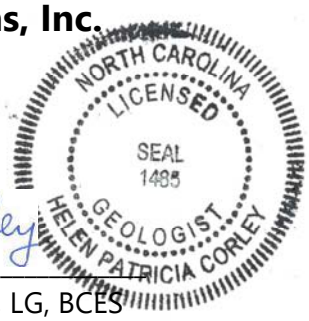
North Carolina Department of Transportation

Phase II Investigation
State Project: R-5709
WBS Element: 50205.1.1
Moore County

Parcel 123
Karlton Oates Property
9849 NC 211 Hwy
Aberdeen, North Carolina
October 21, 2021

Wood Environment & Infrastructure Solutions, Inc.
Project: 20478R5709



Andrew Frantz, REM
Senior Scientist

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Principal Hydrogeologist

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1.0 INTRODUCTION

In response to the North Carolina Department of Transportation (NCDOT) Request for Proposal, dated June 2, 2021, Wood Environment & Infrastructure Solutions, Inc. (Wood) has performed a Phase II Investigation for Parcel 123 (Site). The investigation was conducted in accordance with Wood's Technical and Cost proposal dated June 18, 2021, and NCDOT's July 6, 2021, Notice to Proceed. NCDOT contracted Wood to perform the Phase II Investigation at the parcel, within areas that will be affected by the proposed widening of NC 211 Hwy from US 15-501 in Aberdeen, North Carolina to SR 1244 (West Palmer Street)/SR 1311 (Mockingbird Hill Road) in Raeford, North Carolina.

The Site is located along the northern side of NC 211 Hwy, as shown on the Vicinity Map, **Figure 1**. The Site, which is located at 9849 NC 211 Hwy, is currently vacant. The Site is identified as Parcel 123, Karlton Oates property, within the NCDOT MicroStation survey file and is in Aberdeen of Moore County, North Carolina. The area of investigation at Parcel 123 is approximately 0.413-acres as shown on **Figure 2**.

The Site was reported as a possible former gasoline station in the 2019 NCDOT Phase I Report. In addition, a concrete pad was observed on the southern portion of the parcel. A metal pipe was observed protruding up from the concrete pad. Based on the presence of the metal pipe, it is suspected that the pad is a former dispenser island. Wood reviewed the North Carolina Laserfiche online database and NCDEQ documentation for Parcel 123 was not present. In addition, Wood reviewed the NCDOT Historical Aerial Imagery Index and a photograph from 1990 was available for review. A building is visible on the southern portion of the parcel. Due to the quality of the aerial photograph, other Site features were not discernable.

The following report describes a geophysical survey and subsurface field investigation at the Site, with results from our ultraviolet fluorescence (UVF) soil analyses and evaluation for potential soil contamination within the Site.

2.0 GEOLOGY

2.1 Regional Geology

The Site is located within the Coastal Plain Physiographic Province of North Carolina. According to the 1985 State Geologic Map of North Carolina, the area is within the Middendorf Formation and is underlain by sand, sandstone, and mudstone.

2.2 Site Geology

Site geology was observed through the advancement of 13 shallow soil borings (P123-B1 to P123-B13). The borings were advanced to an approximate depth of 10 feet below ground surface (bgs). Groundwater was not encountered during boring advancement. Figure 2 presents the boring locations and Site layout. Soils encountered in the borings consisted mostly of gray clay overlying white to tan medium-grained sand. Staining and petroleum odors were not observed in the borings. Based on observations of topography of the Site vicinity, the groundwater flow direction is inferred to be generally toward the southwest. Boring logs are presented in **Appendix A**.

3.0 FIELD ACTIVITIES

3.1 Preliminary Activities

Prior to commencing field sampling activities at the Site, several tasks were accomplished in preparation for the subsurface investigation. A Health and Safety Plan (HASP) was created with the Site-specific health and safety information necessary for the field activities, including protocol for COVID-19. North Carolina 811 was contacted on August 24, 2021, for the parcel.

Eastern Solutions, LLC of Charlotte, North Carolina (Eastern Solutions) was retained to perform vegetation clearing at the parcel to facilitate access for geophysical survey equipment. Pyramid Geophysical Services of Greensboro, North Carolina (Pyramid) was retained to conduct a geophysical investigation. Probe Utility Locating (PUL) was retained to perform utility locating activities at the Site. Innovative Environmental Technologies, Inc. (IET) of Concord, North Carolina was retained by Wood to perform the direct push sampling

for soil borings, and UVF instrumentation was rented from Red Lab, LLC (Red Lab) of Wilmington, North Carolina.

Boring locations were strategically placed within the parcel to maximize the opportunity to encounter potential contaminated soil and evaluate areas of subsurface design features.

3.2 Site Reconnaissance and Vegetation Clearing

Wood personnel visited the parcel on June 8, 2021, and observed that the Site was vacant with a suspected dispenser island located on the southern portion of the parcel. In addition, two flush mount groundwater monitoring wells were observed on the western portion of the parcel and identified as MW-1 and MW-2. According to the well tags located at each well, MW-1 has a total depth of 54 feet bgs with a screened interval of 39 – 54 feet bgs while MW-2 has a total depth of 29 feet bgs with a screened interval of 14 – 29 feet bgs. Wood personnel measured the depth to water in each well with an electronic water level meter. The depth to water in MW-1 was measured at 40.70 below top of casing (btoc) and was 21.95 btoc in MW-2. A photographic log is included in **Appendix B**.

The vegetation clearing was conducted by Eastern Solutions personnel on August 4, 2021. Eastern Solutions used a brush hog to mow the tall grass on the southern portion of the parcel.

3.3 Geophysical Survey Results and Utility Locating

The geophysical survey was conducted by Pyramid personnel between August 10 and 12, 2021. Pyramid conducted a geophysical investigation using electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys on the southern portion of the parcel as this area is suspected to have been occupied by a former gasoline station. A total of two EM anomalies were identified. One EM anomaly was associated with a known monitoring well, and the other anomaly consisted of two isolated metallic features that were associated with unknown buried metal. The GPR survey confirmed the absence of buried structures in the areas of the metallic interference. The geophysical survey did not identify evidence of USTs within the investigation area. The complete Pyramid geophysics report is included as **Appendix C**.

Utility locating was performed by PUL personnel on August 24, 2021. The utility locating effort identified a buried water line, several buried telephone and communication lines and buried a natural gas line. The telephone and communications lines traverse the southern and northern portions of the parcel parallel to both East Main Street and NC 211 Hwy. In addition, a telephone line was identified traversing the northwestern corner of the Site, between East Main Street and the western adjacent property. The water and natural gas lines were identified on the northern portion of the parcel parallel to East Main Street. Overhead high-voltage power lines were identified along the southern parcel boundary parallel to NC 211 Hwy.

3.4 Soil Sampling

On September 3 and 7, 2021, Wood and IET mobilized to the Site to advance 13 shallow soil borings (P123-B1 to P123-B13). The borings were advanced via direct-push technology to an approximate depth of 10 feet bgs. Boring locations targeted potential environmental sources at the Site and future drainage features.

The purpose of soil sampling was to assess if a petroleum release had impacted the Site and if so, to estimate the volume of impacted soil that might require special handling during NCDOT construction activities. IET advanced a soil sampler to the target depth at each boring location using an AMS PowerProbe. To minimize the potential for cross-contamination between samples, a new polyvinyl chloride (PVC) sleeve (tube) was inserted into the sampler for each soil interval. Visual and olfactory observations relative to the soil cores were recorded by Wood personnel. The soil types encountered in the borings were recorded to prepare soil boring logs. Wood conducted field screening for volatile organic compounds (VOCs) of the soil borings with a photoionization detector (PID). The portion of each soil core with the highest PID reading was selected from the 0–5 foot interval and the 5-10 foot interval for analysis of total petroleum hydrocarbons (TPH), diesel range organics (DRO), gasoline range organics (GRO), benzene, toluene, ethylbenzene, and xylene (BTEX), total aromatics, and polycyclic aromatic hydrocarbons (PAH) by UVF. Neither groundwater nor bedrock were encountered in the borings. Twenty-six soil samples were collected from the 13 borings at the Site for onsite UVF analysis.

4.0 SOIL SAMPLING RESULTS

Based on September 3 and 7, 2021 PID screening and UVF hydrocarbon analysis, evidence of petroleum hydrocarbon impacts was not identified. The NCDEQ Action Levels of 100 milligrams per kilogram (mg/kg) for DRO and 50 mg/kg for GRO were not exceeded in the 13 borings advanced at the Site.

PID readings for the 26 soil samples ranged from 0.1 parts per million (ppm) in sample P123-B2-4-6 collected from 4 to 6 feet bgs, to 32.0 ppm in sample B123-B13-0-2 collected from 0 to 2 feet bgs. The PID field screening results for samples selected for UVF analysis are summarized in **Table 1** and the full list of PID readings are provided on the boring logs in Appendix A.

Results from the on-Site UVF petroleum soil analyses are presented in **Table 2**, with instrument generated tables in **Appendix D**. Several categories of analyses were measured such as: DRO, GRO, TPH, PAHs, and total aromatics. **Figure 3** presents the GRO and DRO results for the September 2021 investigation.

GRO or DRO detections in the 26 soil samples collected at the Site did not exceed their respective NCDEQ Action Levels. The hydrocarbon results from the QED QROS Hydrocarbon Analyzer are provided in Appendix D.

5.0 CONCLUSIONS

Based on the Site observations and UVF analysis, petroleum-impacted soil contamination was not identified as defined by localized exceedances of the NCDEQ Action Levels of 50 mg/kg for GRO and 100 mg/kg for DRO.

The following bulleted summary is based upon Wood's evaluation of field observations and on-Site quantitative analyses of samples collected from the Site September 3 to 7, 2021.

- The Site is vacant, and USTs were not identified during the geophysical survey or field activities. Subsurface piping was not identified beneath the visible concrete pad on the southern portion of the parcel.

- Thirteen soil borings were advanced to roughly 10 ft bgs in the NCDOT ROW investigation area to collect soil samples for on-Site UVF analysis. Twenty-six soil samples were collected for on-Site UVF analysis.

- UVF analysis of the 26 soil samples collected did not identify petroleum-impacted soil.

6.0 RECOMMENDATIONS

Based on these Phase II Investigation results, Wood recommends no further action.

TABLES

Table 1: Summary of PID Screening Results
R-5709, Parcel 123 - Karlton Oates Property
Aberdeen, North Carolina
Wood Project: 20478R5709

Boring ID	Depth of Sample Interval	PID Reading
P123-B1	0-2	0.3
	6-8	0.5
P123-B2	0-2	0.3
	4-6	0.1
P123-B3	0-2	0.2
	4-6	0.3
P123-B4	2-4	0.4
	6-8	0.4
P123-B5	2-4	1.0
	6-8	0.8
P123-B6	2-4	14.4
	8-10	4.4
P123-B7	0-2	1.2
	4-6	0.6
P123-B8	2-4	0.5
	8-10	0.5
P123-B9	2-4	0.6
	8-10	8.2
P123-B10	2-4	9.6
	8-10	10.4
P123-B11	0-2	19.1
	4-6	14.2
P123-B12	0-2	18.7
	4-6	16.4
P123-B13	0-2	32.0
	6-8	10.7

Notes:

1. Samples collected on 9/3/21
2. Depths shown in feet below ground surface (bgs)
3. PID = Photoionization Detector
4. PID readings shown in parts per million (ppm)

Prepared By/Date: AJF 9/8/21

Checked By/Date: DRH 10/4/21

Table 2: UVF Hydrocarbon Soil Sampling Results
R-5709, Parcel 123 - Karlton Oates Property
Aberdeen, North Carolina
Wood Project: 20478R5709

