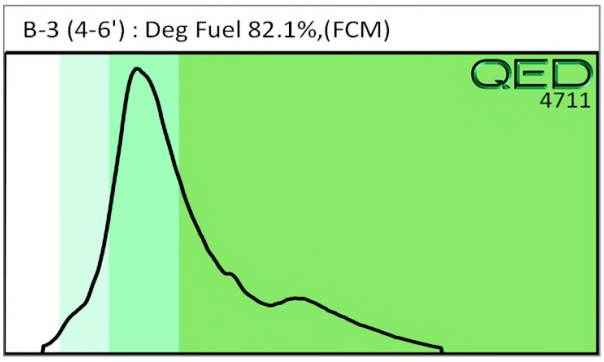
(SBS) or (LBS) = Site Specific or Library Background Subtraction applied to result : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate present

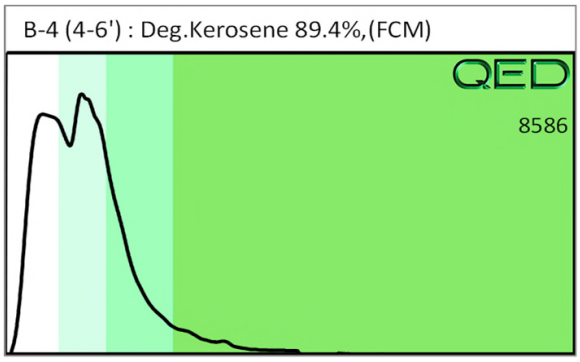
QED Hydrocarbon Fingerprints

Project: NCDOT I-5878 PARCEL 200 ##################









QED

REDLAB™ RAPID ENVIRONMENTAL DIAGNOSTICS

QROS

Hydrocarbon Analysis Results

Client: S&ME
Address: 3201 SPRING FOREST RD
RALEIGH NC

Samples taken Monday, October 28, 2019
Samples extracted Monday, October 28, 2019
Samples analysed Tuesday, October 29, 2019

Contact: JAMIE HONEYCUTT

Operator MAX MOYER

Project: NCDOT I-5878 PARCEL 200

U00902

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
										C5 - C10	C10 - C18	C18	
s	B-5 (4-6')	20.6	<0.52	<0.52	<0.52	<0.52	<0.1	<0.17	<0.021	0	0	0	PHC not detected,(P)
s	B-6 (4-6')	20.2	<0.5	<0.5	1.5	1.5	0.82	<0.16	<0.02	0	69.5	30.5	V.Deg.PHC 77.5%,(FCM),(P)
s	B-7 (2-4')	21.5	<0.54	<0.54	13.8	13.8	6.6	0.29	<0.021	0	61.8	38.2	V.Deg.PHC 94.6%,(FCM),(P)
s	B-8 (4-6')	21.1	<0.53	<0.53	0.94	0.94	0.48	<0.17	<0.021	0	75.3	24.7	Deg Fuel 61%,(FCM),(P)
s	B-9 (4-6')	19.3	<0.48	48.9	20.1	69	29.1	1.1	<0.019	94.3	4.7	1	Deg.Fuel 55.5%,(FCM)

Initial Calibrator QC check OK

Final FCM QC Check OK 99.6 %

Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values uncorrected for moisture or stone content. Fingerprints provide a tentative hydrocarbon identification.

Abbreviations :- FCM = Results calculated using Fundamental Calibration Mode : % = confidence of hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

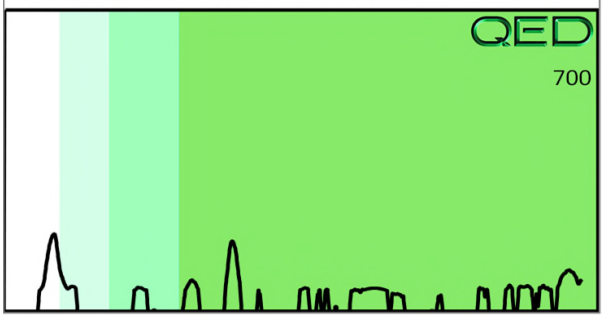
B = Blank Drift : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : (OCR) = Outside cal range : (M) = Modifed Result.

% Ratios estimated aromatic carbon number proportions : HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only. **Data generated by HC-1 Analyser**

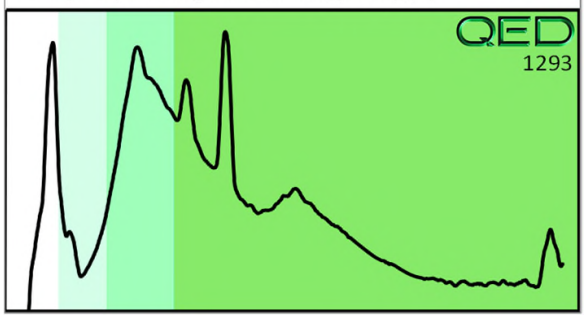
QED Hydrocarbon Fingerprints

Project: NCDOT I-5878 PARCEL 200 ##################

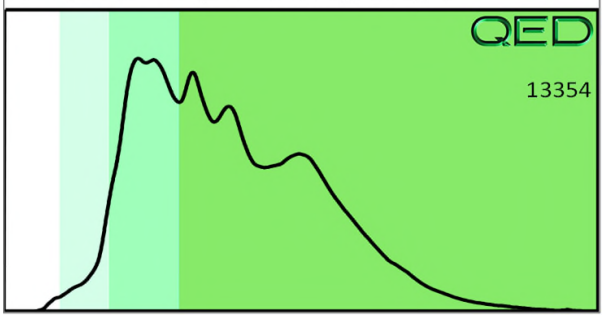
B-5 (4-6') : PHC not detected,(P)



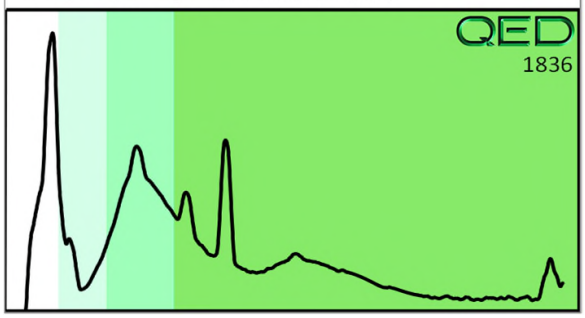
B-6 (4-6') : V.Deg.PHC 77.5%,(FCM),(P)



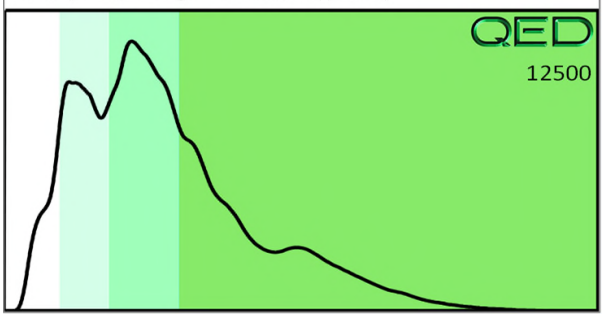
B-7 (2-4') : V.Deg.PHC 94.6%,(FCM),(P)



B-8 (4-6') : Deg Fuel 61%,(FCM),(P)



B-9 (4-6') : Deg.Fuel 55.5%,(FCM)



NCDOT I-5878 Parcel 200 Dunn, NC

Client Name:	S+ME
Address:	3201 Spring Forest Rd Raleigh, NC [redacted]
Contact:	Jamie T Honeycutt
Project Ref.:	NCDOT I-5878 Parcel 200
Email:	jhoneycutt@smeinc.com
Phone #:	910 977-7614
Collected by:	Jamie T Honeycutt

REDLAB™
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 BaP

Sample Collection Date/Time	TAT Requested 24 Hour	TAT Requested 48 Hour	Initials	Sample ID	Total Wt.	Tare Wt.	Sample Wt.
10-23-19 / 1515		//	JTH	B-1 4'-6'	55.4	44.1	11.3
↓ / 1530		//	↓	B-2A 4-6	57.0	44.6	12.4
↓ / 1600	1600	//		B-3 4-6'	56.0	44.0	12
/ 1615		//		B-4 4-6'	57.5	44.6	12.9

Comments:

Relinquished by	Date/Time	Accepted by	Date/Time
[signature]	10/24/19 / 1800		
Relinquished by	Date/Time	Accepted by	Date/Time
		ces	10/25/19 12:00

RED Lab USE ONLY

4

B141

NCDOT I-5878 Parcel 200 Dunn, NC

Client Name:	SEME
Address:	3201 Spring Forest Rd Raleigh NC
Contact:	Jamie T Honeycutt
Project Ref.:	NCDOT I 5878 Parcel 200
Email:	jhoneycutt@seme.com
Phone #:	910 977-7614
Collected by:	Jamie T Honeycutt

REDLAB™
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 BaP

Sample Collection Date/Time	TAT Requested 24 Hour	TAT Requested 48 Hour	Initials	Sample ID	Total Wt.	Tare Wt.	Sample Wt.
10-28-19 / 1020		✓	JTH	B-5 4-6'	57.4	44.8	12.6
/ 1030				B-6 4-6'	57.6	44.7	12.9
/ 1040				B-7 2-4'	56.9	44.8	12.1
/ 1115				B-8 4-6'	56.9	44.6	12.3
/ 1145				B-9 4-6'	58.3	44.8	13.5

Comments:

Relinquished by	Date/Time	Accepted by	Date/Time
Jamie T Honeycutt 10/28/19	10/28/19 1900	MM 10/29/19	1000
Relinquished by	Date/Time	Accepted by	Date/Time

RED Lab USE ONLY

5

Preliminary Site Assessment

I-95 Interchange Improvement

Parcel 274 PSH 42 - Robin Hood Oil Company

605 East Main Street, Benson, Johnston County, North Carolina

TIP No. I-5986B

WBS Element: 47532.1.3

November 21, 2019

Terracon Project No. 70197584

Prepared for:

North Carolina Department of Transportation
Raleigh, North Carolina

Prepared by:

Terracon Consultants, Inc.
Raleigh, North Carolina

Preliminary Site Assessment

I-95 Interchange Improvement

Parcel 274 PSH 42 - Robin Hood Oil Company

605 East Main Street, Benson, Johnston County, North Carolina

TIP No. I-5986B

WBS Element: 47532.1.3

November 21, 2019

Terracon Project No. 70197584

DocuSigned by:
FE221351A43D42F...

11/26/2019

NORTH CAROLINA LICENSED SEAL 2576 GEOLOGIST WILLIAM O. FRAZIER

William O. Frazier, PG
Staff Geologist

For:
Michael T. Jordan, PG, RSM
Department Manager

Donald R. Malone, PE, RSM
Senior Engineer

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Terracon Consultants, Inc. 2401 Brentwood Road, Suite 107 Raleigh, North Carolina 27615
P (919) 873-2211 F (919) 873 9555 terracon.com

TABLE OF CONTENTS

November 21, 2019

North Carolina Department of Transportation
Attention: Mr. John Pilipchuk, LG
GeoEnvironmental Engineering Unit
1589 Mail Service Center
Raleigh, North Carolina 27699-1589

Re: Preliminary Site Assessment (PSA)
I-95 Interchange Improvement
Parcel 274 PSH 42 - Robin Hood Oil Company
605 East Main Street, Benson, Johnston County, North Carolina
TIP No. I-5986B
WBS Element: 47532.1.3

Dear Mr. Pilipchuk:

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. P70197584) dated October 1, 2019. 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:

William O. Frazier, PG
Staff Geologist

Donald R. Malone, PE, RSM
Senior Engineer

Reviewed by:

for Michael T. Jordan, PG, RSM
Environmental Department Manager

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PRELIMINARY SITE ASSESSMENT

I-95 INTERCHANGE IMPROVEMENT
TIP NO. I-5986B
WBS ELEMENT: 47532.1.3
PARCEL 274 PSH 42 - ROBIN HOOD OIL COMPANY
605 EAST MAIN STREET, BENSON, NORTH CAROLINA

1.0 INTRODUCTION

1.1 Site Description

Site Name	Parcel 274 PSH 42 – Robin Hood Oil Company
Site Location/Address	605 East Main Street, Benson, North Carolina 27532 (Johnston County Tax PIN: 153915-62-5812)
General Site Description	The site consists of an approximate 0.56-acre parcel developed with a one-story commercial building currently operating as convenience store, coffee shop, and Exxon gas station. The gas station currently operates four underground storage tanks (USTs). The site is also improved with the associated fueling islands, pump canopy, paved parking areas, and landscaped grounds.

1.2 Site History

The site is located at 605 East Main Street in Benson, Johnston County, North Carolina. At the time of the Preliminary Site Assessment (PSA), the site was operating as an Exxon gas station (Facility ID: 00-0-0000001859). According to the North Carolina Department of Environmental Quality (NCDEQ) – Division of Waste Management UST Section Registered Tank Database, the facility currently operates three 6,000-gallon gasoline USTs and one 2,000-gallon diesel UST that were reportedly installed in December 1988. The facility reportedly operated one 2,000-gallon gasoline UST, two 3,000-gallon gasoline USTs, one 1,000-gallon diesel UST, and one 500-gallon new/used oil UST from 1964 to 1988. Petroleum releases have not been reported at the facility.

1.3 Scope of Work

Terracon conducted the following PSA scope of work (SOW) in accordance with Terracon's Proposal No. P70197584 dated October 1, 2019. This PSA is being completed prior to a planned upgrade of the I-95 interchange and widening of the interstate in Benson, North Carolina (site). The scope of work included a geophysical investigation, the collection of 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 rights-of-way (ROW) as indicated by NCDOT provided plan sheets.

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 Preliminary Site Assessment (Terracon Proposal No. P70197584) dated October 1, 2019 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 Benson, North Carolina, 1997. **Exhibits 2A and 2B** depict the site layout and indicate the approximate locations of the site features, soil boring locations, and analytical results.

2.1 Geophysical Survey

On October 28 and 29, 2019, Terracon conducted a geophysical investigation at the site in an effort to determine if unknown, metallic USTs are present beneath the proposed ROW area. The geophysical investigation included an electromagnetic (EM) induction survey using a Geonics EM31-SH metal detection instrument and a ground penetrating radar (GPR) survey using a Geophysical Survey Systems SIR-4000 unit.

The geophysical investigation identified a possible metallic UST within the proposed ROW area, as depicted on **Exhibits 2A and 2B**. The possible UST measured approximately 4 feet long and was located approximately 2.3 feet below land surface (bls). Surface features such as a vent pipe or fill port were not observed in association with the possible UST. Terracon advanced a probe rod and hand auger at the possible UST location in an effort to confirm the feature; however, refusal was encountered between 1 and 1.5 feet bls upon an apparent gravel and asphalt-containing layer.

In addition to metal detection and GPR scans, NC One Call public utility locator was used to identify several underground utility lines and to clear boring locations. A copy of the geophysical report is in **Appendix A**.

2.2 Soil Sampling

Based on the findings of the geophysical investigation and Terracon's site observations, Terracon oversaw the advancement of five soil borings (605-SB-01 through 605-SB-05) along the southern portion of the parcel and within the proposed NCDOT ROW. The borings were completed by a North Carolina Certified Well Contractor (Quantex, Inc.) using a truck-mount Geoprobe® 7822DT direct-push drill rig.

Soil samples were collected in 5-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 ranged from less than 1 part per million (ppm)

to 3,249 ppm, typically increasing with depth. The PID screening values are summarized in **Table 1**.

Based on the proposed disturbance depths and discussion with the NCDOT, each of the soil borings was advanced to a depth of approximately 10 feet below land surface (bls). Based on the results of the field screening, five soil samples, one from each boring, were collected from depths between approximately 4.5 feet and 9 feet bls. Soil samples were collected in the depth interval that was most likely to be impacted. Samples were placed in laboratory provided sample containers and shipped to REDLAB/QROS, LLC – Environmental Testing for analysis by Ultraviolet Fluorescence (UVF).

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 bentonite pellets. Surface completion was achieved with either dirt or asphalt cold patch. Remaining investigation derived waste (IDW) was spread on the site.

Soil generally consisted of fine-grained sand to a depth of approximately 1 foot underlain by gravel and asphalt to approximately 2 feet bls and sandy clay and clayey sand to approximately 8 feet bls and lean clay to approximately 10 feet bls. Groundwater was not encountered in the soil borings. The soil boring logs are included in **Appendix B**. Sample locations were measured using a sub-foot Trimble Geo7X GPS unit and are depicted on **Exhibits 2A** and **2B**.

3.0 LABORATORY ANALYSES

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

- TPH-gasoline range organics (C_5-C_{10}) (TPH-GRO);
- TPH-diesel range organics (C_{10}-C_{35}) (TPH-DRO);
- Total petroleum hydrocarbons (C_5-C_{35}) (TPH);
- Benzene, toluene, ethylbenzene, and xylenes (BTEX);
- Total aromatics (C_{10}-C_{35});
- 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 identified the following detections above the laboratory reporting limits in soil samples 605-SB-01 through 605-SB-05:

- BTEX was reported within 605-SB-02 at a concentration of 41.1 milligrams per kilogram (mg/kg);
- TPH-GRO was reported within 605-SB-01 through 605-SB-04 at concentrations ranging from 14.6 mg/kg to 117.9 mg/kg;
- TPH-DRO was reported within each sample at concentrations ranging from 2.4 mg/kg to 215.6 mg/kg;
- TPH was reported within each sample at concentrations ranging from 17.3 mg/kg to 306.8 mg/kg;
- Total aromatics (C_{10}-C_{35}) was reported within each sample at concentrations ranging from 3.7 mg/kg to 138.7 mg/kg;
- 16 EPA PAHs was reported within 605-SB-04 and 605-SB-05 at concentrations ranging from 4.9 mg/kg to 5.3 mg/kg; and
- BaP was not detected above laboratory reporting limits within the samples collected.

Laboratory analysis identified concentrations of TPH-GRO and TPH-DRO in excess of the NCDEQ Action Levels (50 mg/kg and 100 mg/kg, respectively) within 605-SB-01 and 605-SB-02.

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

5.0 CONCLUSIONS AND RECOMMENDATIONS

The findings of this investigation are discussed below.

- The geophysical investigation identified a possible metallic UST within the proposed NCDOT ROW, measuring approximately 4 feet long and buried at a depth of approximately 2.3 feet bls. Surface features such as a vent pipe or fill port were not observed in

association with the possible UST. The feature could not be confirmed to be a UST, because the probe rod and hand auger encountered refusal at approximately 1 to 1.5 feet bls at the possible UST location.

- Laboratory analysis reported concentrations of BTEX, TPH-GRO, TPH-DRO, TPH, Total Aromatics, and 16 EPA PAHs in multiple soil borings at the site. The detected concentrations of TPH-GRO and TPH-DRO exceed the NCDEQ Action Levels in 605-SB-01 and 605-SB-02.

- The area of contamination appears to be located to the south of the existing pump islands and includes the area to the west of the identified possible UST. An estimated weight and volume of petroleum impacted soil in this area is 233 tons, or 156 cubic yards. This calculation is based on an impacted area of approximately 700 square feet and depths ranging from 4 to 10 feet bls, where evidence of contamination was encountered. The density was estimated at 1.5 tons of soil per cubic yard. The actual amount of impacted soil can only be determined after excavation or by advancing additional borings at the site to further delineate the extents of petroleum impacts.

- Terracon recommends NCDOT provide a copy of the results to the owner and/or operator of the site.

- Terracon recommends NCDOT provide a copy of the results to NCDEQ.

- Terracon does not recommend further assessment of the ROW at this site. However, based on detections of petroleum compounds, impacted soil and groundwater encountered during NCDOT's project should be managed and/or disposed of in accordance with applicable local and State requirements. In addition, construction workers should be alert for potential soil and/or groundwater impacts at the site.

6.0 REFERENCES

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

TABLES

Table 1
Summary of PID Field Screening Values
Preliminary Site Assessment
Parcel# 274 PSH 42 - Robin Hood Oil Company
605 East Main Street, Benson, Johnston County, North Carolina
Terracon Project No. 70197584

Boring Depth (feet bls)	605-SB-01	605-SB-02	605-SB-03	605-SB-04	605-SB-05
(0 - 2)	<0.1	<0.1	<0.1	<0.1	<0.1
(3 - 4)	254	<0.1	<0.1	<0.1	<0.1
(4 - 6)	2317	25.8	5.7	66	151
(6 - 8)	3249	2.5	<0.1	<0.1	30.2
(8 - 10)	773	1171	393	233	93.2

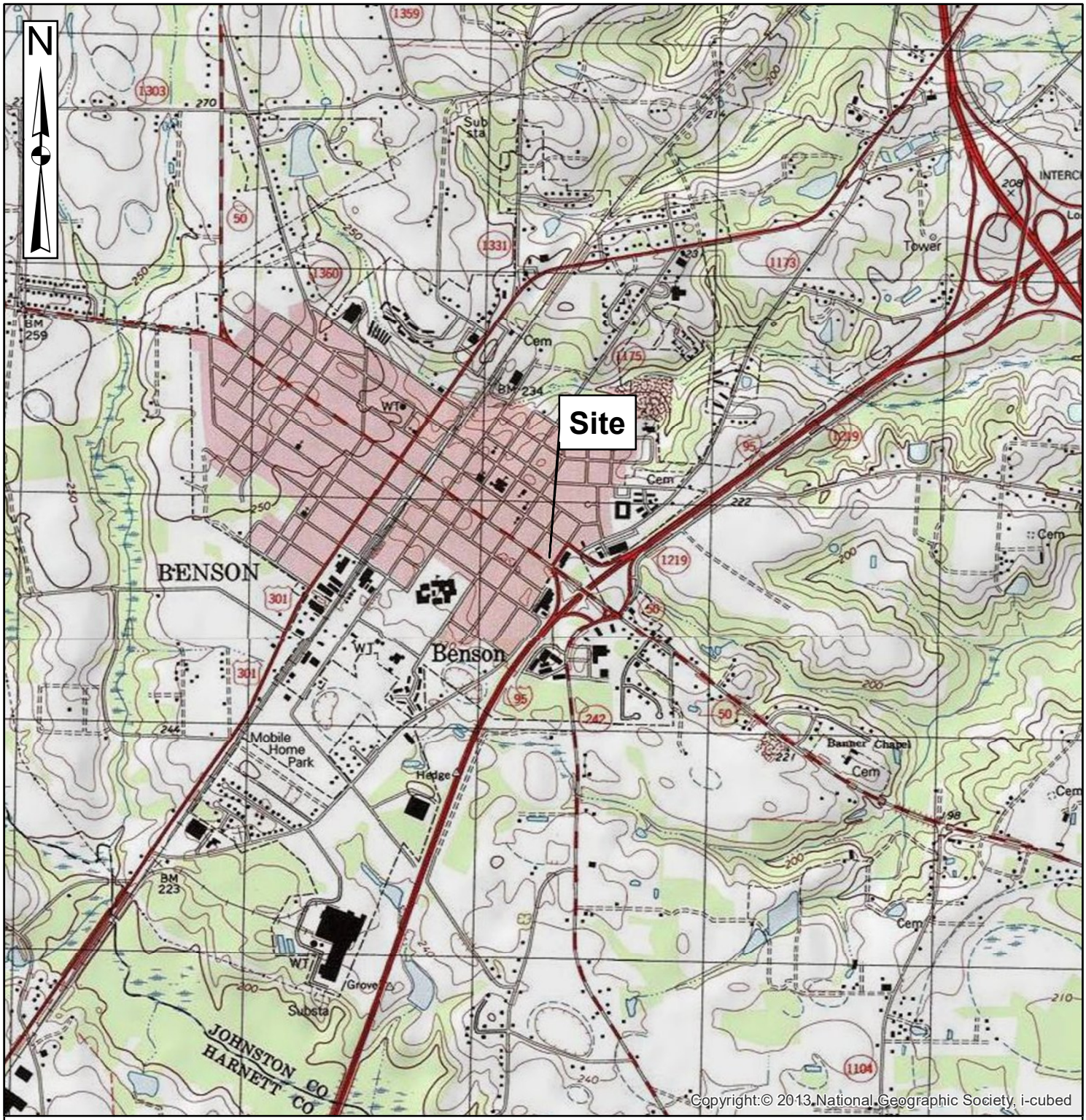
Notes:
Field screening was conducted on October 31, 2019
Values shown are given in parts per million (ppm)
PID - Photo-ionization detector
PID was calibrated using 100 ppm isobutylene gas
ft bls - feet below land surface.