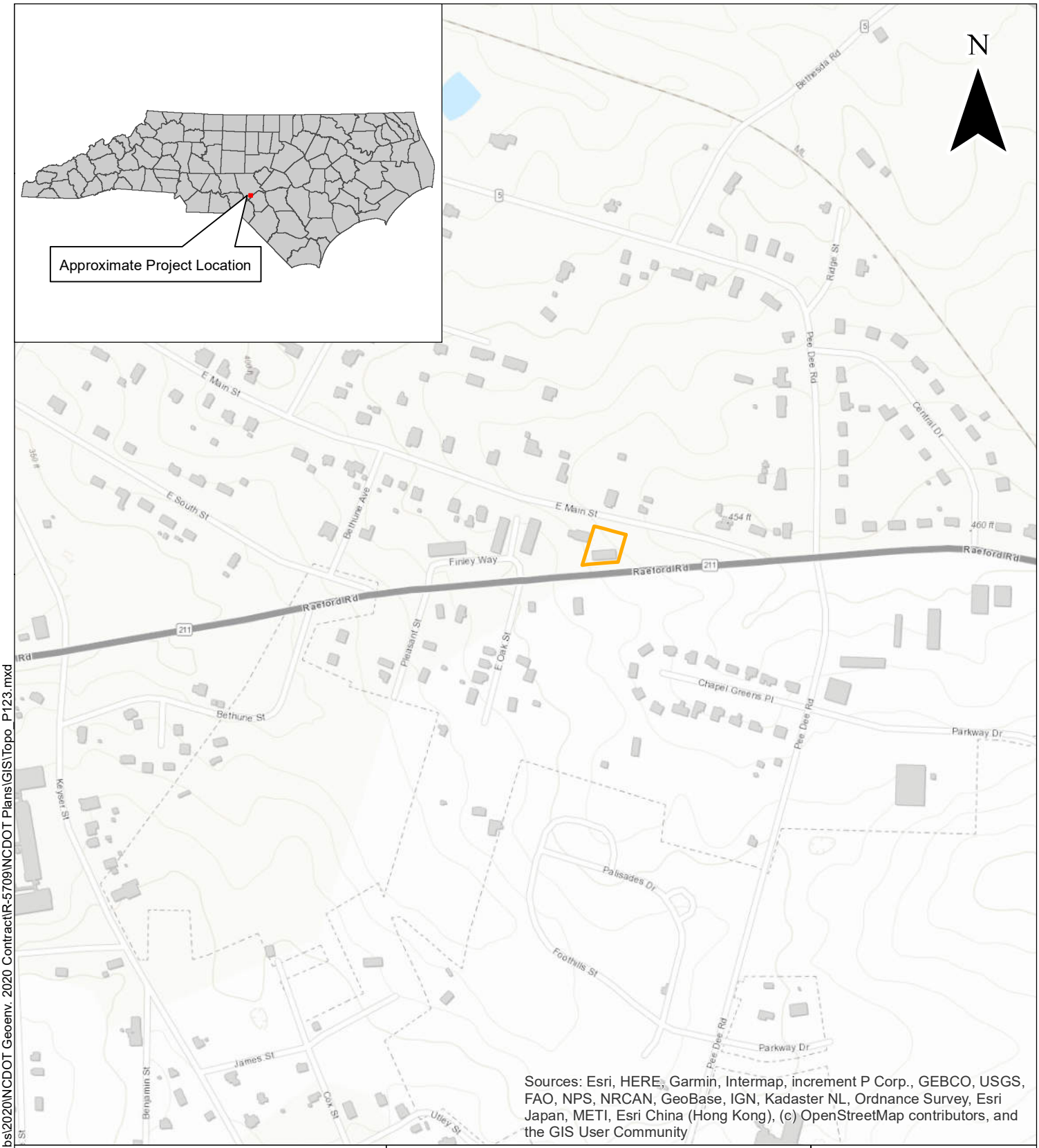
Sample ID Number	Sample Depth (ft. bgs)	BTEX (mg/kg)	GRO (mg/kg)	DRO (mg/kg)	PAHs (mg/kg)
P123-B1-0-2	0-2	<0.3	<0.3	<0.14	0.003
P123-B1-6-8	6-8	<0.3	<0.3	<0.12	<0.006
P123-B2-0-2	0-2	<0.3	<0.3	<0.13	<0.007
P123-B2-4-6	4-6	<0.25	<0.25	0.17	0.004
P123-B3-0-2	0-2	<0.22	<0.22	<0.09	<0.005
P123-B3-4-6	4-6	<0.22	<0.22	0.9	0.016
P123-B4-2-4	2-4	<0.22	<0.22	<0.09	<0.005
P123-B4-6-8	6-8	<0.12	<0.12	0.08	0.01
P123-B5-2-4	2-4	<0.27	<0.27	5.7	0.08
P123-B5-6-8	6-8	<0.3	<0.3	<0.13	0.001
P123-B6-2-4	2-4	<0.25	<0.25	0.029	0.002
P123-B6-8-10	8-10	<0.27	<0.27	<0.11	0.001
P123-B7-0-2	0-2	<0.3	<0.3	0.5	0.012
P123-B7-4-6	4-6	<0.25	<0.25	<0.1	<0.005
P123-B8-2-4	2-4	<0.3	39.2	0.3	0.009
P123-B8-8-10	8-10	<0.25	<0.25	<0.1	<0.005
P123-B9-2-4	2-4	<0.25	<0.25	<0.1	0.002
P123-B9-8-10	8-10	<0.2	<0.2	<0.08	<0.004
P123-B10-2-4	2-4	<0.25	<0.25	0.8	0.011
P123-B10-8-10	8-10	<0.27	<0.27	0.11	0.002
P123-B11-0-2	0-2	<0.25	<0.25	0.04	0.002
P123-B11-4-6	4-6	<0.25	<0.25	0.15	0.005
P123-B12-0-2	0-2	<0.25	<0.25	9.6	0.025
P123-B12-4-6	4-6	<0.3	<0.3	0.4	0.008
P123-B13-0-2	0-2	<0.22	<0.22	1.3	0.03
P123-B13-6-8	6-8	<0.3	<0.3	<0.13	0.001
NC State Action Level		**N/A**	**50**	**100**	**N/A**

Notes:

1. Samples collected on September 3 and 7, 2021
2. Depths shown in feet below ground surface (bgs)
3. Concentrations shown in milligrams per kilogram (mg/kg)
4. BTEX = Benzene, toluene, ethylbenzene, xylene
5. GRO = Gasoline Range Organics
6. DRO = Diesel Range Organics
7. PAHs = Polycyclic aromatic hydrocarbons
8. N/A = Not applicable
9. Bold values exceed respective NC State Action Level

Prepared By/Date: DRH 9/9/21
Checked By/Date: AJF 9/24/21

FIGURES



wood.
Wood Environment & Infrastructure Solutions, Inc.
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Charlotte, NC 28208
(704) 357-8600

VICINITY MAP
R5709-PARCEL 123
9849 NC 221 HWY
ABERDEEN, NORTH CAROLINA

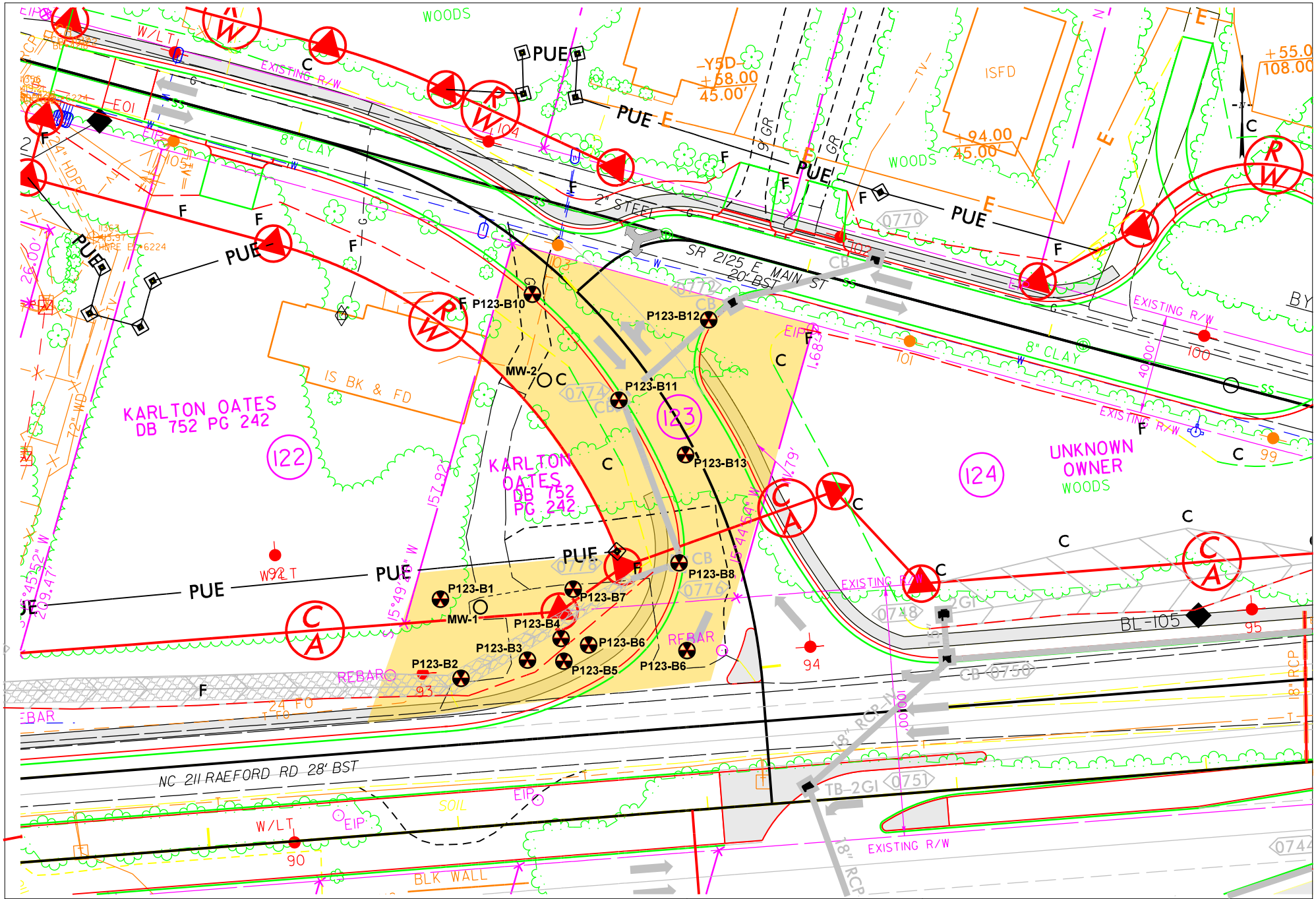
PREPARED BY:	LMM
DATE:	10/14/2021
CHECKED BY:	HPC
DATE:	10/14/2021
PROJECT NO:	20478R5709
FIGURE:	1

Legend

Site Boundary

0 500 1,000 Feet

Document Path: P:\6228 Environmental\Jobs\2020\NCDOT Geoenv. 2020 Contract\R-5709\NCDOT Plans\GIS\Topo_P123.mxd



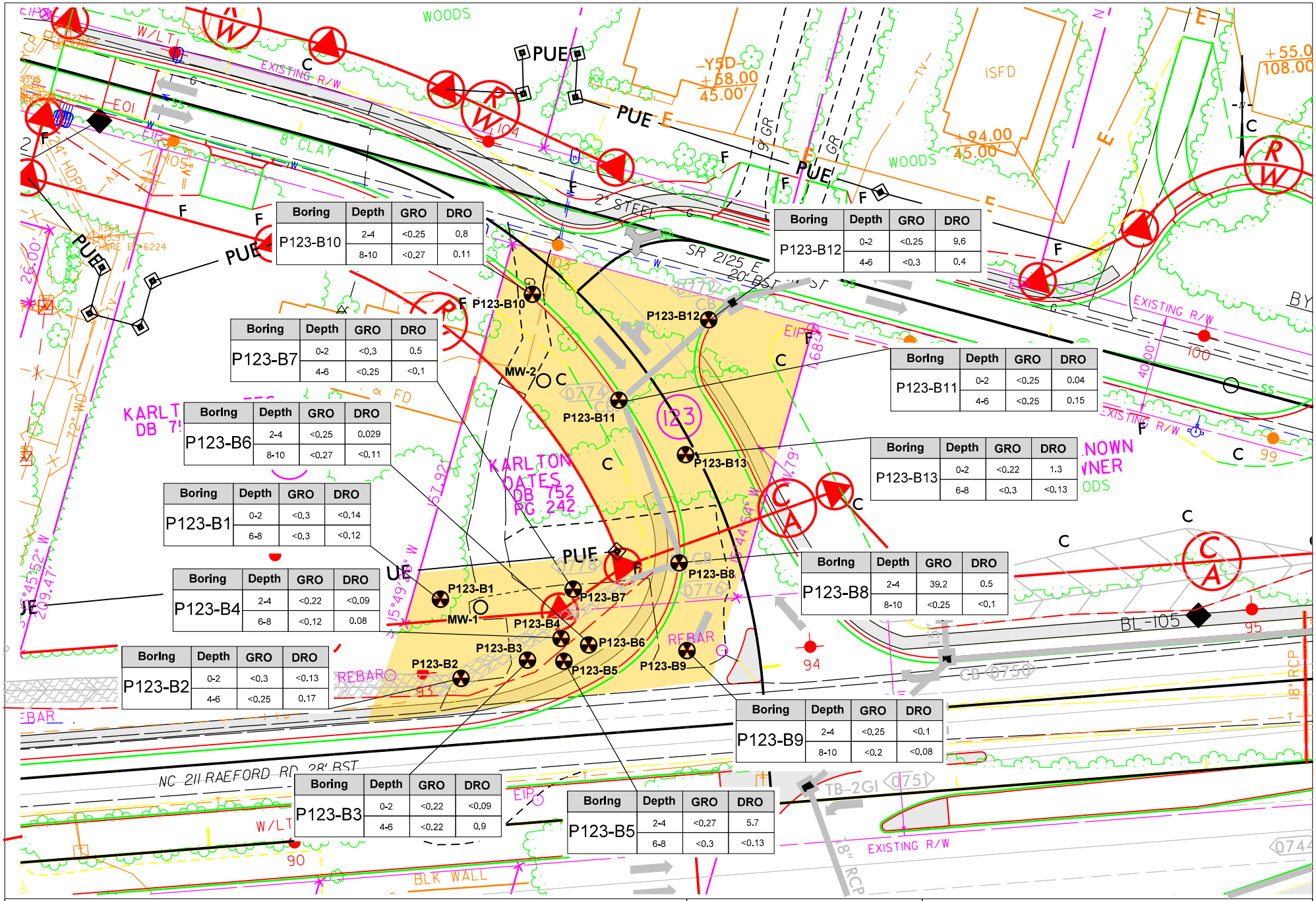
BORING LOCATION
AREA OF INVESTIGATION
MONITORING WELL LOCATION

20' 0' 20' 40'
10'
(ENGLISH)

wood.