Table 2
Summary of Soil Analytical Results
Preliminary Site Assessment
Parcel# 274 PSH 42 - Robin Hood Oil Company
605 East Main Street, Benson, Johnston County, North Carolina
Terracon Project No. 70197584

Sample ID: / Sample Depth (ft bls):	605-SB-01 / 8	605-SB-02 / 9.5	605-SB-03 / 9	605-SB-04 / 4.5	605-SB-05 / 4	NCDEQ Action Level	MSCC Industrial / Commercial
BTEX (C6 - C9)	<1.5	**41.1**	<0.49	<1.8	<1.6	**NE**	**NE**
GRO (C5 - C10)	**69.9**	**117.9**	**14.9**	**17.8**	<1.6	**50**	**NE**
DRO (C10 - C35)	**215.6**	**188.9**	**2.4**	**74.2**	**68.4**	**100**	**NE**
TPH (C5 - C35)	**285.5**	**306.8**	**17.3**	**92**	**68.4**	**NE**	**NE**
Total Aromatics (C10-C35)	**11.9**	**18.5**	**3.7**	**138.7**	**128.1**	**NE**	**NE**
16 EPA PAHs	<0.47	**0.71**	<0.16	**5.3**	**4.9**	**NE**	**NE**
BaP	<0.059	<0.021	<0.02	<0.07	<0.066	**NE**	**0.78**

Notes:
Soil samples were collected on October 31, 2019.
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, anthracene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[g,h,i]perylene, benzo[a]pyrene, chrysene, dibenzo[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.

FIGURES



USGS TOPOGRAPHIC MAP
SITE: BENSON, NC QUADRANGLE (1997)
SOUTH: DUNN, NC QUADRANGLE (1997)

1 inch = 2,000 feet

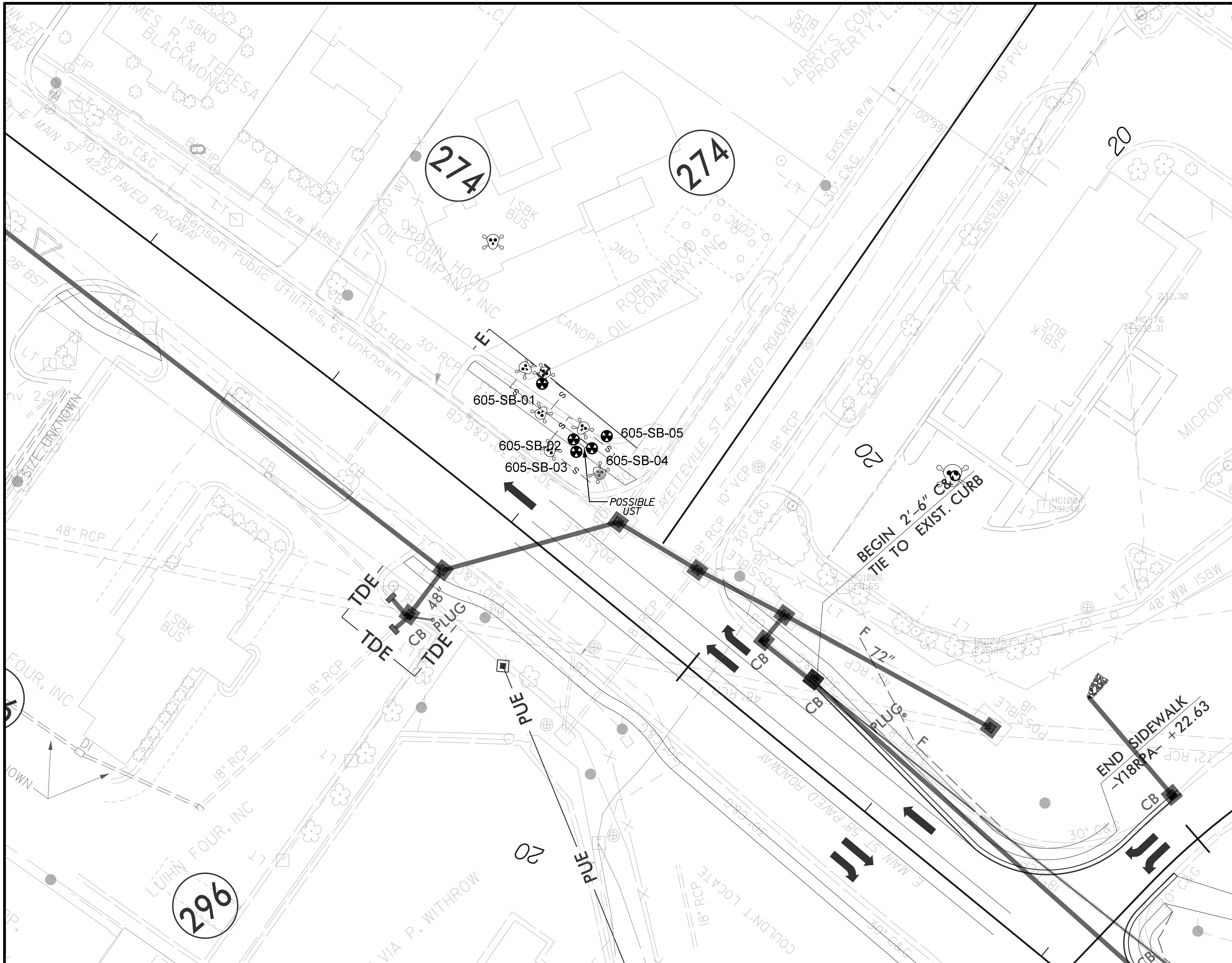
PM: WOF	Project No. 70197584	Terracon	**Topographic Vicinity Map**	**EXHIBIT NO.**
Drawn By: WOF	Scale: 1:24,000		Preliminary Site Assessment Robin Hood Oil Company 605 East Main Street Benson, North Carolina	**1**
Checked By: MTJ	Filename: Exhibit 1 - Topo_605			
Approved By: MTJ	Date: Nov. 2019			

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

PROJECT REFERENCE NO.	EXHIBIT
47532.1.3 (I-5986B)	2A

SITE DIAGRAM WITH BORING LOCATIONS

PARCEL 274
ROBIN HOOD OIL CO.
605 EAST MAIN STREET
BENSON, JOHNSTON COUNTY, NC


605-SB-01
605-SB-02
605-SB-03
605-SB-04
605-SB-05
POSSIBLE UST
274
274
296
ROBIN HOOD OIL COMPANY, INC
ROBIN HOOD OIL COMPANY, INC
BEGIN 2'-6" C&G TIE TO EXIST. CURB
END SIDEWALK -Y18RPA- +22.63
FAYETTEVILLE ST 40' PAVED ROADWAY
E MAIN ST 58' PAVED ROADWAY
LUHN FOUR, INC
SYLVIA P. WITHROW
LARRY'S COMMERCIAL PROPERTY, LLC
JAMES R. & TERESA BLACKMON
TDE
PUE
CB
PLUG
48" RCP
18" RCP
30" C&G
CANOPY
CONC
COULDN'T LOCATE

LEGEND

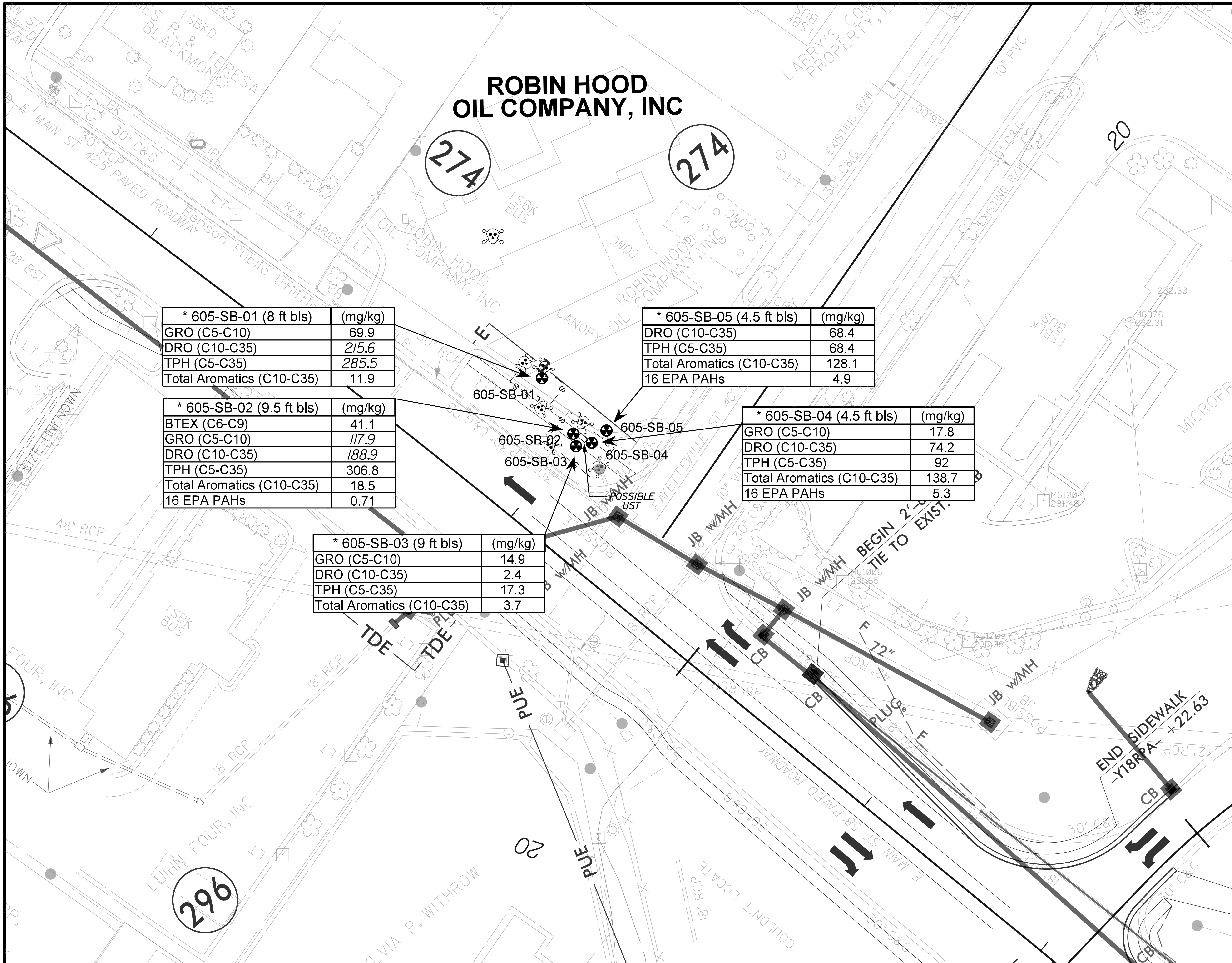
- PROPERTY LINE
- EXISTING RIGHT OF WAY LINE
- EXISTING EDGE OF PAVEMENT
- NEW TEMPORARY CONSTRUCTION EASEMENT
- KNOWN CONTAMINATION SITE
- KNOWN SOIL CONTAMINATION AREA
- BORING LOCATION
- POSSIBLE UST