SITE MAP WITH BORING LOCATIONS
R-5709 - PARCEL 123
9849 NC 211 HWY
ABERDEEN, NORTH CAROLINA

PREPARED BY:	DATE:	CHECKED BY:	DATE:	JOB NUMBER	FIGURE
LMM	9/29/21	AJF	9/29/21	20478R5709	2



Boring	Depth	GRO	DRO
P123-B10	2-4	<0.25	0.8
	8-10	<0.27	0.11

Boring	Depth	GRO	DRO
P123-B12	0-2	<0.25	9.6
	4-6	<0.3	0.4

Boring	Depth	GRO	DRO
P123-B7	0-2	<0.3	0.5
	4-6	<0.25	<0.1

Boring	Depth	GRO	DRO
P123-B11	0-2	<0.25	0.04
	4-6	<0.25	0.15

Boring	Depth	GRO	DRO
P123-B6	2-4	<0.25	0.029
	8-10	<0.27	<0.11

Boring	Depth	GRO	DRO
P123-B13	0-2	<0.22	1.3
	6-8	<0.3	<0.13

Boring	Depth	GRO	DRO
P123-B1	0-2	<0.3	<0.14
	6-8	<0.3	<0.12

Boring	Depth	GRO	DRO
P123-B8	2-4	39.2	0.5
	8-10	<0.25	<0.1

Boring	Depth	GRO	DRO
P123-B4	2-4	<0.22	<0.09
	6-8	<0.12	0.08

Boring	Depth	GRO	DRO
P123-B2	0-2	<0.3	<0.13
	4-6	<0.25	0.17

Boring	Depth	GRO	DRO
P123-B9	2-4	<0.25	<0.1
	8-10	<0.2	<0.08

Boring	Depth	GRO	DRO
P123-B3	0-2	<0.22	<0.09
	4-6	<0.22	0.9

Boring	Depth	GRO	DRO
P123-B5	2-4	<0.27	5.7
	6-8	<0.3	<0.13

BORING LOCATION MONITORING WELL LOCATION

AREA OF INVESTIGATION

DEPTHS SHOWN IN FEET BELOW GROUND SURFACE
CONCENTRATIONS SHOWN IN MILLIGRAMS PER KILOGRAM (mg/kg)
GRO=GASOLINE RANGE ORGANICS
DRO=DIESEL RANGE ORGANICS
GRO STATE ACTION LEVEL = 50 mg/kg
DRO STATE ACTION LEVEL = 100 mg/kg
BOLD CONCENTRATION EXCEEDS RESPECTIVE STATE ACTION LEVEL

20' 0' 20' 40'
10'
(ENGLISH)

wood.

ANALYTICAL RESULTS MAP
R-5709 - PARCEL 123
9849 NC 211 HWY
ABERDEEN, NORTH CAROLINA

PREPARED BY:	DATE:	CHECKED BY:	DATE:	JOB NUMBER	FIGURE
LMM	10/1/21	AJF	10/1/21	20478R5709	3

APPENDIX A

BORING LOGS

SOIL BORING FIELD WORKSHEET

BORING #	**P123-B1**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/3/2021**			WEATHER CONDITIONS	**Partly cloudy, 80°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.3	Top soil/organics Gray/tan clay	P123-B1-0-2 selected for UVF analyses
2			
3	0.3		
4			
5	0.4		
6		Gray/purple/pink clay	
7	0.5		P123-B1-6-8 selected for UVF analyses
8			
9	0.4		
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P123-B2**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/3/2021**			WEATHER CONDITIONS	**Partly cloudy, 80°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.3	Broken concrete/gravel Gray/purple clay	P123-B2-0-2 selected for UVF analyses
2			
3	0.2		
4		Gray/tan clay	
5	0.1		P123-B2-4-6 selected for UVF analyses
6			
7	0.1	Gray/pink clay	
8			
9	0.1		
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P123-B3**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/3/2021**			WEATHER CONDITIONS	**Partly cloudy, 80°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.2	Broken concrete/gravel Gray clay	P123-B3-0-2 selected for UVF analyses
2			
3	0.1		
4			
5	0.3	Gray/purple clay	P123-B3-4-6 selected for UVF analyses
6			
7	0.2		
8		White/gray sand	
9	0.1		
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

SOIL BORING FIELD WORKSHEET

BORING #	**P123-B4**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/3/2021**			WEATHER CONDITIONS	**Partly cloudy, 80°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.1	Broken concrete/gravel	
2		Gray clay	
3	0.4		P123-B4-2-4 selected for UVF analyses
4			
5	0.4	Gray/purple clay	
6			
7	0.4		P123-B4-6-8 selected for UVF analyses
8		White/gray sand	
9	0.2		
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P123-B5**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/3/2021**			WEATHER CONDITIONS	**Partly cloudy, 80°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.9	Broken concrete/gravel	
2		Gray clay	
3	1.0		P123-B5-2-4 selected for UVF analyses
4			
5	0.8	Gray/purple clay	
6			
7	0.8		P123-B5-6-8 selected for UVF analyses
8		White/gray sand	
9	0.7		
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

SOIL BORING FIELD WORKSHEET

BORING #	**P123-B6**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/3/2021**			WEATHER CONDITIONS	**Partly cloudy, 80°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	1.0	Broken concrete/gravel Tan/gray clay	
2			
3	14.4		P123-B6-2-4 selected for UVF analyses
4		Gray clay	
5	13.0		
6		Gray/purple/pink clay	
7	2.4		
8			
9	4.4		P123-B6-8-10 selected for UVF analyses
10		Tan/white sand	
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

SOIL BORING FIELD WORKSHEET

BORING #	**P123-B7**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/3/2021**			WEATHER CONDITIONS	**Partly cloudy, 80°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	1.2	Concrete/gravel	
2		Tan/gray clay	P123-B7-0-2 selected for UVF analyses
3	0.4		
4			
5	0.6		P123-B7-4-6 selected for UVF analyses
6			
7	0.4	Gray clay	
8			
9	0.3		
10		Tan/white sand	
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

SOIL BORING FIELD WORKSHEET

BORING #	**P123-B8**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/3/2021**			WEATHER CONDITIONS	**Partly cloudy, 80°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.4	Gravel	
2		Tan/brown sand	
3	0.5		P123-B8-2-4 selected for UVF analyses
4			
5	0.4	Tan/orange clayey sand	
6			
7	0.3		
8			
9	0.5	Orange/brown clayey sand	P123-B8-8-10 selected for UVF analyses
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

SOIL BORING FIELD WORKSHEET

BORING #	**P123-B9**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/3/2021**			WEATHER CONDITIONS	**Partly cloudy, 80°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.5	Tan/brown sand	
2			
3	0.6		P123-B9-2-4 selected for UVF analyses
4			
5	1.7		
6			
7	0.4	Gray clay	
8		Gray/purple clay	
9	8.2		P123-B9-8-10 selected for UVF analyses
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

SOIL BORING FIELD WORKSHEET

BORING #	**P123-B10**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/3/2021**			WEATHER CONDITIONS	**Partly cloudy, 80°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	3.9	Concrete/asphalt	
2		Tan sand	
3	9.6		P123-B10-2-4 selected for UVF analyses
4			
5	9.9		
6			
7	9.3	Tan/brown sand	
8		Gray/purple clay	
9	10.4		P123-B10-8-10 selected for UVF analyses
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

SOIL BORING FIELD WORKSHEET

BORING #	**P123-B11**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/3/2021**			WEATHER CONDITIONS	**Partly cloudy, 80°F**
DRILLING SUB-CONTRACTOR		**IET**		DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	19.1	Tan sand, pine tree odor	P123-B11-0-2 selected for UVF analyses
2		Tan/brown sand	
3	11.4		
4			
5	14.2		P123-B11-4-6 selected for UVF analyses
6			
7	9.6	Tan/brown clayey sand	
8			
9	10.0	Tan/white clayey sand	
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

SOIL BORING FIELD WORKSHEET

BORING #	**P123-B12**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/3 and 9/7/2021**			WEATHER CONDITIONS	**Partly cloudy, 80°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	18.7	Tan sand, pine tree odor	P123-B12-0-2 selected for UVF analyses
2		Tan/brown sand	
3	14.4		
4			
5	16.4		P123-B12-4-6 selected for UVF analyses
6			
7	11.5	Tan/brown clayey sand	
8			
9	12.4	Tan/white clayey sand	
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

SOIL BORING FIELD WORKSHEET

BORING #	**P123-B13**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/3/2021**			WEATHER CONDITIONS	**Partly cloudy, 80°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	32.0	Tan sand, pine tree odor	P123-B13-0-2 selected for UVF analyses
2			
3	12.1	Tan/brown sand	
4			
5	10.9		
6			
7	10.7		P123-B13-6-8 selected for UVF analyses
8		Tan/brown clayey sand	
9	7.5		
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

APPENDIX B

PHOTOGRAPHIC LOG

Photograph 1:
Southern portion of parcel 123 prior to vegetation clearing, facing northwest.

Photograph 2:
Southern portion of parcel 123 following vegetation clearing, facing northwest.

Photograph 3:
Northern portion of parcel 123, facing east.

Photograph 4:
View of IET maneuvering direct-push rig to collect soil samples, facing southwest.

Photograph 5:
View of on-Site UVF analysis setup, photograph taken on different parcel.

Photograph 6:
MW-1 located in the southwestern portion of parcel 123, facing north.

Photograph 7:
MW-2 located on the northwestern portion of parcel 123, facing north.

APPENDIX C

GEOPHYSICAL REPORT

PYRAMID GEOPHYSICAL SERVICES
(PROJECT 2021-201)

GEOPHYSICAL SURVEY

METALLIC UST INVESTIGATION:
PARCEL 123
NCDOT PROJECT R-5709 (50205.1.1)

906 E. MAIN STREET, ABERDEEN, NC

August 25, 2021

Report prepared for: **Helen P. Corley, LG, RSM, BCES**
Wood, PLC
2801 Yorkmont Road #100
Charlotte, NC 28208

Prepared by: _____
Eric C. Cross, P.G.
NC License #2181

Reviewed by: _____
Douglas A. Canavello, P.G.
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C257: GEOLOGY C1251: ENGINEERING

GEOPHYSICAL INVESTIGATION REPORT
Parcel 123 - 906 E. Main Street
Aberdeen, Moore County, North Carolina

Table of Contents

Figures

LIST OF ACRONYMS

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

EXECUTIVE SUMMARY

Project Description: Pyramid Environmental (Pyramid) conducted a geophysical investigation for Wood, PLC at Parcel 123, located at 906 E. Main Street, in Aberdeen, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project R-5709). The survey area was indicated to Pyramid by Wood, PLC, and generally extended from the existing edge of pavement into the furthest proposed ROW and/or easement. Conducted from August 10-12, 2021, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

Geophysical Results: The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. Two EM anomalies were identified. One EM anomaly was associated with a visible well cap, and two other EM features were associated with unknown buried metal. GPR was performed across the areas containing unknown buried metal. No evidence of significant buried structures such as USTs was observed. The features are likely associated with a combination of buried debris and/or buried former infrastructure. Collectively, the geophysical data did not record any evidence of metallic USTs at Parcel 123.

INTRODUCTION

Pyramid Environmental conducted a geophysical investigation for Wood, PLC at Parcel 123, located at 906 E. Main Street, in Aberdeen, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project R-5709). The survey area was indicated to Pyramid by Wood, PLC, and generally extended from the existing edge of pavement into the furthest proposed ROW and/or easement. Conducted from August 10-12, 2021, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

The site consisted of a vacant lot containing grass, gravel, and dirt surfaces. An aerial photograph showing the survey area boundaries and ground-level photographs are shown in **Figure 1**.

FIELD METHODOLOGY

The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. Pyramid collected the EM data using a Geonics EM61-MK2 (EM61) metal detector integrated with a Geode External GPS/GLONASS receiver. The integrated GPS system allows the location of the instrument to be recorded in real-time during data collection, resulting in an EM data set that is geo-referenced and can be overlain on aerial photographs and CADD drawings. A boundary grid was established around the perimeter of the site with marks every 10 feet to maintain orientation of the instrument throughout the survey and assure complete coverage of the area.

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

generally parallel survey lines, spaced five feet apart. The data were downloaded to a computer and reviewed in the field and office using the Geonics NAV61 and Surfer for Windows Version 15.0 software programs.

GPR data were acquired across select EM anomalies on August 12, 2021, using a Geophysical Survey Systems, Inc. (GSSI) SIR 4000 control unit coupled to a 350 MHz HS antenna. Data were collected both in reconnaissance fashion as well as along formal transect lines across EM features. The GPR data were viewed in real-time using a vertical scan of 512 samples, at a rate of 48 scans per second. GPR data were viewed down to a maximum depth of approximately 6 feet, based on dielectric constants calculated by the SIR 4000 unit in the field during the reconnaissance scans. GPR transects across specific anomalies were saved to the hard drive of the DF unit for post-processing and figure generation.

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

Geophysical Surveys for Underground Storage Tanks
on NCDOT Projects

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

DISCUSSION OF RESULTS

Discussion of EM Results

A contour plot of the EM61 results obtained across the survey area at the property is presented in **Figure 2**. Each EM anomaly is numbered for reference in the figure. The

following table presents the list of EM anomalies and the cause of the metallic response, if known:

LIST OF METALLIC ANOMALIES IDENTIFIED BY EM SURVEY

Metallic Anomaly #	Cause of Anomaly	Investigated with GPR
1	Well	
2	Unknown Buried Metal	✓

EM Anomaly 1 was associated with a visible well cap. EM Anomaly 2 consisted of two isolated metallic features that were associated with unknown buried metal. GPR was performed across these two features to further investigate the unknown buried metal.

Discussion of GPR Results

Figure 3 presents the locations of the formal GPR transects performed at the property as well as the transect images. A total of four formal GPR transects were performed at the site. GPR Transects 1-2 were performed across the southern location of EM Anomaly 2 containing unknown buried metal and Transects 3-4 were performed across the northern location of EM Anomaly 2. No evidence of any significant structures such as USTs was observed. The northern feature may be associated with buried former infrastructure. The southern feature is likely associated with buried debris.

Collectively, the geophysical data did not record any evidence of metallic USTs at Parcel 123. **Figure 4** provides an overlay of the metal detection results on the NCDOT engineering plans for reference.

SUMMARY & CONCLUSIONS

Pyramid's evaluation of the EM61 and GPR data collected at Parcel 123 in Aberdeen, North Carolina, provides the following summary and conclusions:

- The EM61 and GPR surveys provided reliable results for the detection of metallic USTs within the accessible portions of the geophysical survey area.
- One EM anomaly was associated with a visible well cap, and two other EM features

were associated with unknown buried metal.

- GPR was performed across the areas containing unknown buried metal. No evidence of significant buried structures such as USTs was observed. The features are likely associated with a combination of buried debris and/or buried former infrastructure.
- Collectively, the geophysical data did not record any evidence of metallic USTs at Parcel 123.

LIMITATIONS

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

APPROXIMATE BOUNDARIES OF GEOPHYSICAL SURVEY AREA

View of Survey Area (Facing Approximately East)

View of Survey Area (Facing Approximately West)

N

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PROJECT: PARCEL 123 ABERDEEN, NORTH CAROLINA NCDOT PROJECT R-5709	TITLE: PARCEL 123 - GEOPHYSICAL SURVEY BOUNDARIES AND SITE PHOTOGRAPHS	DATE: 8/16/2021 PYRAMID PROJECT #: 2021-201	CLIENT: Wood, PLC **FIGURE 1**

EM61 METAL DETECTION RESULTS

NO EVIDENCE OF METALLIC USTs WAS OBSERVED.

The contour plot shows the differential results of the EM61 instrument in millivolts (mV). The differential results focus on larger metallic objects such as USTs and drums. The EM data were collected on August 10, 2021, using a Geonics EM61-MK2 instrument. Verification GPR data were collected using a GSSI SIR 4000 instrument with a 350 MHz HS antenna on August 12, 2021.

EM61 Metal Detection Response (millivolts)

N

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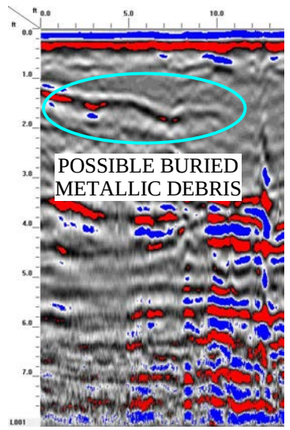
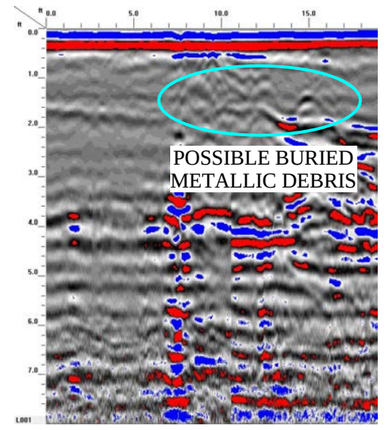
PROJECT: PARCEL 123 ABERDEEN, NORTH CAROLINA NCDOT PROJECT R-5709	TITLE: PARCEL 123 - EM61 METAL DETECTION CONTOUR MAP	DATE: 8/16/2021	CLIENT: Wood, PLC
		PYRAMID PROJECT #: 2021-201	**FIGURE 2**

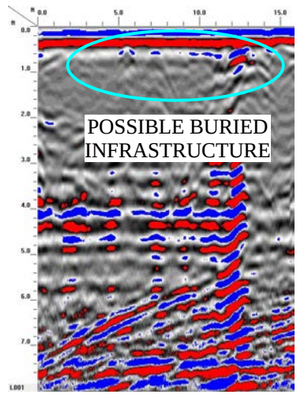
GPR TRANSECT LOCATIONS



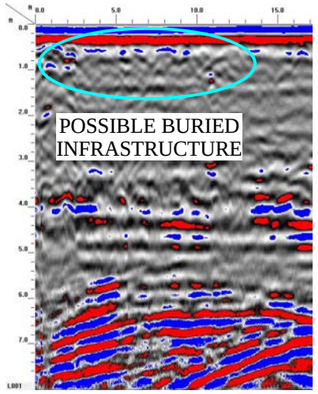
GPR TRANSECT 1 (T1)



GPR TRANSECT 2 (T2)



GPR TRANSECT 3 (T3)



GPR TRANSECT 4 (T4)

N

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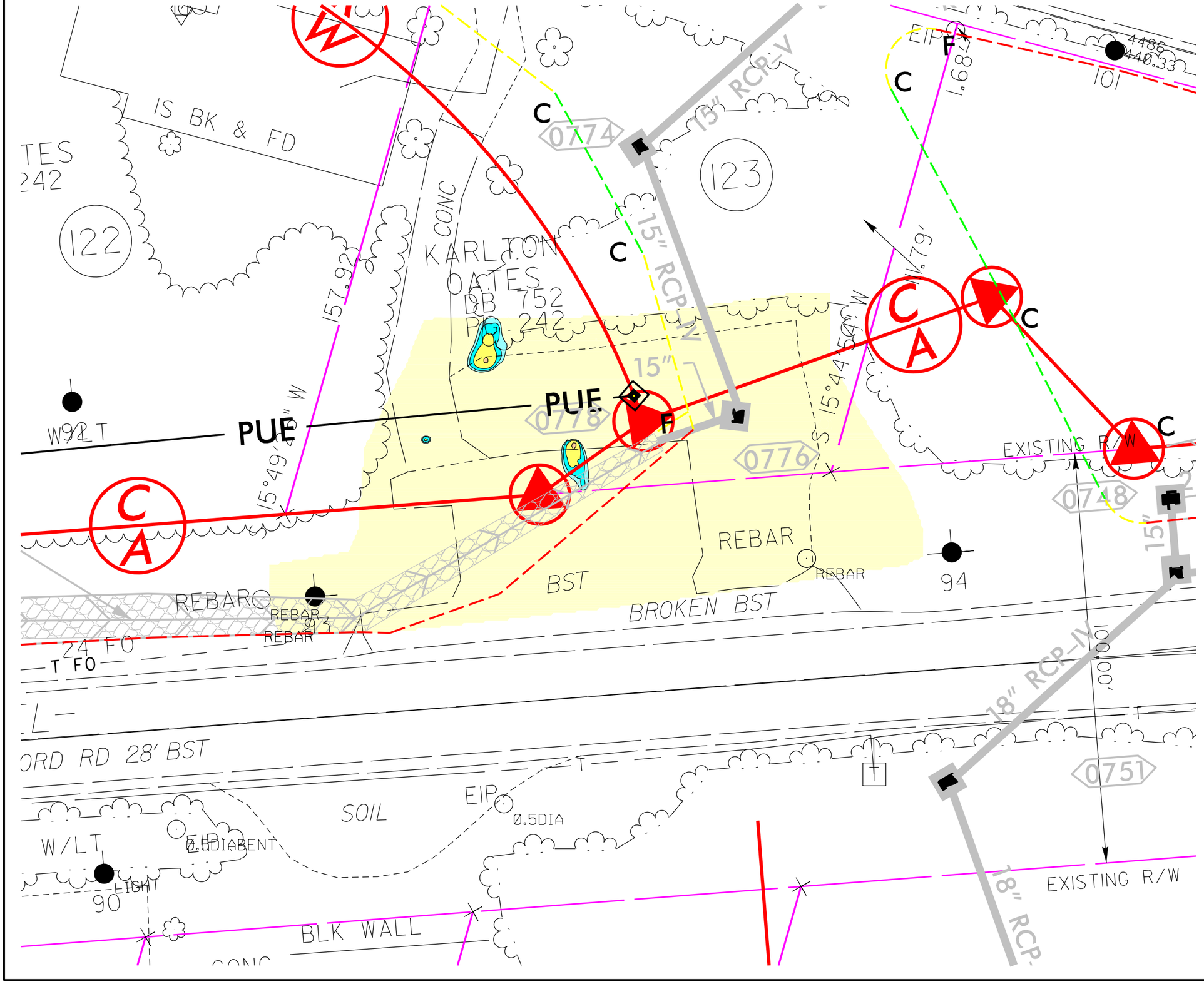
PROJECT	PARCEL 123 ABERDEEN, NORTH CAROLINA NCDOT PROJECT R-5709
TITLE	PARCEL 123 - GPR TRANSECT LOCATIONS AND IMAGES
DATE	8/16/2021
CLIENT	Wood, PLC
PYRAMID PROJECT #:	2021-201
	FIGURE 3



LEGEND

- EXISTING ROW
- EXISTING PROPERTY BOUNDARY
- PROPOSED ROW LINE
- E — TEMPORARY CONSTRUCTION EASEMENT
- PDE — PROPOSED PERMANENT DRAINAGE
- PROPOSED SS CUT LINE
- PROPOSED SS FILL LINE

MILLIVOLTS (mV)

1000 750 500 400 300 200 150 100 75 60 50 40 30 -90 -100 -200 -400 -5000

0 10 20
FEET

N

TITLE
OVERLAY OF METAL DETECTION RESULTS
ON NCDOT ENGINEERING PLANS

PROJECT
PARCEL 123
ABERDEEN, NORTH CAROLINA
NCDOT PROJECT R-5709

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DATE: 08-18-2021	REVISION NO. 0
PYRAMID PROJECT NO. 2021-201	FIGURE NO. 4

APPENDIX D

UVF HYDROCARBON ANALYTICAL RESULTS

Hydrocarbon Analysis Results

Client: Wood
Address: 2801 Yorkmont Road
Charlotte, NC 28208

Contact: Helen Corley

Project: P123

Samples taken Friday, September 3, 2021
Samples extracted Friday, September 3, 2021
Samples analysed Friday, September 3, 2021

Operator DRH

H09382

Matrix	Sample ID	Dilution used	BTEX C6-C9	GRO C5-C10	DRO C10-C35	TPH C5-C35	Total Aromatics C10-C35	16 EPA PAHs	BaP	% Ratios C5:10	% Ratios C10:C 18	% Ratios C18+	HC Fingerprint Match
Soil	P123-B1-0-2	14.0	<0.3	<0.3	<0.14	0.029	0.029	0.003	<0.001	0	95.5	4.5	Residual HC
Soil	P123-B1-6-8	12.0	<0.3	<0.3	<0.12	<0.3	<0.006	<0.006	<0.004	0	100	0	Residual HC
Soil	P123-B2-0-2	13.0	<0.3	<0.3	<0.13	<0.3	<0.007	<0.007	<0.004	0	100	0	Residual HC
Soil	P123-B2-4-6	10.0	<0.25	<0.25	0.17	0.17	0.08	0.004	<0.001	0	80.4	19.6	V.Deg.PHC 89.4%,(FCM)
Soil	P123-B3-0-2	9.0	<0.22	<0.22	<0.09	<0.22	<0.005	<0.005	<0.003	0	100	0	Residual HC,(BO)
Soil	P123-B3-4-6	9.0	<0.22	<0.22	0.9	0.9	0.4	0.016	<0.001	0	84.9	15.1	V.Deg.PHC 90.5%,(FCM)
Soil	P123-B4-2-4	9.0	<0.22	<0.22	<0.09	<0.22	<0.005	<0.005	<0.003	0	0	0	PHC ND,(FCM)
Soil	P123-B4-6-8	5.0	<0.12	<0.12	0.08	0.08	0.07	0.01	0.002	0	47.7	52.3	Background Organics

Initial Calibrator QC check OK

Final FCM QC Check OK 96.5%

Analysis by QED HC-1 Analyser

Concentration values in mg/kg for soil 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 for hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

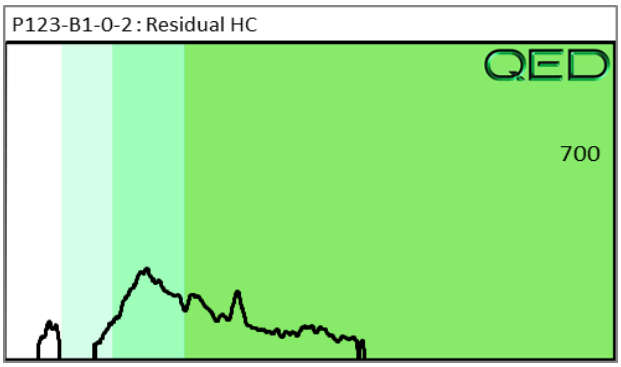
HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only : % Ratios estimated carbon number proportions : (OCR)/(Q) = Outside cal range, values and HC match estimates : ND = Not Detected

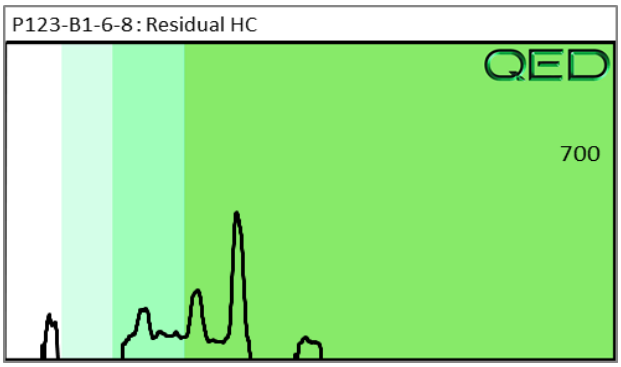
(B) = Blank Drift : (M) = Adjusted value : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : SB = sample selected as site background