0 40 80
FEET

PROJECT REFERENCE NO.	EXHIBIT
47532.1.3 (I-5986B)	2B

SITE DIAGRAM WITH BORING LOCATIONS AND ANALYTICAL DATA

PARCEL 274
ROBIN HOOD OIL CO.
605 EAST MAIN STREET
BENSON, JOHNSTON COUNTY, NC



* 605-SB-01 (8 ft bls)	(mg/kg)
GRO (C5-C10)	69.9
DRO (C10-C35)	*215.6*
TPH (C5-C35)	*285.5*
Total Aromatics (C10-C35)	11.9

* 605-SB-02 (9.5 ft bls)	(mg/kg)
BTEX (C6-C9)	41.1
GRO (C5-C10)	*117.9*
DRO (C10-C35)	*188.9*
TPH (C5-C35)	306.8
Total Aromatics (C10-C35)	18.5
16 EPA PAHs	0.71

* 605-SB-03 (9 ft bls)	(mg/kg)
GRO (C5-C10)	14.9
DRO (C10-C35)	2.4
TPH (C5-C35)	17.3
Total Aromatics (C10-C35)	3.7

* 605-SB-04 (4.5 ft bls)	(mg/kg)
GRO (C5-C10)	17.8
DRO (C10-C35)	74.2
TPH (C5-C35)	92
Total Aromatics (C10-C35)	138.7
16 EPA PAHs	5.3

* 605-SB-05 (4.5 ft bls)	(mg/kg)
DRO (C10-C35)	68.4
TPH (C5-C35)	68.4
Total Aromatics (C10-C35)	128.1
16 EPA PAHs	4.9

LEGEND

- PROPERTY LINE
- EXISTING RIGHT OF WAY LINE
- EXISTING EDGE OF PAVEMENT
- NEW TEMPORARY CONSTRUCTION EASEMENT
- KNOWN CONTAMINATION SITE
- KNOWN SOIL CONTAMINATION AREA
- BORING LOCATION
- POSSIBLE UST

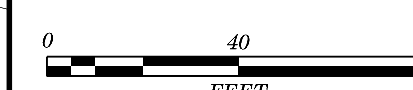
NOTES

* COMPOUNDS DETECTED ABOVE LABORATORY REPORTING LIMITS ARE SUMMARIZED IN THE ANALYTICAL DATA TABLES

CONCENTRATIONS SHOWN IN ITALICS EXCEED THEIR NCDEQ ACTION LEVEL

mg/kg = MILLIGRAMS PER KILOGRAM

ft bls = FEET BELOW LAND SURFACE



APPENDIX A

GEOPHYSICAL SURVEY REPORT

November 8, 2019

John Pilipchuk, L.G., P.E.
North Carolina Department of Transportation
GeoEnvironmental Engineering Unit
1589 Mail Service Center
Raleigh, NC 27699-1589

Re: Report for GeoEnvironmental Phase II Site Investigations
Locate USTs and Utilities using Geophysical Methods
Robin Hood Oil Company
605 East Main Street
Benson, Johnston County, North Carolina
ID: 35976; TIP: I-5986B; WBS Element No. 47532.1.3
Terracon Project No. 70197584

Dear Mr. Pilipchuk:

On October 28 and 29, 2019, a representative of Terracon Consultants, Inc. (Terracon) performed geophysical exploration services at the above referenced site in general accordance with Terracon Proposal No. P70197584 dated October 1, 2019. This report is presented as a summary of those geophysical services.

1.0 PROJECT DESCRIPTION

Based on the RFP from the NCDOT, PSAs are requested for the Robin Hood Oil Company site, located at 605 East Main Street in Benson, North Carolina. The project consisted of the exploration of an approximately 3,150 square-foot area of the existing right-of-way (ROW) of the existing gas station. The purpose of the geophysical exploration was to aid in identifying anomalies consistent with Underground Storage Tanks (USTs) utilizing non-intrusive geophysical methods.

2.0 EXPLORATION METHODS

Terracon used a frequency domain electromagnetic profiler (EM) consisting of a Geonics EM-31-SH system with data logger to collect EM data. In general, field data collection followed the procedures referenced in ASTM D6639-18. More information on both the general method and collection procedures can be found in the referenced standard. EM collects soil conductivity in millisiemens per meter (mS/m) and magnetic susceptibility in parts per trillion (ppt).

Data was collected on a bi-directional grid at approximately 5-foot spacings in both directions. Data was post-processed utilizing trackmaker 31 software engineered by Geomar and Surfer software developed by Golden software.
Additionally, a Ground Penetrating System (GPR) consisting of a 350 MHz antenna and SIR-4000 system made by Geophysical Survey Systems Inc. (GSSI), was utilized to collect GPR data. Data was collected on a bi-directional grid with spacings of approximately 5-feet in both directions. Following the completion of field data collection, data was post-processed utilizing RADAN software engineered by GSSI.

3.0 FINDINGS AND CONCLUSIONS

Terracon reviewed the EM and GPR data collected. Due to interreference from multiple buried utilities and above-ground structures, the anomalies consistent with USTs could not be isolated from the EM data. In general, soil conductivity measurements between -20 to 40 mS/m and magnetic susceptibly measurements between -4 to 4 ppt were considered “background”. Measurements outside of these ranges were interpreted to be caused by above or below ground anomalies. The depth of EM signal penetration is approximately 9-feet below the existing grade, however, the actual depth is not produced from the data collected.

Upon review of the GPR data, an anomaly consistent with a UST was identified at coordinates 35.3779875 N, -78.5417551 W and approximately 3.25 feet below the existing grade and approximately 4 feet long. GPR is not able to provide accurate information regarding an anomaly’s diameter/width. Further details on the location of this anomaly is provided in Appendix A. The depth of GPR signal penetration across the site was approximately 8 feet below the existing grade.

4.0 LIMITATIONS

It should be noted that the process relies on instrument signals to indicate physical conditions in the field. Signal information can be affected by on-site conditions beyond the control of the operator, such as, but not limited to, cultural features, concrete/soil types, concrete/soil moisture, groundwater table depth, and/or reinforcing steel spacing. Interpretation of those signals is based on a combination of known factors combined with the experience of the operator and geophysical scientist evaluating the results. Utilizing conventional observation, sampling, and testing of select areas are recommended to confirm the results from the geophysical surveys. As with all geophysical methods, the geophysical results provide a level of confidence, but should not be considered absolute. We cannot be responsible for the interpretation of geophysical results by others.

4.0 CLOSURE

We appreciate the opportunity to work with you on this project. Please do not hesitate to contact the undersigned if you have any questions regarding this information or if we can be of further service to you.

Sincerely,
Terracon Consultants, Inc.