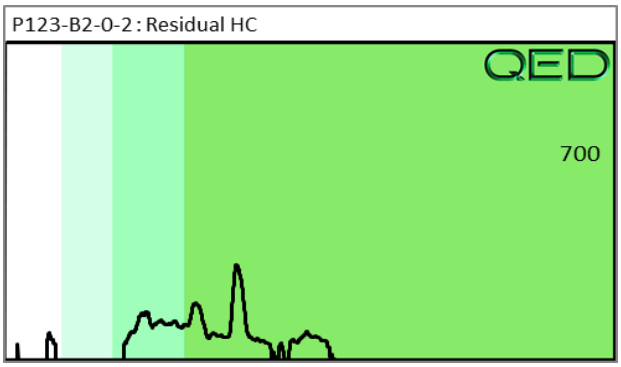
(TD) = Calibration outside limit

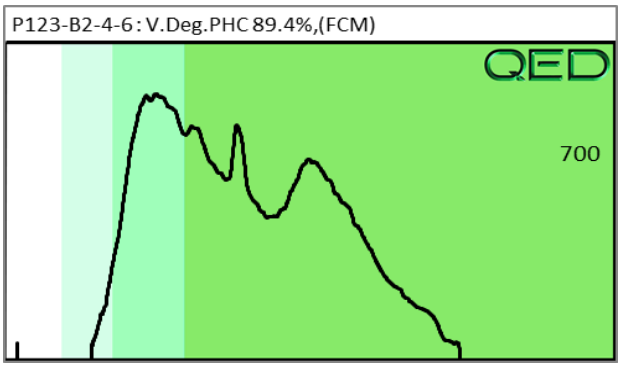
QED Hydrocarbon Fingerprints

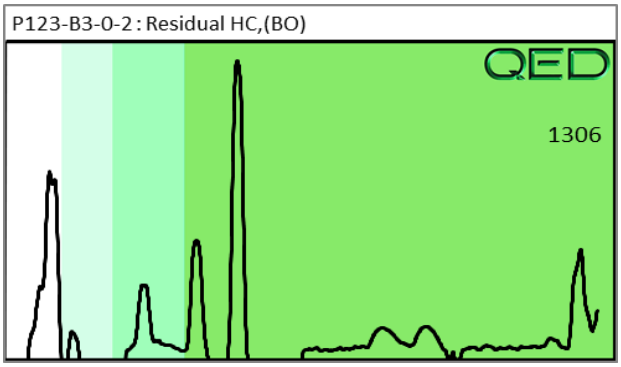
Project: P123

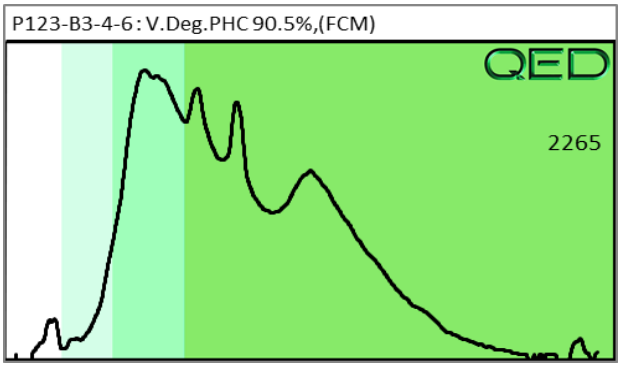


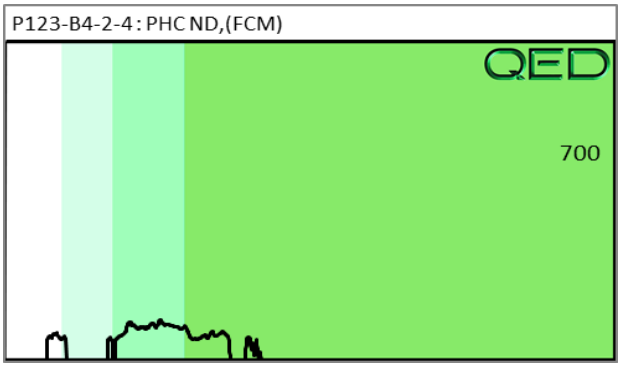


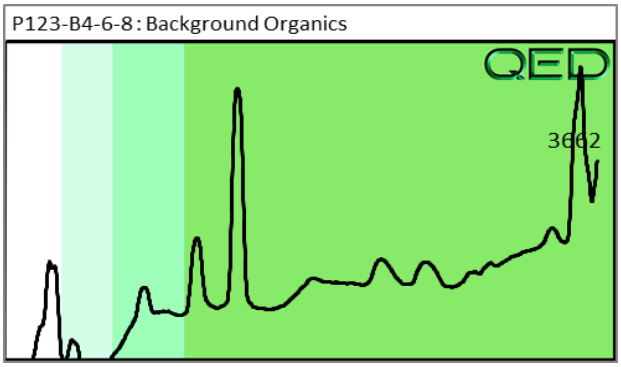












Hydrocarbon Analysis Results

Client: Wood
Address: 2801 Yorkmont Road
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Contact: Helen Corley

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Samples taken Friday, September 3, 2021
Samples extracted Friday, September 3, 2021
Samples analysed Friday, September 3, 2021

Operator DRH

H09382

Matrix	Sample ID	Dilution used	BTEX C6-C9	GRO C5-C10	DRO C10-C35	TPH C5-C35	Total Aromatics C10-C35	16 EPA PAHs	BaP	% Ratios C5:10	% Ratios C10:C 18	% Ratios C18+	HC Fingerprint Match
Soil	P123-B5-2-4	11.0	<0.27	<0.27	5.7	5.7	2.8	0.08	0.001	0	87.5	12.5	V.Deg.PHC 81.2%,(FCM)
Soil	P123-B5-6-8	13.0	<0.3	<0.3	<0.13	0.008	0.008	0.001	<0.004	0	0	100	Residual HC
Soil	P123-B6-2-4	10.0	<0.25	<0.25	0.029	0.029	0.025	0.002	<0.003	0	100	0	Residual HC
Soil	P123-B6-8-10	11.0	<0.27	<0.27	<0.11	0.009	0.009	0.001	<0.003	0	34	66	Residual HC
Soil	P123-B7-0-2	12.0	<0.3	<0.3	0.5	0.5	0.23	0.012	<0.0	0	81	19	V.Deg.PHC 86.6%,(FCM)
Soil	P123-B7-4-6	10.0	<0.25	<0.25	<0.1	<0.25	<0.005	<0.005	<0.003	0	0	0	PHC ND,(FCM)
Soil	P123-B8-2-4	12.0	<0.3	39.2	0.3	39.59	0.17	0.009	<0.004	99.6	0.3	0.1	No Match found
Soil	P123-B8-8-10	10.0	<0.25	<0.25	<0.1	<0.25	<0.005	<0.005	<0.003	0	0	0	PHC ND,(FCM)
Soil	P123-B9-2-4	10.0	<0.25	<0.25	<0.1	0.019	0.019	0.002	<0.003	0	49.7	50.3	Residual HC
Soil	P123-B9-8-10	8.0	<0.2	<0.2	<0.08	<0.2	<0.004	<0.004	<0.002	0	0	0	PHC ND,(FCM)

Initial Calibrator QC check OK Final FCM QC Check OK 92.4%

Analysis by QED HC-1 Analyser

Concentration values in mg/kg for soil 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 for hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

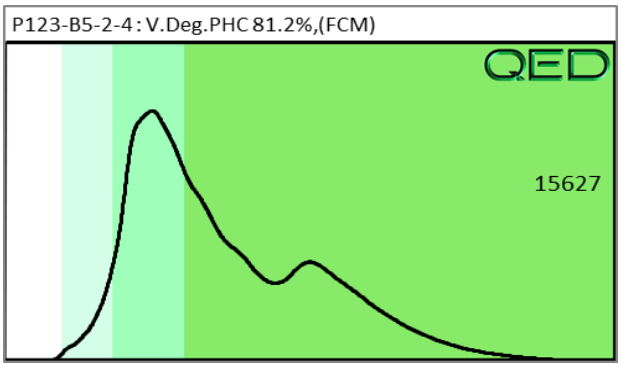
HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only : % Ratios estimated carbon number proportions : (OCR)/(Q) = Outside cal range, values and HC match estimates : ND = Not Detected

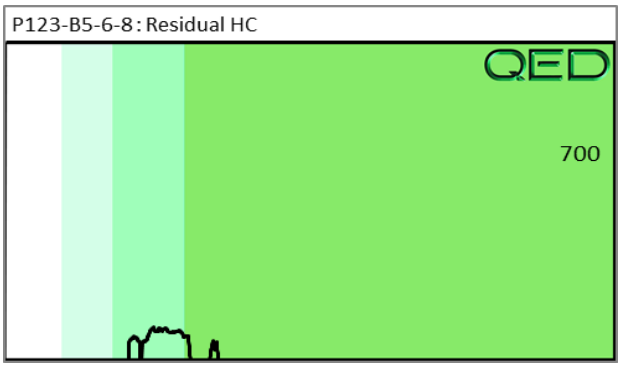
(B) = Blank Drift : (M) = Adjusted value : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : SB = sample selected as site background

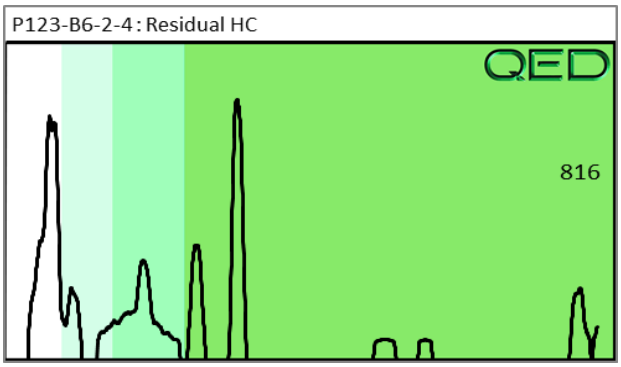
(TD) = Calibration outside limit

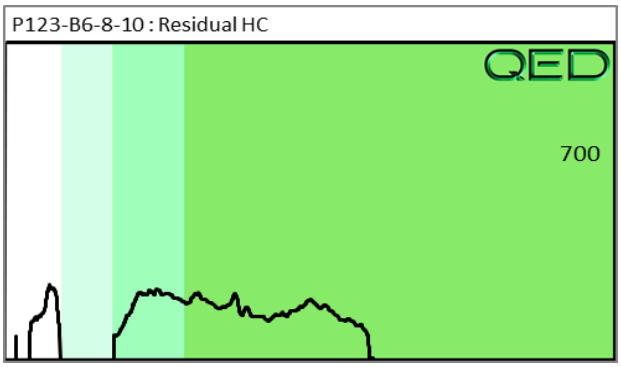
QED Hydrocarbon Fingerprints

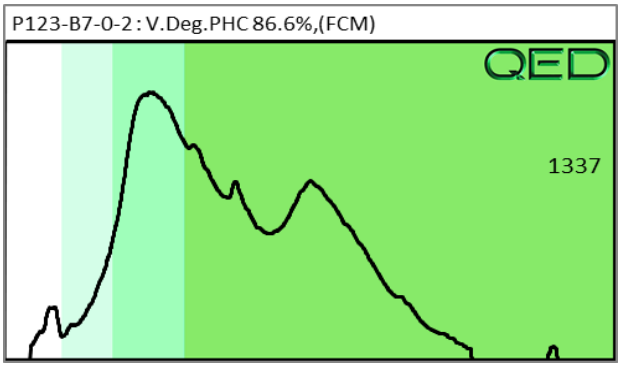
Project: P123

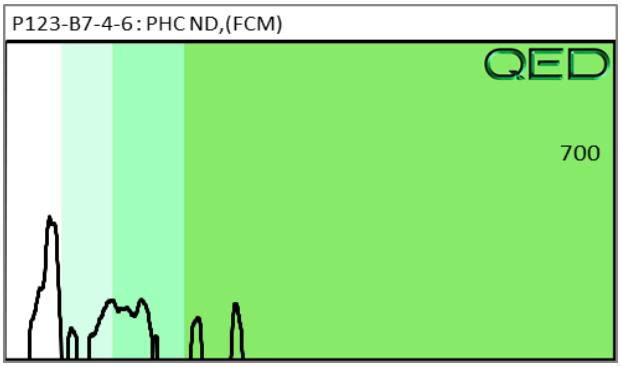


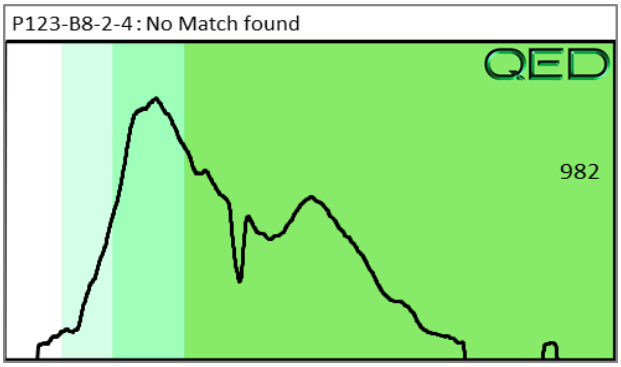


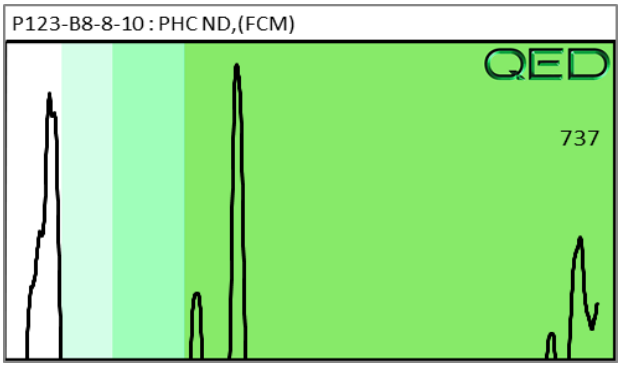


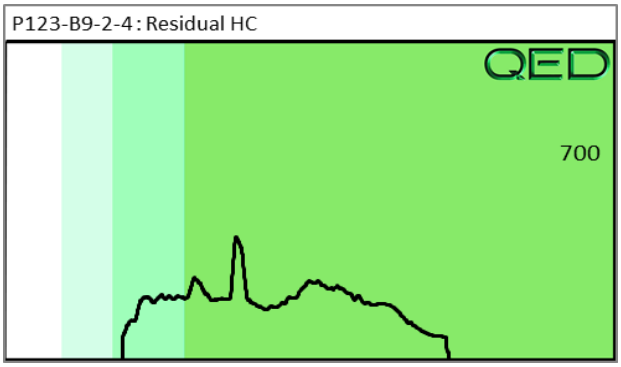


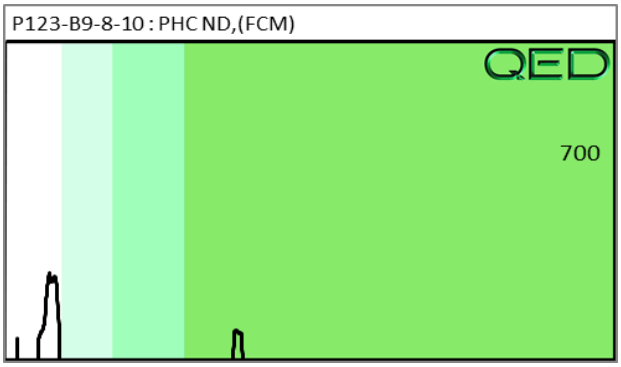












Hydrocarbon Analysis Results

Client: Wood
Address 2801 Yorkmont Rd
Charlotte, NC

Contact: Helen Corley

Project: P123

Samples taken Friday, September 3, 2021
Samples extracted Friday, September 3, 2021
Samples analysed Friday, September 3, 2021

Operator DRH

H09382

Matrix	Sample ID	Dilution used	BTEX C6-C9	GRO C5-C10	DRO C10-C35	TPH C5-C35	Total Aromatics C10-C35	16 EPA PAHs	BaP	% Ratios C5:10	% Ratios C10:C18	% Ratios C18+	HC Fingerprint Match
Soil	P123-B10-2-4	10.0	<0.25	<0.25	0.8	0.8	0.4	0.011	<0.001	0	87.6	12.4	V.Deg.PHC 86.3%,(FCM)
Soil	P123-B10-8-10	11.0	<0.27	<0.27	0.11	0.11	0.026	0.002	<0.003	0	100	0	Deg Fuel 78.8%,(FCM)
Soil	P123-B11-4-6	10.0	<0.25	<0.25	0.15	0.15	0.13	0.005	<0.003	0	91.4	8.6	Residual PHC
Soil	P123-B11-0-2	10.0	<0.25	<0.25	0.04	0.04	0.03	0.002	<0.003	0	34	66	Residual HC
Soil	P123-B12-4-6	14.0	<0.3	<0.3	0.4	0.4	0.28	0.008	<0.002	0	93.7	6.3	V.Deg.PHC 58.6%,(FCM)
Soil	P123-B13-0-2	9.0	<0.22	<0.22	1.3	1.3	0.8	0.03	<0.003	0	95.1	4.9	V.Deg.Light Fuel 49.6%,(FCM)
Soil	P123-B13-6-8	13.0	<0.3	<0.3	<0.13	0.009	0.009	0.001	<0.004	0	0	100	Residual HC

Initial Calibrator QC check OK

Final FCM QC Check OK 99.3%

Analysis by QED HC-1 Analyser

Concentration values in mg/kg for soil 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 for hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only : % Ratios estimated carbon number proportions : (OCR)/(Q) = Outside cal range, values and HC match estimates : ND = Not Detected

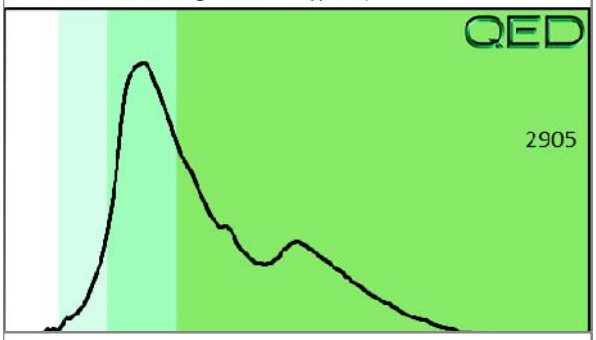
(B) = Blank Drift : (M) = Adjusted value : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : SB = sample selected as site background

(TD) = Calibration outside limit

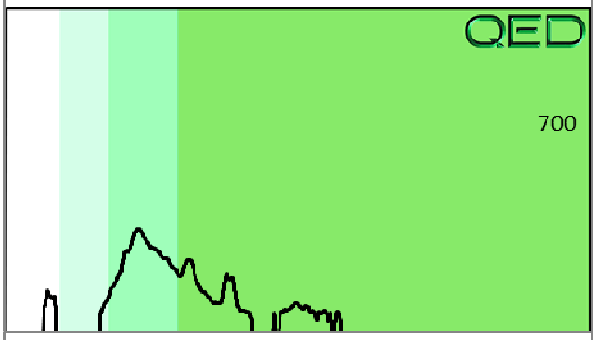
QED Hydrocarbon Fingerprints

Project: P123

P123-B10-2-4 : V.Deg.PHC 86.3%,(FCM)

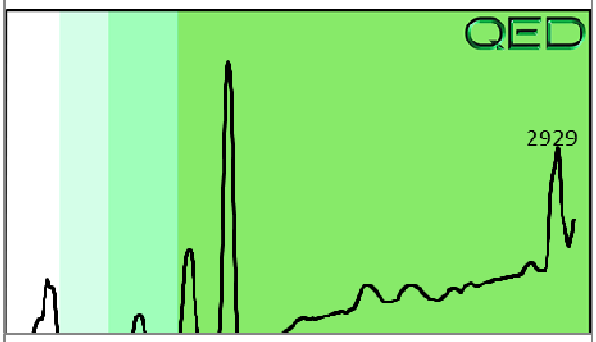


P123-B10-8-10 : Deg Fuel 78.8%,(FCM)

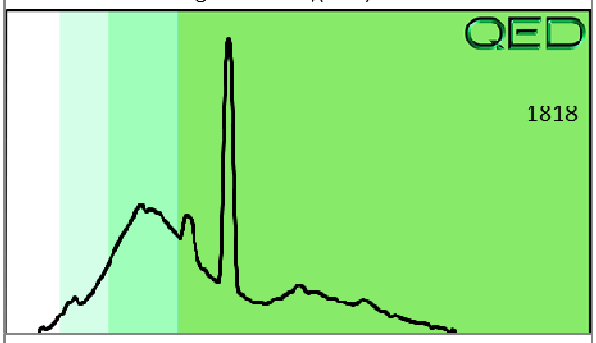


P123-B11-4-6 : Residual PHC

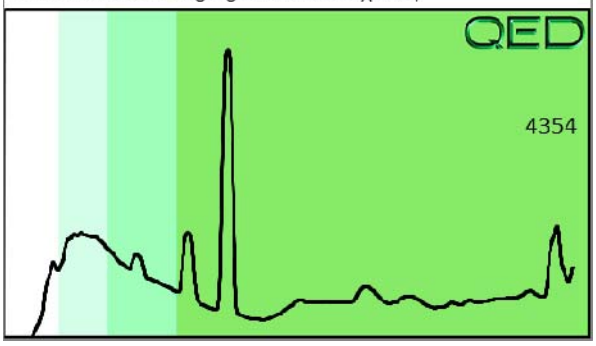
P123-B11-0-2 : Residual HC



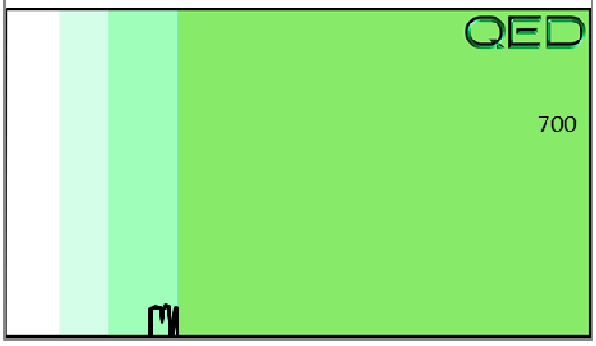
P123-B12-4-6 : V.Deg.PHC 58.6%,(FCM)



P123-B13-0-2 : V.Deg.Light Fuel 40.6%,(FCM)



P123-B13-6-8 : Residual HC



Hydrocarbon Analysis Results

Client: Wood
Address: 2801 Yorkmont Road
Charlotte, NC 28208

Contact: Helen Corley

Project: P123

Samples taken Tuesday, September 7, 2021
Samples extracted Tuesday, September 7, 2021
Samples analysed Tuesday, September 7, 2021

Operator DRH

H09382

Matrix	Sample ID	Dilution used	BTEX C6-C9	GRO C5-C10	DRO C10-C35	TPH C5-C35	Total Aromatics C10-C35	16 EPA PAHs	BaP	% Ratios			HC Fingerprint Match
										C5:10	C10:C 18	C18+	
Soil	P123-B12-0-2	10.0	<0.25	<0.25	9.6	9.6	0.4	0.025	0.001	0	83.4	16.6	V.Deg.Light Fuel 91.9%,(FCM)

Initial Calibrator QC check OK

Final FCM QC Check OK 101.7%

Analysis by QED HC-1 Analyser

Concentration values in mg/kg for soil 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 for hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

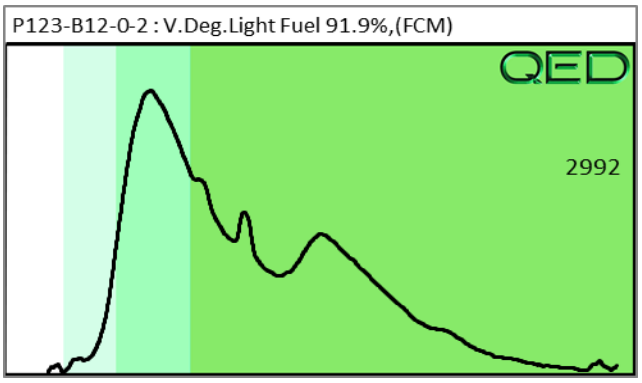
HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only : % Ratios estimated carbon number proportions : (OCR)/(Q) = Outside cal range, values and HC match estimates : ND = Not Detected

(B) = Blank Drift : (M) = Adjusted value : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : SB = sample selected as site background

(TD) = Calibration outside limit

QED Hydrocarbon Fingerprints

Project: P123

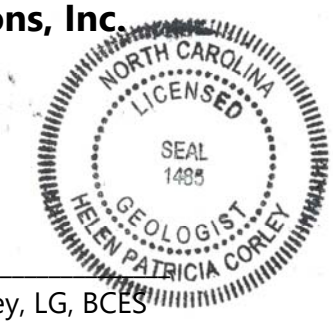


North Carolina Department of Transportation

Phase II Investigation
State Project: R-5709
WBS Element: 50205.1.1
Moore County

Parcel 217
John & Kay Bolin Property
10531 NC 211 Hwy
Aberdeen, North Carolina
October 21, 2021

Wood Environment & Infrastructure Solutions, Inc.
Project: 20478R5709



Andrew Frantz, REM
Senior Scientist

Helen Corley, LG, BCES
Principal Hydrogeologist

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APPENDICES

1.0 INTRODUCTION

In response to the North Carolina Department of Transportation (NCDOT) Request for Proposal, dated June 2, 2021, Wood Environment & Infrastructure Solutions, Inc. (Wood) has performed a Phase II Investigation for Parcel 217 (Site). The investigation was conducted in accordance with Wood's Technical and Cost proposal dated June 18, 2021, and NCDOT's July 6, 2021 Notice to Proceed. NCDOT contracted Wood to perform the Phase II Investigation at the parcel, within areas that will be affected by the proposed widening of NC 211 Hwy from US 15-501 in Aberdeen, North Carolina to SR 1244 (West Palmer Street)/SR 1311 (Mockingbird Hill Road) in Raeford, North Carolina.

The Site is located on the northeast side of NC 211 Hwy, as shown on the Vicinity Map, **Figure 1**. The Site, which is located at 10531 NC 211 Hwy, is currently occupied by a garage and several old vehicles and trailers. The Site is identified as Parcel 217, John & Kay Bolin Property, within the NCDOT MicroStation survey file and is in Aberdeen of Moore County, North Carolina. The area of investigation at Parcel 217 is approximately 0.50-acres as shown on **Figure 2**.

The Site was reported as a possible former gasoline station in the 2019 NCDOT Phase I Report. In addition, the Phase I noted a concrete pad was observed along the southwestern exterior of the Site building with a metal pipe protruding. Based on the location of the concrete pad and the presence of the metal pipe, it is suspected to be a former dispenser island. Wood reviewed the North Carolina Laserfiche online database and NCDEQ documentation for Parcel 217 was not present. Wood reviewed the NCDOT Historical Aerial Imagery Index, and Parcel 217 was not covered by photographs in the index.

The following report describes a geophysical survey and subsurface field investigation at the Site, with results from our ultraviolet fluorescence (UVF) soil analyses and evaluation for potential soil contamination within the Site.

2.0 GEOLOGY

2.1 Regional Geology

The Site is located within the Coastal Plain Physiographic Province of North Carolina. According to the 1985 State Geologic Map of North Carolina, the area is within the Pinehurst Formation and is underlain by medium to coarse grained sand with cross-bedding and rhythmic bands of clayey sand.

2.2 Site Geology

Site geology was observed through the advancement of 15 shallow soil borings (P217-B1 to P217-B15). The borings were advanced to approximate depths of 10 to 15 feet below ground surface (bgs). Groundwater was not encountered during boring advancement. Figure 2 presents the boring locations and Site layout. Soils encountered in the borings consisted mostly of tan to brown medium-grained sand overlying tan, gold, and white clay. Staining and petroleum odors were not observed in the borings. Based on observations of topography of the Site vicinity, the groundwater flow direction is inferred to be generally toward the southeast. Boring logs are presented in **Appendix A**.

3.0 FIELD ACTIVITIES

3.1 Preliminary Activities

Prior to commencing field sampling activities at the Site, several tasks were accomplished in preparation for the subsurface investigation. A Health and Safety Plan (HASP) was created with the Site-specific health and safety information necessary for the field activities, including protocol for COVID-19. North Carolina 811 was contacted on August 24, 2021, for the parcel.

Pyramid Geophysical Services of Greensboro, North Carolina (Pyramid) was retained to conduct a geophysical investigation. Probe Utility Locating (PUL) was retained to perform utility locating activities at the Site. Innovative Environmental Technologies, Inc. (IET) of Concord, North Carolina was retained by Wood to perform the direct push sampling for soil

borings, and UVF instrumentation was rented from Red Lab, LLC (Red Lab) of Wilmington, North Carolina.

Boring locations were strategically placed within the parcel to maximize the opportunity to encounter potential contaminated soil and evaluate areas of subsurface design features.