Joshua A. Lopez
Geophysicist

James D. Hoskins, III, P.E.
Principal / Greensboro Office Manager

Attachments: Appendix A – Geophysical Exploration Results

SITE LOCATION DIAGRAM

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

EXPLORATION LOCATION DIAGRAM

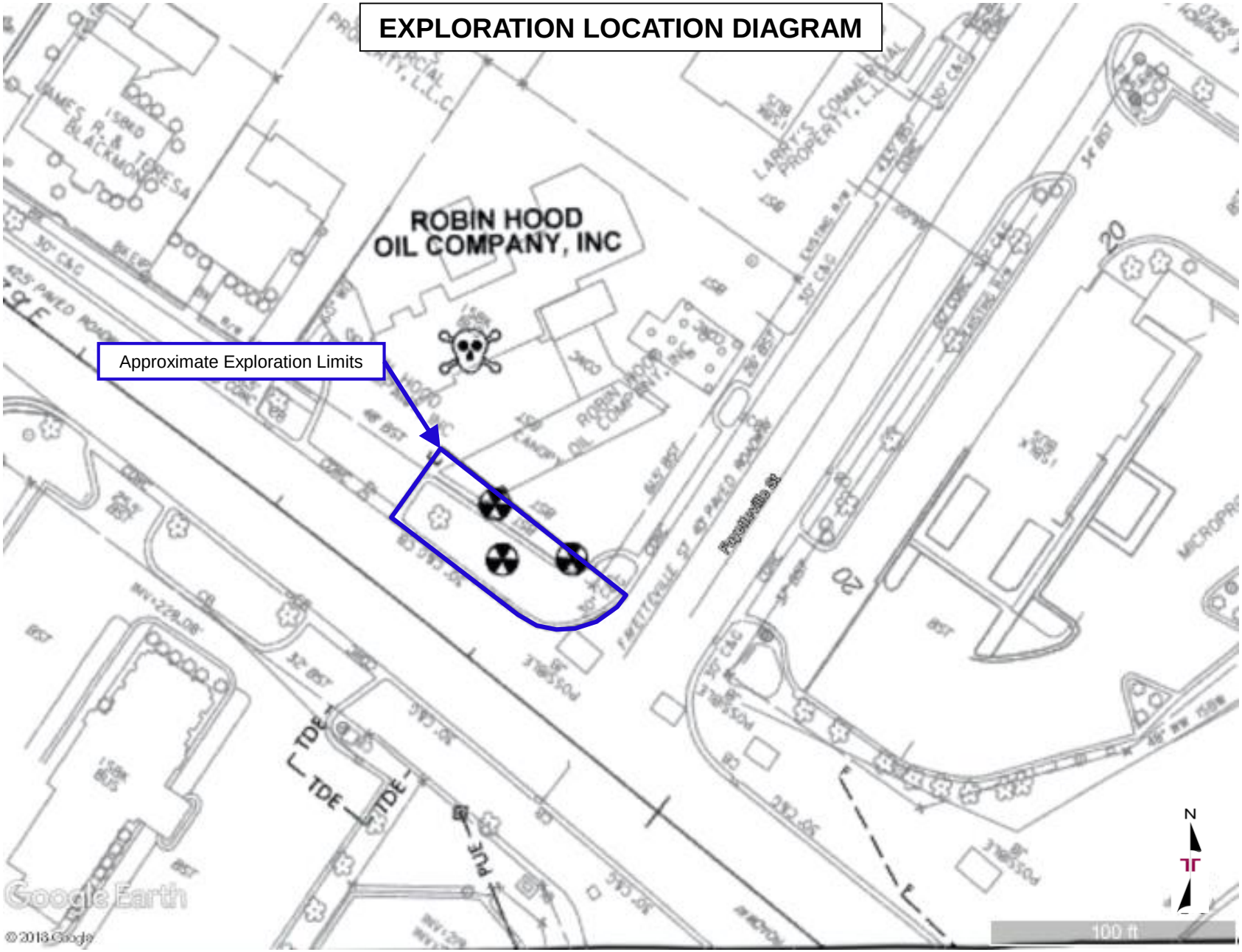


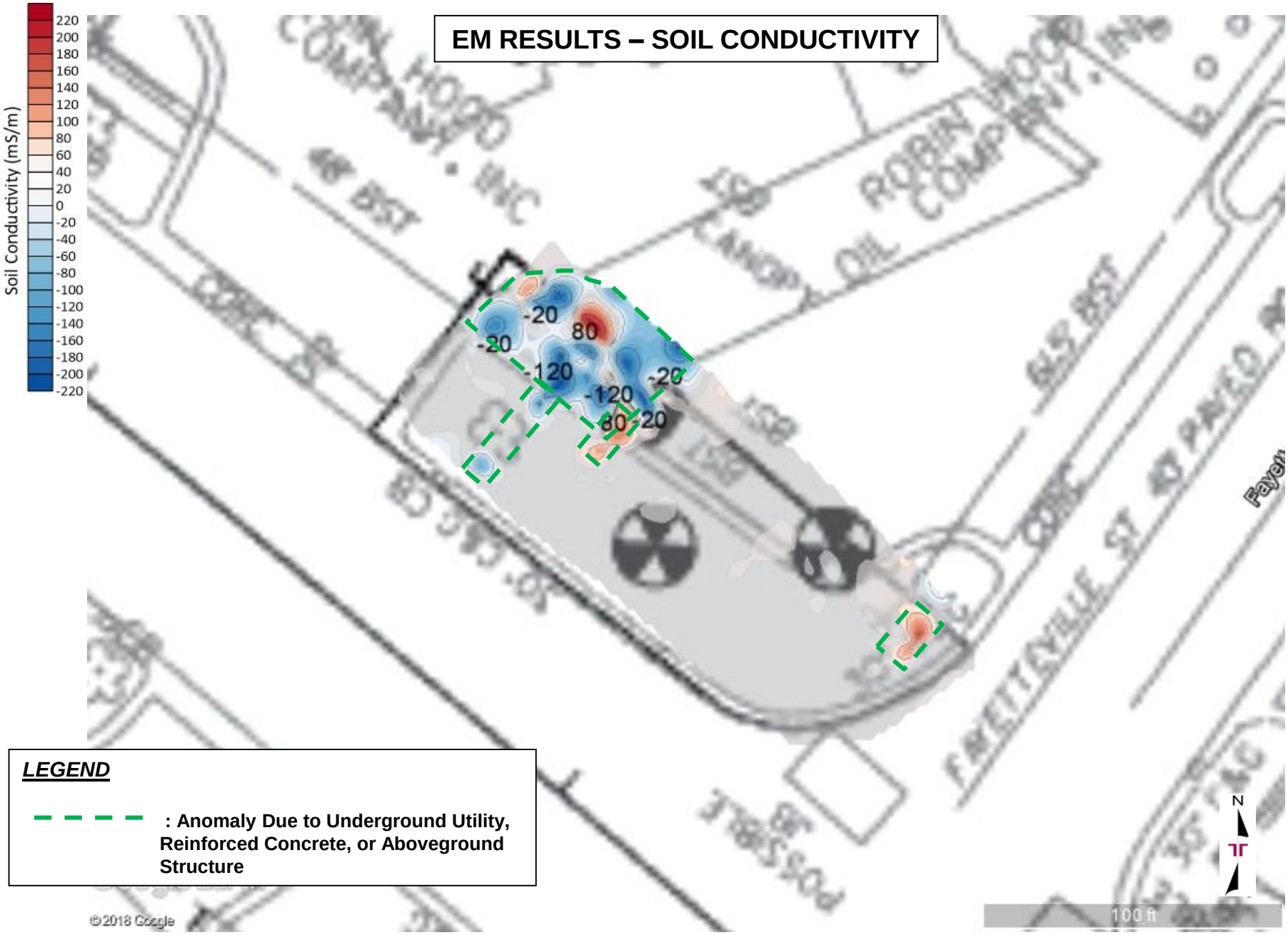
DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

EXPLORATION LOCATION DIAGRAM

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Terracon GeoReport

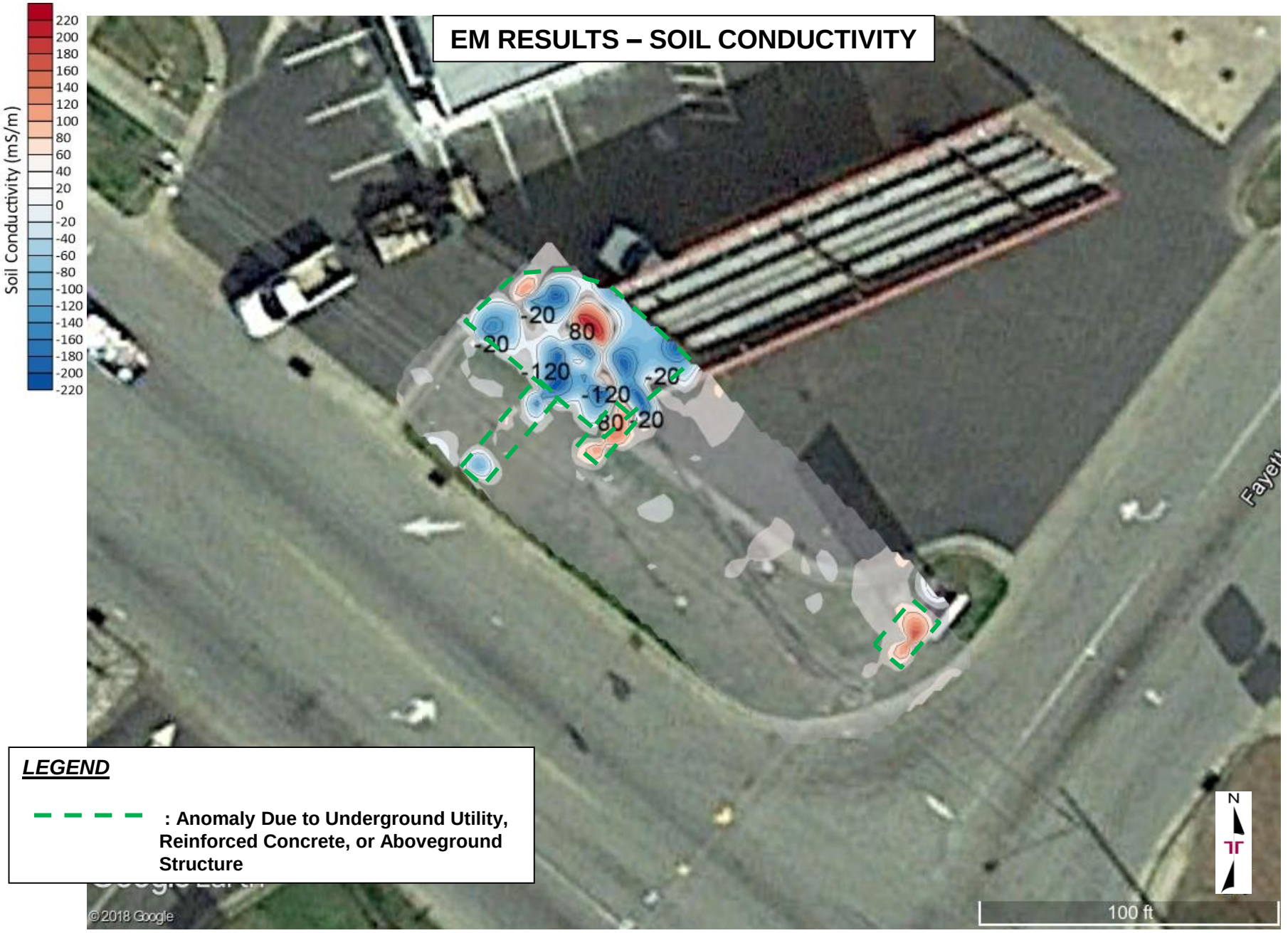
EM RESULTS – SOIL CONDUCTIVITY



LEGEND

: Anomaly Due to Underground Utility, Reinforced Concrete, or Aboveground Structure

EM RESULTS – SOIL CONDUCTIVITY

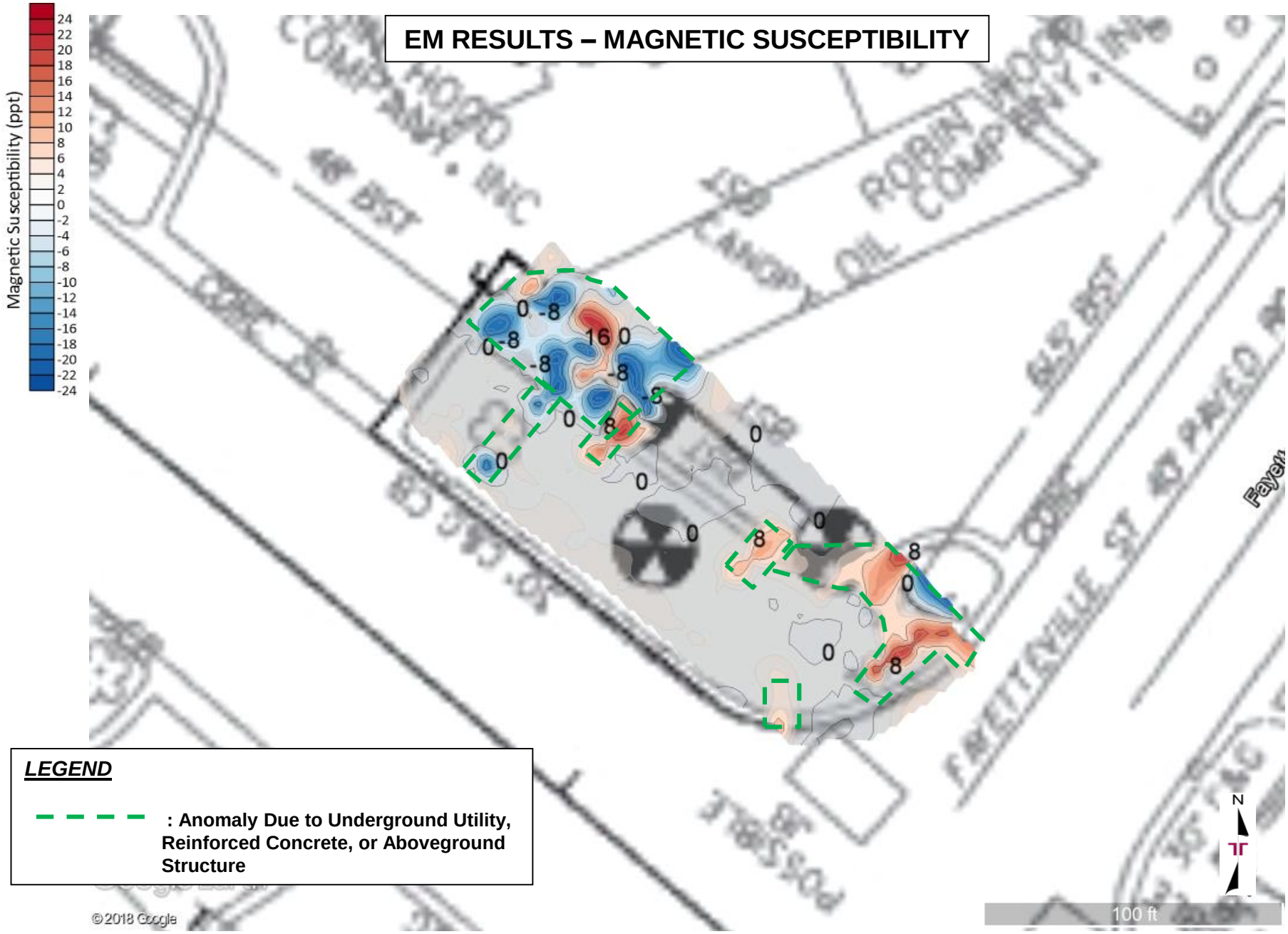


LEGEND

: Anomaly Due to Underground Utility, Reinforced Concrete, or Aboveground Structure

Terracon GeoReport

EM RESULTS – MAGNETIC SUSCEPTIBILITY



LEGEND

– – – : **Anomaly Due to Underground Utility, Reinforced Concrete, or Aboveground Structure**

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

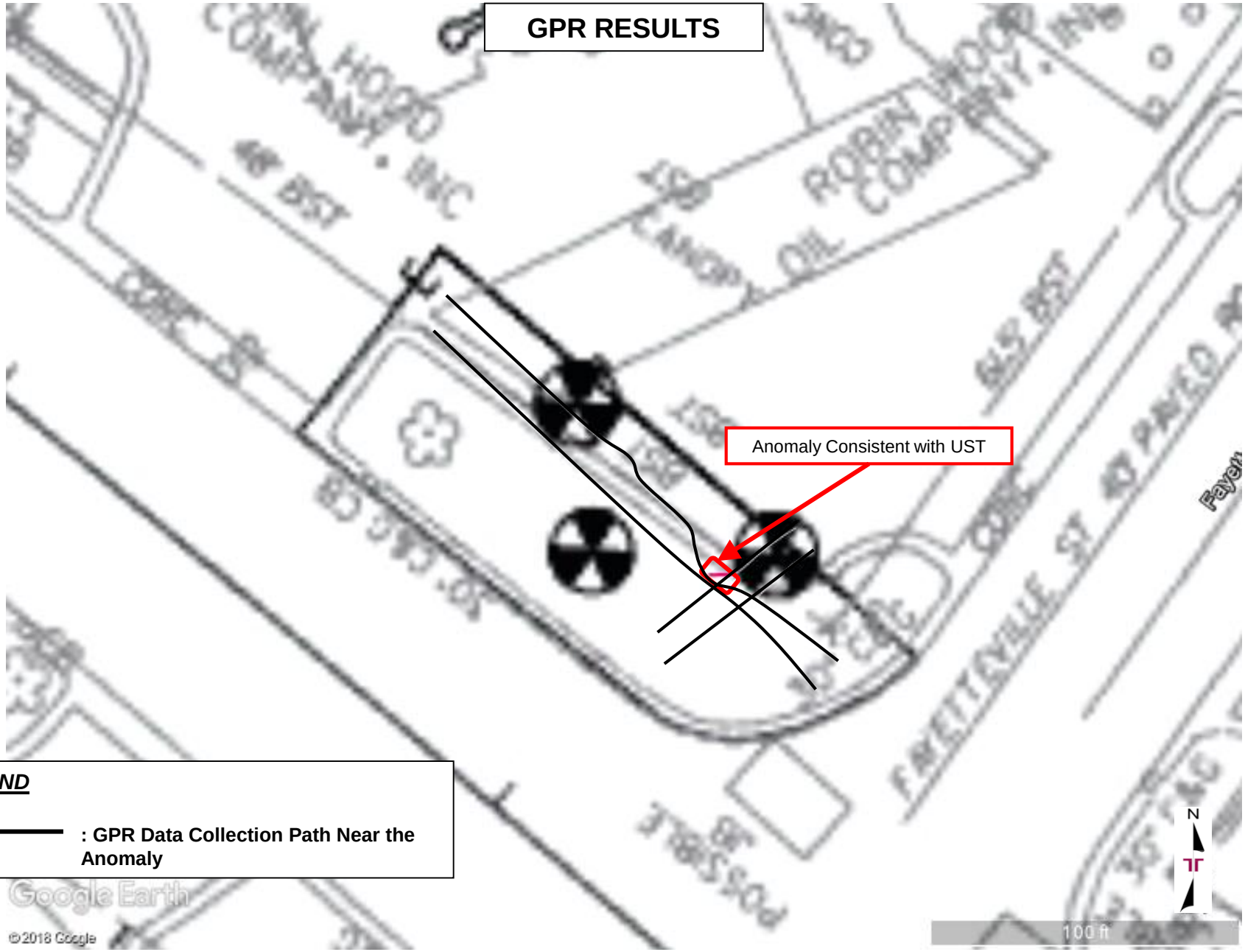
EM RESULTS – MAGNETIC SUSCEPTIBILITY

LEGEND

: **Anomaly Due to Underground Utility, Reinforced Concrete, or Aboveground Structure**

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

GPR RESULTS



LEGEND

: GPR Data Collection Path Near the Anomaly

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

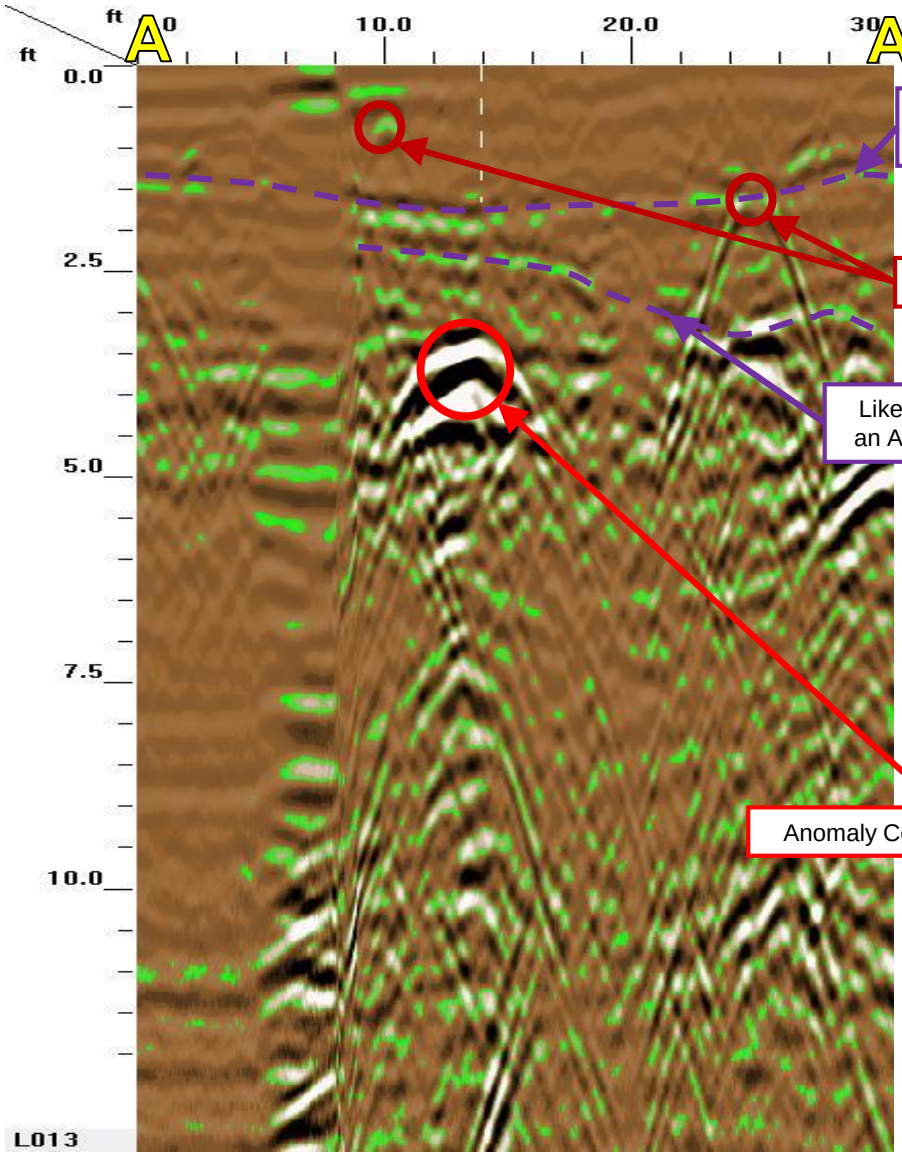
GPR RESULTS

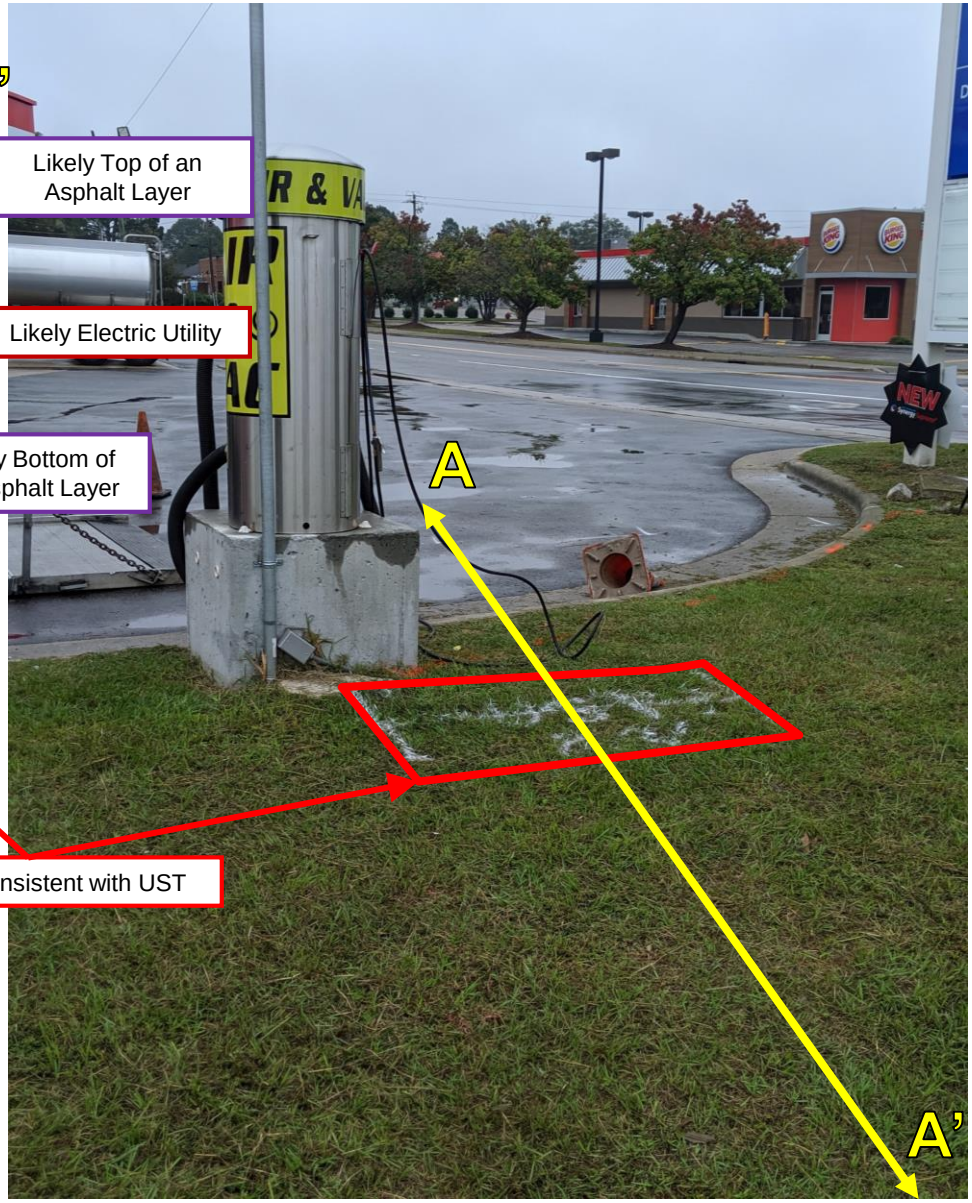
LEGEND

: GPR Data Collection Path Near the Anomaly

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

GPR RESULTS


ft
A
10.0
20.0
30
A'
ft
0.0
2.5
5.0
7.5
10.0
L013
Likely Top of an Asphalt Layer
Likely Electric Utility
Likely Bottom of an Asphalt Layer
Anomaly Consistent with UST


A
A'

APPENDIX B

SOIL BORING LOGS

BORING LOG NO. 605-SB-01

PROJECT: I-95 Interchange Improvement
Parcel 274 PSH 42 - Robin Hood Oil Company

CLIENT: NCDOT
Raleigh, North Carolina

SITE: 605 East Main Street
Benson, Johnston County, North Carolina

LOCATION See Exhibit 2A

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	OVA/PID (ppm)	SAMPLE SENT TO LAB (ID NUMBER)
	ASPHALT AND AGGREGATE BASE COURSE						
1.0						<0.1	
	CLAYEY SAND (SC), brown, moderate odor observed, moist					254	
2.0							
	FINE SAND (SC), trace clay, gray and tan, moderate odor observed, moist				36	17.8	
						255	
		5				1880	605-SB-01 (8 feet) UVF 12:45
						2317	
7.0							
	LEAN CLAY (CL), tan and gray, very strong odor observed, moist				52	3249	
						1418	
						773	
10.0		10					
	Boring Terminated at 10 Feet						

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
2-inch DPT

Abandonment Method:
Boring backfilled with bentonite upon completion.

Notes:
UVF: Ultraviolet fluorescence

WATER LEVEL OBSERVATIONS

Evidence of groundwater table not observed during boring advancement

Terracon
2401 Brentwood Rd, Ste 107
Raleigh, NC

Boring Started: 10-31-2019 | Boring Completed: 10-31-2019
Drill Rig: GeoProbe 7822DT | Driller: Quantex, Inc.
Project No.: 70197584 | Appendix B

BORING LOG NO. 605-SB-02

PROJECT: I-95 Interchange Improvement
Parcel 274 PSH 42 - Robin Hood Oil Company

CLIENT: NCDOT
Raleigh, North Carolina

SITE: 605 East Main Street
Benson, Johnston County, North Carolina

LOCATION See Exhibit 2A

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	OVA/PID (ppm)	SAMPLE SENT TO LAB (ID NUMBER)
	FINE SAND (SP), brown, odor not observed, dry to moist					<0.1	
1.0							
1.5	**ASPHALT AND AGGREGATE BASE COURSE**						
	FINE SAND (SP), brown, mild odor observed from 5 to 6 feet, dry to moist				28	<0.1	
						25.8	
		5					605-SB-02 (9.5 feet) UVF 11:50
6.0						<0.1	
	CLAYEY SAND (SC), gray, mild odor observed, moist				60	2.5	
9.0							
	LEAN CLAY (CL), tan and orange, moderate to moderately strong odor observed, moist					1171	
10.0		10					
	Boring Terminated at 10 Feet						

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
2-inch DPT

Abandonment Method:
Boring backfilled with bentonite upon completion.

Notes:
UVF: Ultraviolet fluorescence

WATER LEVEL OBSERVATIONS

Evidence of groundwater table not observed during boring advancement

Terracon
2401 Brentwood Rd, Ste 107
Raleigh, NC

Boring Started: 10-31-2019 | Boring Completed: 10-31-2019
Drill Rig: GeoProbe 7822DT | Driller: Quantex, Inc.
Project No.: 70197584 | Appendix B

BORING LOG NO. 605-SB-03

PROJECT: I-95 Interchange Improvement
Parcel 274 PSH 42 - Robin Hood Oil Company

CLIENT: NCDOT
Raleigh, North Carolina

SITE: 605 East Main Street
Benson, Johnston County, North Carolina

LOCATION See Exhibit 2A

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	OVA/PID (ppm)	SAMPLE SENT TO LAB (ID NUMBER)
	FINE SAND (SP), brown, odor not observed, dry					<0.1	
1.0	**ASPHALT AND AGGREGATE BASE COURSE**						
2.0	**CLAYEY SAND (SC)**, brown, mild odor observed, dry to moist				36	<0.1	
						5.7	
5.0	**FINE SAND (SP)**, brown, odor not observed, moist	5				<0.1	605-SB-03 (9 feet) UVF 12:00
					36	<0.1	
8.0	**SANDY LEAN CLAY (CL)**, gray and orange, moderate odor observed, moist					393	
10.0	***Boring Terminated at 10 Feet***	10					

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
2-inch DPT

Abandonment Method:
Boring backfilled with bentonite upon completion.

Notes:
UVF: Ultraviolet fluorescence

WATER LEVEL OBSERVATIONS

Evidence of groundwater table not observed during boring advancement

Terracon
2401 Brentwood Rd, Ste 107
Raleigh, NC

Boring Started: 10-31-2019 | Boring Completed: 10-31-2019
Drill Rig: GeoProbe 7822DT | Driller: Quantex, Inc.
Project No.: 70197584 | Appendix B

BORING LOG NO. 605-SB-04

PROJECT: I-95 Interchange Improvement
Parcel 274 PSH 42 - Robin Hood Oil Company

CLIENT: NCDOT
Raleigh, North Carolina

SITE: 605 East Main Street
Benson, Johnston County, North Carolina

LOCATION See Exhibit 2A

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	OVA/PID (ppm)	SAMPLE SENT TO LAB (ID NUMBER)
	FINE SAND (SP), brown, odor not observed, dry					<0.1	
1.0	**ASPHALT AND AGGREGATE BASE COURSE**						
2.0	**SANDY LEAN CLAY (CL)**, brown, mild odor observed				41	<0.1	
						66	
		5					605-SB-04 (4.5 feet) UVF 12:15
5.5	**FINE SAND (SW)**, with gravel, brown, odors not observed, dry					<0.1	
6.5	**LEAN CLAY (CL)**, gray and orange, moderate odor observed between 9 and 10 feet, stiff				60	<0.1	
						233	
10.0	***Boring Terminated at 10 Feet***	10					

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
2-inch DPT

Abandonment Method:
Boring backfilled with bentonite upon completion.

Notes:
UVF: Ultraviolet fluorescence

WATER LEVEL OBSERVATIONS

Evidence of groundwater table not observed during boring advancement

Terracon
2401 Brentwood Rd, Ste 107
Raleigh, NC

Boring Started: 10-31-2019 | Boring Completed: 10-31-2019
Drill Rig: GeoProbe 7822DT | Driller: Quantex, Inc.
Project No.: 70197584 | Appendix B

BORING LOG NO. 605-SB-05

PROJECT: I-95 Interchange Improvement
Parcel 274 PSH 42 - Robin Hood Oil Company

CLIENT: NCDOT
Raleigh, North Carolina

SITE: 605 East Main Street
Benson, Johnston County, North Carolina

LOCATION See Exhibit 2A

DEPTH	MATERIAL DESCRIPTION	DEPTH (ft)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	OVA/PID (ppm)	SAMPLE SENT TO LAB (ID NUMBER)
	ASPHALT AND AGGREGATE BASE COURSE					<0.1	
2.0	**LEAN CLAY (CL)**, brown, odor not observed, moist, (gray staining and moderate odor observed at 4 feet)				46	<0.1	
4.0						151	
4.5	**FINE SAND (CL)**, with gravel, tan, mild odor observed, dry						
	SANDY LEAN CLAY (CL), tan and orange, mild odor observed	5				15.6	605-SB-05 (4 feet) UVF 12:30
8.0					60	30.2	
	LEAN CLAY (CL), tan, gray, and orange, moderate odor observed, moist to wet, (sand seam at 9.5 feet)					93.2	
10.0		10					
	Boring Terminated at 10 Feet						

The stratification lines represent the approximate transition between differing soil types and/or rock types; in-situ these transitions may be gradual or may occur at different depths than shown.

Advancement Method:
2-inch DPT

Abandonment Method:
Boring backfilled with bentonite upon completion.

Notes:
UVF: Ultraviolet fluoresence

WATER LEVEL OBSERVATIONS

Evidence of groundwater table not observed during boring advancement

Terracon
2401 Brentwood Rd, Ste 107
Raleigh, NC

Boring Started: 10-31-2019 | Boring Completed: 10-31-2019
Drill Rig: GeoProbe 7822DT | Driller: Quantex, Inc.
Project No.: 70197584 | Appendix B

APPENDIX C

LABORATORY ANALYTICAL REPORTS AND CHAIN-OF-CUSTODY FORMS

Hydrocarbon Analysis Results

Client: TERRACON
Address: 2401 BRENTWOOD ROAD #107
RALEIGH NC

Contact: WILL FRAZIER

Project: #70197584

Samples taken Thursday, October 31, 2019
Samples extracted Thursday, October 31, 2019
Samples analysed Friday, November 1, 2019

Operator MAX MOYER

U00902

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
										C5 - C10	C10 - C18	C18	
s	904-SB-01	21.0	<0.52	<0.52	<0.52	<0.52	<0.1	<0.17	<0.021	0	0	0	PHC not detected
s	904-SB-02	20.5	<0.51	<0.51	<0.51	<0.51	<0.1	<0.16	<0.02	0	0	0	PHC not detected
s	903-SB-01	10.7	<0.27	1.7	0.27	1.97	0.2	<0.09	<0.011	96.5	2.4	1.1	Deg.PHC 72.4%,(FCM)
s	903-SB-02	22.8	<0.57	8.3	3.5	11.8	1.7	<0.18	<0.023	87.5	9.5	3	Deg.PHC 70.5%,(FCM)
s	903-SB-03	21.8	<0.55	0.97	2.4	3.4	1.4	<0.17	<0.022	66.7	26.9	6.5	Deg Fuel 79.9%,(FCM)
s	903-SB-04	22.0	<0.55	<0.55	<0.55	<0.55	<0.11	<0.18	<0.022	0	0	0	PHC not detected
s	903-SB-05	22.4	<0.56	1.7	5.7	7.4	3.6	<0.18	<0.022	57	34	9	Deg Fuel 77.2%,(FCM)
s	605-SB-01	58.6	<1.5	69.9	215.6	285.5	11.9	<0.47	<0.059	99.7	0.3	0	Deg.Kerosene 81.4%,(FCM)
s	605-SB-02	21.0	41.1	117.9	188.9	306.8	18.5	0.71	<0.021	99.7	0.2	0.1	Deg.Kerosene 68.5%,(FCM),(P)
s	605-SB-03	19.5	<0.49	14.9	2.4	17.3	3.7	<0.16	<0.02	98.7	1.1	0.2	No Match found

Initial Calibrator QC check OK

Final FCM QC Check OK 101.2 %

Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values uncorrected for moisture or stone content. Fingerprints provide a tentative hydrocarbon identification.

Abbreviations :- FCM = Results calculated using Fundamental Calibration Mode : % = confidence of hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

B = Blank Drift : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : (OCR) = Outside cal range : (M) = Modifed Result.

% Ratios estimated aromatic carbon number proportions : HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only. **Data generated by HC-1 Analyser**

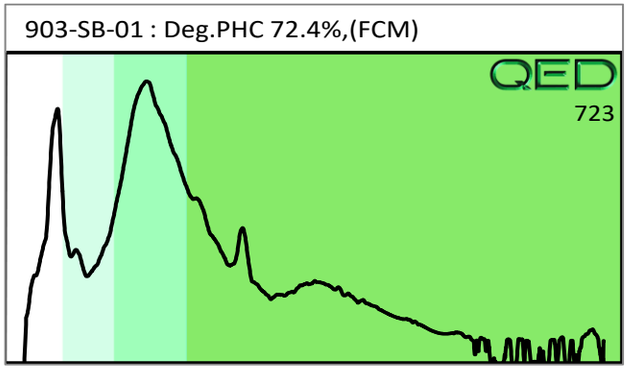
QED Hydrocarbon Fingerprints

Project: #70197584 ##################

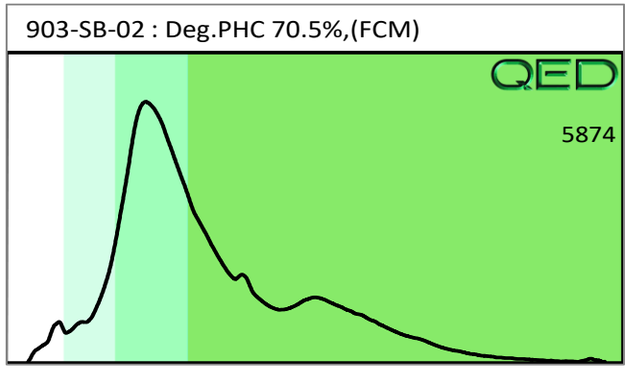
904-SB-01 : PHC not detected

904-SB-02 : PHC not detected

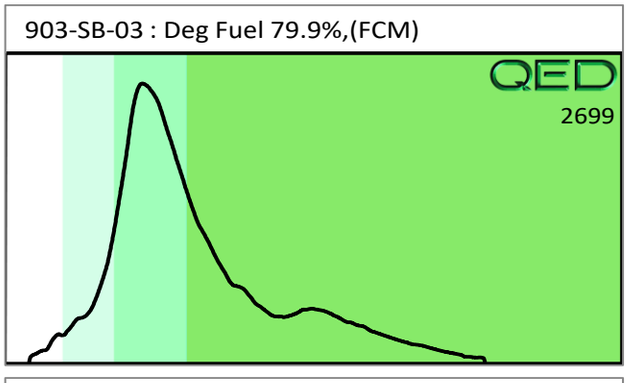
903-SB-01 : Deg.PHC 72.4%,(FCM)



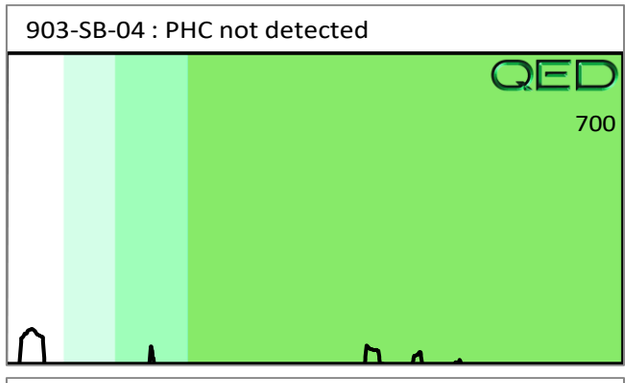
903-SB-02 : Deg.PHC 70.5%,(FCM)



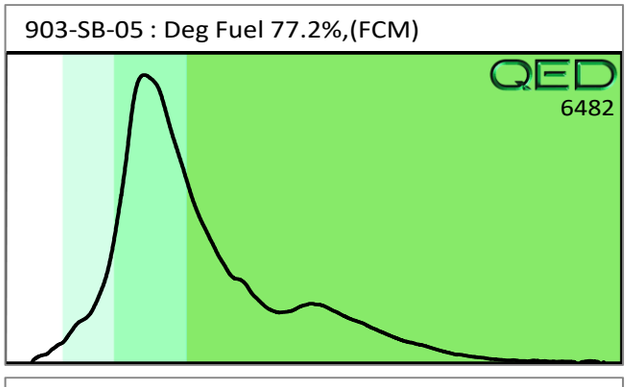
903-SB-03 : Deg Fuel 79.9%,(FCM)



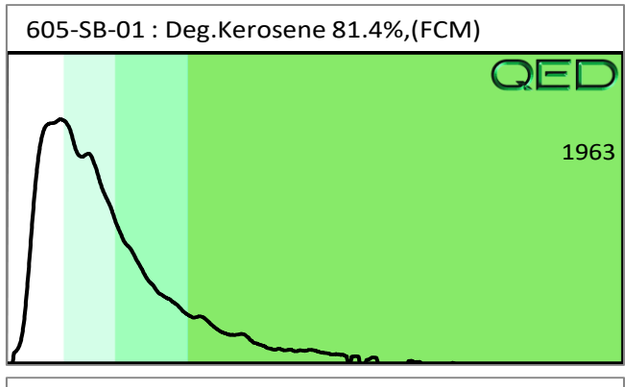
903-SB-04 : PHC not detected



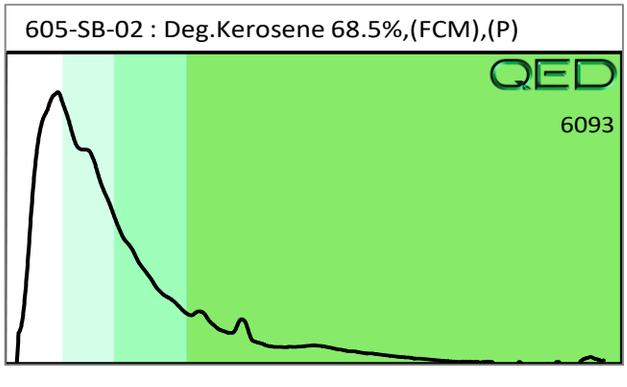
903-SB-05 : Deg Fuel 77.2%,(FCM)



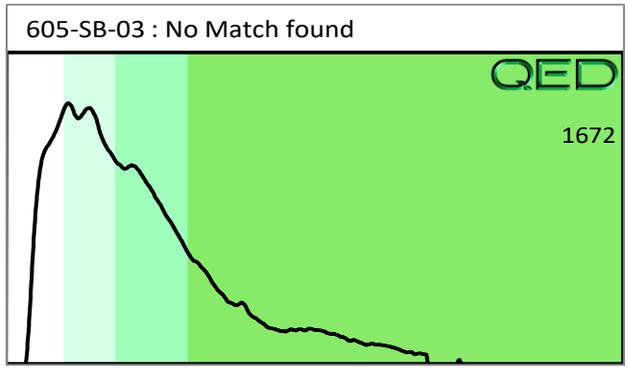
605-SB-01 : Deg.Kerosene 81.4%,(FCM)



605-SB-02 : Deg.Kerosene 68.5%,(FCM),(P)



605-SB-03 : No Match found



QED

REDLAB™ RAPID ENVIRONMENTAL DIAGNOSTICS

AQROS

Hydrocarbon Analysis Results

Client: TERRACON
Address: 2401 BRENTWOOD ROAD #107
RALEIGH NC

Contact: WILL FRAZIER

Project: #70197584

Samples taken Thursday, October 31, 2019
Samples extracted Thursday, October 31, 2019
Samples analysed Friday, November 1, 2019

Operator MAX MOYER

U00902

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
										C5 - C10	C10 - C18	C18	
s	605-SB-04	70.1	<1.8	17.8	74.2	92	138.7	5.3	<0.07	58.5	32.5	9	Deg.Fuel 85.3%,(FCM)
s	605-SB-05	65.6	<1.6	<1.6	68.4	68.4	128.1	4.9	<0.066	0	77.8	22.2	Deg.Fuel 86%,(FCM)

Initial Calibrator QC check OK

Final FCM QC Check OK 98.9 %

Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values uncorrected for moisture or stone content. Fingerprints provide a tentative hydrocarbon identification.

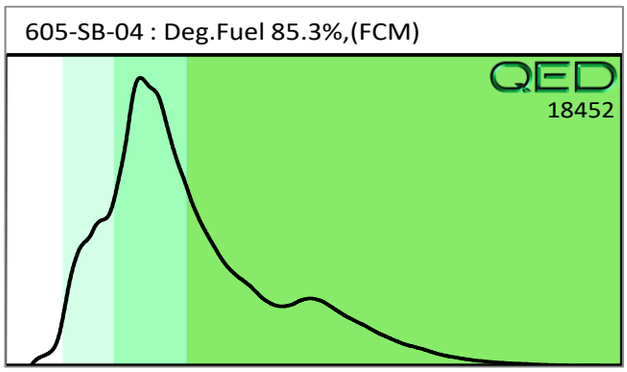
Abbreviations :- FCM = Results calculated using Fundamental Calibration Mode : % = confidence of hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

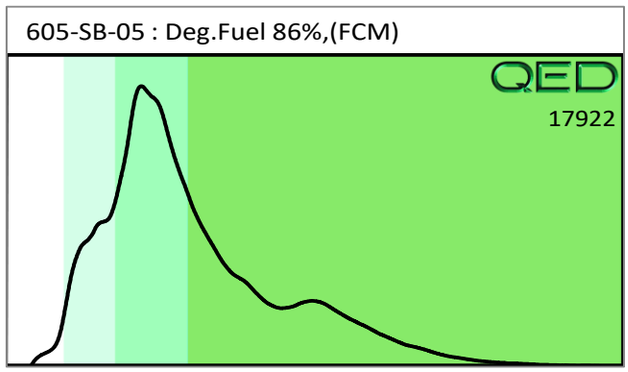
B = Blank Drift : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : (OCR) = Outside cal range : (M) = Modifed Result.

% Ratios estimated aromatic carbon number proportions : HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only. **Data generated by HC-1 Analyser**

QED Hydrocarbon Fingerprints

Project: #70197584 ##################





B143

Client Name:	Terracon Consultants
Address:	2401 Brentwood Rd #107 Raleigh NC
Contact:	Will Frazier
Project Ref.:	70197584
Email:	wafrazier@terracon.com
Phone #:	984-202-4059
Collected by:	W. Frazier

REDLAB™

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 BaP

Sample Collection Date/Time	TAT Requested 24 Hour	TAT Requested 48 Hour	Initials	Sample ID	Total Wt.	Tare Wt.	Sample Wt.
10/31/19 0920		✓	WOF	904-SB-01	57.4	45.0	12.4
0930		✓	WOF	904-SB-02	57.7	45.0	12.7
0945		✓	WOF	903-SB-01	58.2	45.1	13.1
1000		✓	WOF	903-SB-02	56.6	45.2	11.4
1010		✓	WOF	903-SB-03	56.9	45.0	11.9
1025		✓	WOF	903-SB-04	56.8	45.0	11.8
1040		✓	WOF	903-SB-05	56.6	45.0	11.6
1245		✓	WOF	605-SB-01	59.1	45.1	14.0
1150		✓	WOF	605-SB-02	57.5	45.1	12.4
1200		✓	WOF	605-SB-03	58.4	45.1	13.3
1215		✓	WOF	605-SB-04	56.9	45.2	11.7
1230		✓	WOF	605-SB-05	57.3	44.8	12.5

Comments:

Relinquished by	Date/Time	Accepted by	Date/Time
W. Frazier	10/31/19 1500	MM 11/1/19	1150
Relinquished by	Date/Time	Accepted by	Date/Time

RED Lab USE ONLY

12