3.2 Site Reconnaissance

Wood personnel visited the parcel on June 8, 2021 and observed that the Site was occupied with a garage building, a suspected dispenser island located to the southwest of the building, and several old vehicles and trailers. The garage building is suspected to have been formerly operated as a gasoline station. In addition, two suspected UST fill ports were observed along the northwestern exterior of the garage building. A photographic log is included in **Appendix B**.

3.3 Geophysical Survey Results and Utility Locating

The geophysical survey was conducted by Pyramid personnel between August 10 and 12, 2021. Pyramid conducted a geophysical investigation using electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys on the northern and western portions of the parcel, as these areas were most likely to contain USTs. A total of seven EM anomalies were identified, the majority of which were attributed to visible cultural features at the ground surface. Of the seven EM anomalies identified, one was a large and consistent with buried structures such as USTs. The large anomaly was located along the northwestern exterior of the garage building in the same area of the suspected UST fill ports observed during the June site reconnaissance. The GPR survey of the large EM anomaly identified the presence of two probable USTs. Both probable USTs measured approximately 26 feet long by 7 feet wide. Evidence of additional buried structures associated with the six other EM anomalies was not observed. The complete Pyramid geophysics report is included as **Appendix C**.

Utility locating was performed by PUL personnel on August 24, 2021. The utility locating effort identified buried water lines, buried electrical lines, several buried telephone and communication lines and a buried natural gas line. A buried water line, several telephone and communication lines and a natural gas line were identified along the southwestern Site boundary parallel to NC 211 Hwy. Several buried electrical lines were identified extending

from the Site building to light poles located at the parcel. The service water lines for the on-Site building and off-Site buildings located further to the east were suspected to traversing the northern portion of the parcel; however, these lines were not able to be located by PUL. The service lines are likely constructed of polyvinyl chloride (PVC) and can be difficult to locate. The buried natural gas line was observed to be extending from the southern corner of the on-Site building to the southwest toward NC 211 Hwy. Overhead high-voltage power lines were identified along the southwestern Site boundary parallel to NC 211 Hwy.

3.4 Soil Sampling

On September 2, 2021, Wood and IET mobilized to the Site to advance 15 shallow soil borings (P217-B1 to P217-B15). The borings were advanced via direct-push technology to approximate depths ranging from 10 to 15 feet bgs. Boring locations targeted potential environmental sources at the Site and future drainage features.

The purpose of soil sampling was to assess if a petroleum release had impacted the Site and if so, to estimate the volume of impacted soil that might require special handling during NCDOT construction activities. IET advanced a soil sampler to the target depth at each boring location using an AMS PowerProbe. To minimize the potential for cross-contamination between samples, a new PVC sleeve (tube) was inserted into the sampler for each soil interval. Visual and olfactory observations relative to the soil cores were recorded by Wood personnel. The soil types encountered in the borings were recorded to prepare soil boring logs. Wood conducted field screening for volatile organic compounds (VOCs) of the soil borings with a photoionization detector (PID). The portion of each soil core with the highest PID reading was selected from the 0–5 foot interval and the 5-10 foot interval for analysis of total petroleum hydrocarbons (TPH), diesel range organics (DRO), gasoline range organics (GRO), benzene, toluene, ethylbenzene, and xylene (BTEX), total aromatics, and polycyclic aromatic hydrocarbons (PAH) by UVF. In borings extended to 15 feet bgs near the probable USTs (borings P217-B5 to B8), an additional portion was selected from the 10-15 foot interval for the analyses indicated above. Neither groundwater nor bedrock were encountered in the borings. Thirty-four soil samples were collected from the 15 borings at the Site for onsite UVF analysis.

4.0 SOIL SAMPLING RESULTS

Based on September 2, 2021, PID screening and UVF hydrocarbon analysis, evidence of petroleum hydrocarbon impacts was not identified. The NCDEQ Action Levels of 100 milligrams per kilogram (mg/kg) for DRO and 50 mg/kg for GRO were not exceeded in the 15 borings advanced at the Site.

PID readings for the 15 borings ranged from not detected in borings P217-B13, B14, and B15 to 62.9 parts per million (ppm) in sample P217-B7-10-12 collected from 10 to 12 feet bgs. The PID field screening results for samples selected for UVF analysis are summarized in **Table 1** and the full list of PID readings are provided on the boring logs in Appendix A.

Results from the on-Site UVF petroleum soil analyses are presented in **Table 2**, with instrument generated tables in **Appendix D**. Several categories of analyses were measured such as: DRO, GRO, TPH, PAHs, and total aromatics. **Figure 3** presents the GRO and DRO results for the September 2021 investigation.

GRO or DRO detections in the 34 soil samples collected at the Site did not exceed their respective NCDEQ Action Levels. The hydrocarbon results from the QED QROS Hydrocarbon Analyzer are provided in Appendix D.

5.0 CONCLUSIONS

Based on the Site observations and UVF analysis, petroleum-impacted soil contamination was not identified as defined by localized exceedances of the NCDEQ Action Levels of 50 mg/kg for GRO and 100 mg/kg for DRO.

The following bulleted summary is based upon Wood's evaluation of field observations and on-Site quantitative analyses of samples collected from the Site on September 2, 2021.

- The Site is occupied with a garage building, a suspected dispenser island located to the southwest of the building, and several old vehicles and trailers.

- The geophysical survey identified two probable USTs located along the northwestern exterior of the Site building. Both USTs measured approximately 26 feet long by 7 feet wide and 3 feet to top of tanks.

- Fifteen soil borings were advanced to roughly 10 to 15 feet bgs in the NCDOT ROW investigation area to collect soil samples for on-Site UVF analysis. Thirty-four soil samples were collected for on-Site UVF analysis.

- UVF analysis of the 34 soil samples collected did not identify petroleum-impacted soil.

6.0 RECOMMENDATIONS

Based on these Phase II Investigation results, Wood recommends the two probable USTs identified during the geophysical survey should be removed in general accordance with the NCDEQ guidelines.

TABLES

Table 1: Summary of PID Screening Results
R-5709, Parcel 217 - John & Kay Bolin Property
Aberdeen, North Carolina
Wood Project: 20478R5709

Boring ID	Depth of Sample Interval	PID Reading
P217-B1	2-4	5.2
	6-8	4.8
P217-B2	2-4	5.7
	6-8	7.4
P217-B3	0-2	7.8
	6-8	7.7
P217-B4	0-2	7.2
	4-6	8.7
P217-B5	2-4	5.1
	6-8	5.6
	12-14	7.5
P217-B6	2-4	8.9
	6-8	7.2
	10-12	8.3
P217-B7	0-2	42.1
	6-8	11.1
	10-12	62.9
P217-B8	2-4	9.4
	4-6	10.6
	12-14	7.7
P217-B9	0-2	5.1
	6-8	6.6
P217-B10	2-4	7.9
	6-8	8.6
P217-B11	2-4	7.3
	6-8	7.9
P217-B12	2-4	5.8
	6-8	6.3
B217-B13	2-4	0.0
	4-6	0.0
B217-B14	0-2	0.0
	6-8	0.0
P217-B15	2-4	0.0
	8-10	0.0

Notes:

1. Samples collected on 9/2/21
2. Depths shown in feet below ground surface (bgs)
3. PID = Photoionization Detector
4. PID readings shown in parts per million (ppm)

Prepared By/Date: AJF 9/8/21

Checked By/Date: DRH 10/4/21

Table 2: UVF Hydrocarbon Soil Sampling Results
R-5709, Parcel 217 - John & Kay Bolin Property
Aberdeen, North Carolina
Wood Project: 20478R5709

Sample ID Number	Sample Depth (ft. bgs)	BTEX (mg/kg)	GRO (mg/kg)	DRO (mg/kg)	PAHs (mg/kg)
P217-B1-2-4	2-4	<0.2	<0.2	<0.08	0.002
P217-B1-6-8	6-8	<0.25	<0.25	<0.1	<0.005
P217-B2-2-4	2-4	<0.17	<0.17	6.2	0.018
P217-B2-6-8	6-8	<0.27	<0.27	<0.11	<0.006
P217-B3-0-2	0-2	<0.27	<0.27	22	0.3
P217-B3-6-8	6-8	<0.2	<0.2	<0.08	<0.004
P217-B4-0-2	0-2	<0.2	<0.2	7.2	0.17
P217-B4-4-6	4-6	<0.2	<0.2	7.1	0.027
P217-B5-2-4	2-4	<0.27	35.9	0.6	0.012
P217-B5-6-8	6-8	<0.22	<0.22	<0.09	<0.005
P217-B5-12-14	12-14	<0.25	<0.25	8.8	0.014
P217-B6-2-4	2-4	<0.25	<0.25	8.8	0.006
P217-B6-6-8	6-8	<0.2	<0.2	<0.08	<0.004
P217-B6-10-12	10-12	<0.3	<0.3	4.8	0.07
P217-B7-0-2	0-2	<0.3	<0.3	0.8	0.016
P217-B7-6-8	6-8	<0.2	<0.2	0.1	0.002
P217-B7-10-12	10-12	<0.2	<0.2	2.2	0.05
P217-B8-2-4	2-4	<0.17	<0.17	1.1	0.02
P217-B8-4-6	4-6	<0.3	<0.3	0.05	0.006
P217-B8-12-14	12-14	<0.17	<0.17	6.2	0.009
P217-B9-0-2	0-2	<0.17	0.027	0.027	0.003
P217-B9-6-8	6-8	<0.25	0.25	0.25	0.025
P217-B10-2-4	2-4	<0.22	8.5	8.5	0.027
P217-B10-6-8	6-8	<0.5	<0.21	<0.5	<0.011
P217-B11-2-4	2-4	<0.2	1.8	1.8	0.05
P217-B11-6-8	6-8	<0.27	<0.11	0.015	<0.0
P217-B12-2-4	2-4	22.9	9	31.9	0.15
P217-B12-6-8	6-8	<0.22	8	8	0.011
P217-B13-2-4	2-4	<0.25	<0.25	1.3	0.04
P217-B13-4-6	4-6	<0.3	<0.3	12.7	0.019
P217-B14-0-2	0-2	<0.27	<0.27	0.9	0.025
P217-B14-6-8	6-8	<0.2	<0.2	0.04	0.004
P217-B15-2-4	2-4	<0.3	<0.3	0.6	0.016
P217-B15-8-10	8-10	<0.27	<0.27	<0.11	0.001
NC State Action Level		**N/A**	**50**	**100**	**N/A**

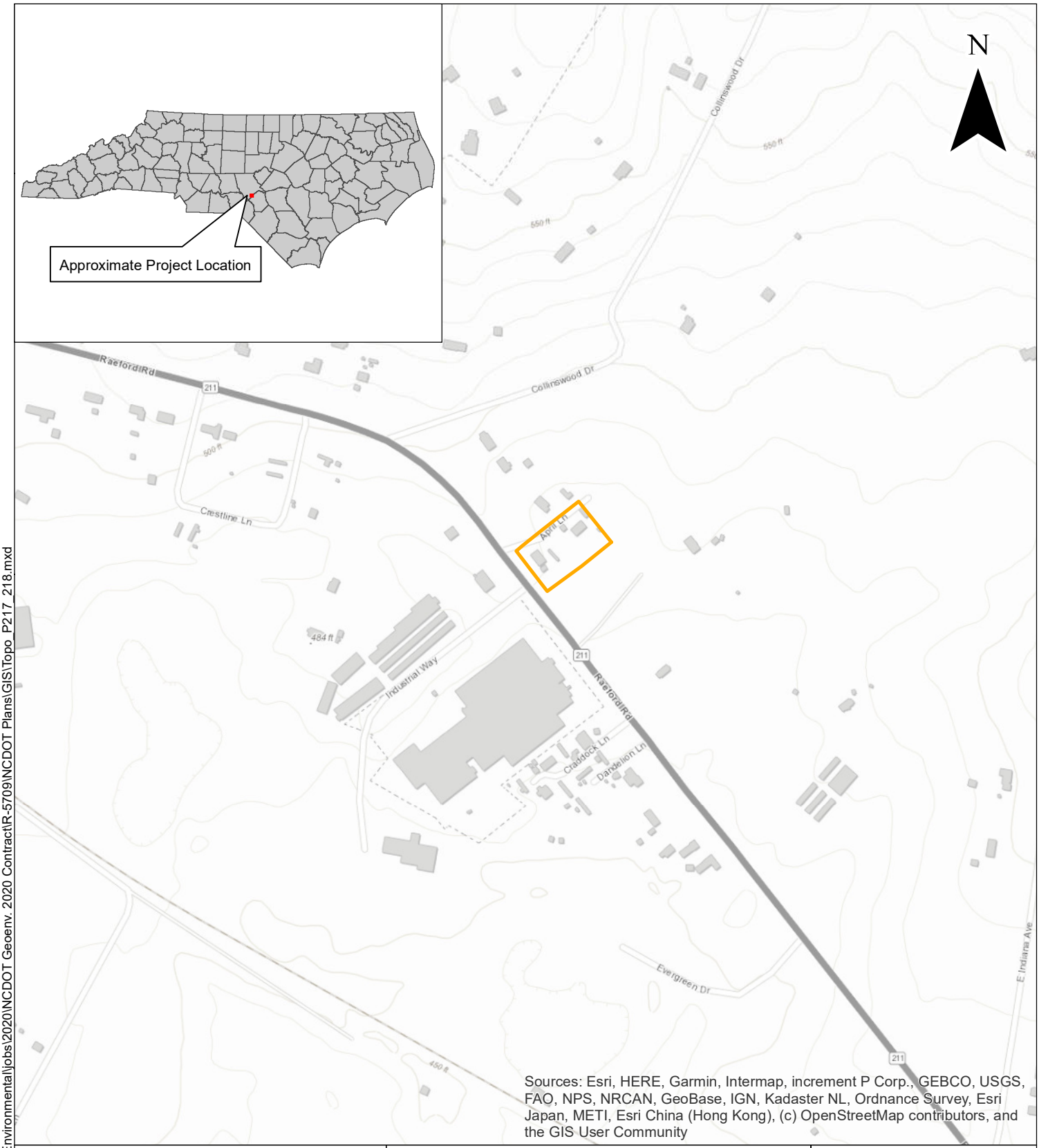
Notes:

1. Samples collected on September 2, 2021
2. Depths shown in feet below ground surface (bgs)
3. Concentrations shown in milligrams per kilogram (mg/kg)
4. BTEX = Benzene, toluene, ethylbenzene, xylene
5. GRO = Gasoline Range Organics
6. DRO = Diesel Range Organics
7. PAHs = Polycyclic aromatic hydrocarbons
8. N/A = Not applicable
9. Bold values exceed respective NC State Action Level

Prepared By/Date: DRH 9/9/21

Checked By/Date: AJF 9/24/21

FIGURES



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

wood.
Wood Environment & Infrastructure Solutions, Inc.
2801 Yorkmont Road, Suite 100
Charlotte, NC 28208
(704) 357-8600

VICINITY MAP
R5709-PARCEL 217
9849 NC 221 HWY
ABERDEEN, NORTH CAROLINA

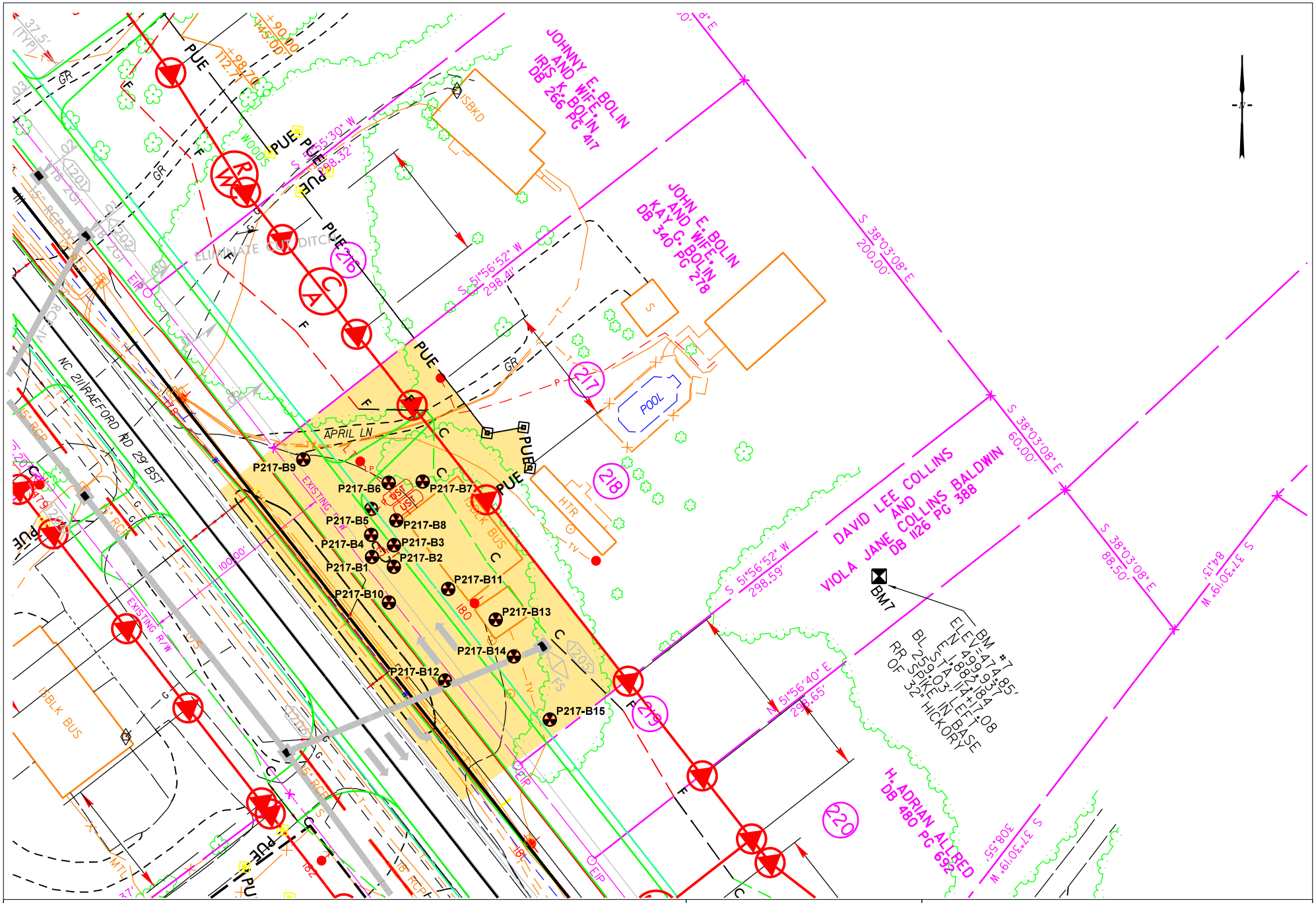
PREPARED BY:	LMM
DATE:	10/21/2021
CHECKED BY:	HPC
DATE:	10/21/2021
PROJECT NO:	20478R5709
FIGURE:	1

Legend

Site Boundary

0 500 1,000 Feet

Document Path: \\clt1-fs1\projects\6228 Environmental\jobs\2020\NCDOT Geoenv. 2020 Contract\R-5709\NCDOT Plans\GIS\Topo_P217_218.mxd



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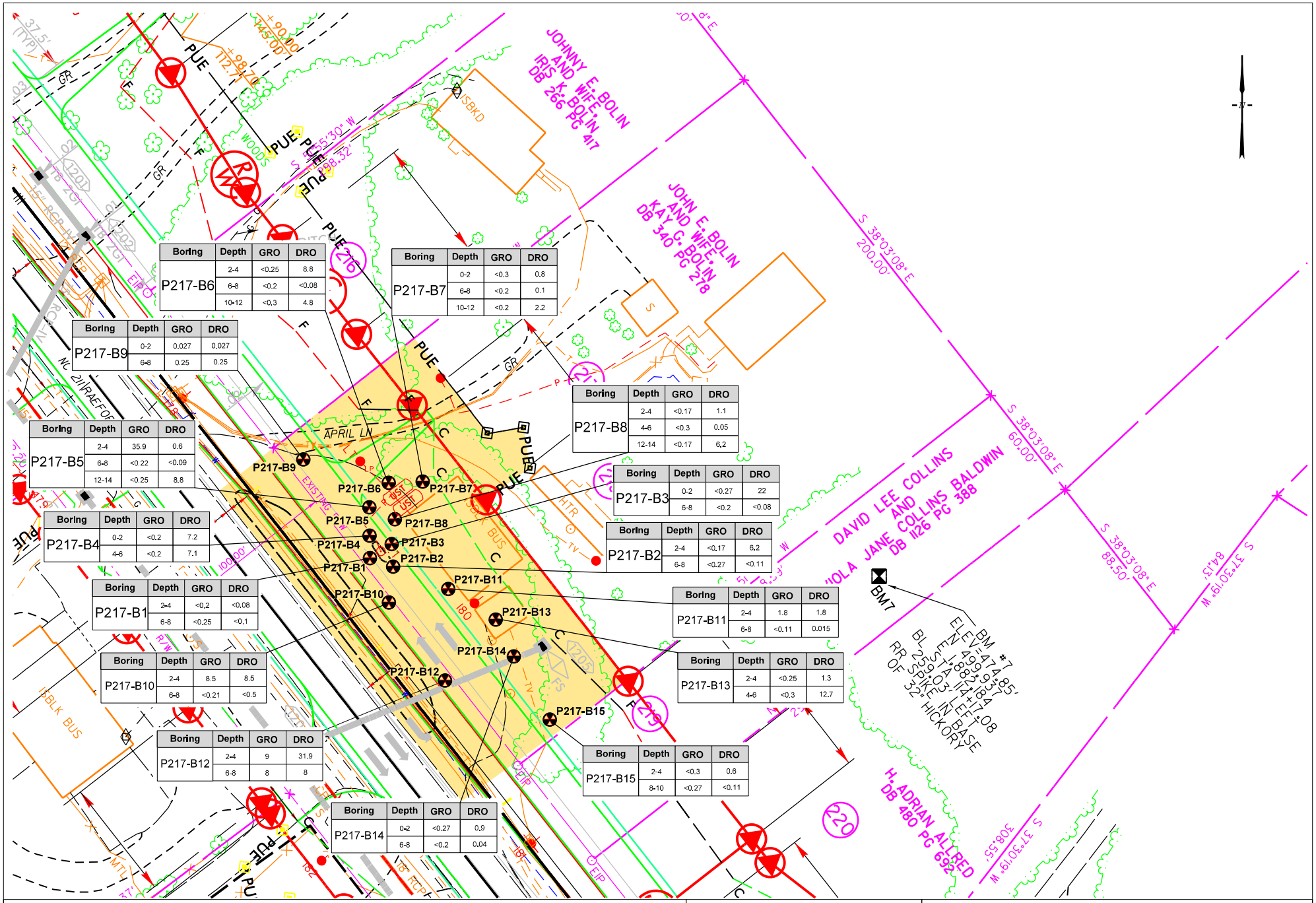
SITE MAP WITH BORING LOCATIONS
R-5709 - PARCEL 217
10531 NC 211 HWY
ABERDEEN, NORTH CAROLINA

PREPARED BY:	DATE:	CHECKED BY:	DATE:	JOB NUMBER	FIGURE
LMM	9/29/21	AJF	9/29/21	20478R5709	2



Boring	Depth	GRO	DRO
P217-B6	2-4	<0.25	8.8
	6-8	<0.2	<0.08
	10-12	<0.3	4.8

Boring	Depth	GRO	DRO
P217-B7	0-2	<0.3	0.8
	6-8	<0.2	0.1
	10-12	<0.2	2.2

Boring	Depth	GRO	DRO
P217-B9	0-2	0.027	0.027
	6-8	0.25	0.25

Boring	Depth	GRO	DRO
P217-B8	2-4	<0.17	1.1
	4-6	<0.3	0.05
	12-14	<0.17	6.2

Boring	Depth	GRO	DRO
P217-B5	2-4	35.9	0.6
	6-8	<0.22	<0.09
	12-14	<0.25	8.8

Boring	Depth	GRO	DRO
P217-B3	0-2	<0.27	22
	6-8	<0.2	<0.08

Boring	Depth	GRO	DRO
P217-B4	0-2	<0.2	7.2
	4-6	<0.2	7.1

Boring	Depth	GRO	DRO
P217-B2	2-4	<0.17	6.2
	6-8	<0.27	<0.11

Boring	Depth	GRO	DRO
P217-B1	2-4	<0.2	<0.08
	6-8	<0.25	<0.1

Boring	Depth	GRO	DRO
P217-B11	2-4	1.8	1.8
	6-8	<0.11	0.015

Boring	Depth	GRO	DRO
P217-B10	2-4	8.5	8.5
	6-8	<0.21	<0.5

Boring	Depth	GRO	DRO
P217-B13	2-4	<0.25	1.3
	4-6	<0.3	12.7

Boring	Depth	GRO	DRO
P217-B12	2-4	9	31.9
	6-8	8	8

Boring	Depth	GRO	DRO
P217-B15	2-4	<0.3	0.6
	8-10	<0.27	<0.11

Boring	Depth	GRO	DRO
P217-B14	0-2	<0.27	0.9
	6-8	<0.2	0.04

APPROXIMATE BORING LOCATION

AREA OF INVESTIGATION UST PROBABLE UST

DEPTHS SHOWN IN FEET BELOW GROUND SURFACE
CONCENTRATIONS SHOWN IN MILLIGRAMS PER KILOGRAM (mg/kg)
GRO=GASOLINE RANGE ORGANICS
DRO=DIESEL RANGE ORGANICS
GRO STATE ACTION LEVEL = 50 mg/kg
DRO STATE ACTION LEVEL = 100 mg/kg
BOLD CONCENTRATION EXCEEDS RESPECTIVE STATE ACTION LEVEL

40' 0' 20' 40'
10'
(ENGLISH)

wood.

ANALYTICAL RESULTS MAP
R-5709 - PARCEL 217
10531 NC 211 HWY
ABERDEEN, NORTH CAROLINA

PREPARED BY:	DATE:	CHECKED BY:	DATE:	JOB NUMBER	FIGURE
LMM	10/14/21	AJF	10/14/21	20478R5709	3

APPENDIX A

BORING LOGS

SOIL BORING FIELD WORKSHEET

BORING #	**P217-B1**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/2/2021**			WEATHER CONDITIONS	**Partly cloudy, 85°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	2.7	Asphalt/gravel Tan/brown sand	
2			
3	5.2	Tan clayey sand	P217-B1-2-4 selected for UVF analyses
4			
5	4.3	Tan/orange/white clay	
6			
7	4.8		P217-B1-6-8 selected for UVF analyses
8			
9	3.9		
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

SOIL BORING FIELD WORKSHEET

BORING #	**P217-B2**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/2/2021**			WEATHER CONDITIONS	**Partly cloudy, 85°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	3.3	Asphalt/gravel	
2		Tan/brown sand	
3	5.7		P217-B2-2-4 selected for UVF analyses
4			
5	7.2	Tan clayey sand	
6			
7	7.4	Tan/orange/white/red clay	P217-B2-6-8 selected for UVF analyses
8			
9	7.2		
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

SOIL BORING FIELD WORKSHEET

BORING #	**P217-B3**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/2/2021**			WEATHER CONDITIONS	**Partly cloudy, 85°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	7.8	Asphalt/gravel	
2		Tan/brown sand	P217-B3-0-2 selected for UVF analyses
3	4.3		
4			
5	6.1	Tan/brown clayey sand	
6		Tan/white clay	
7	7.7		P217-B3-6-8 selected for UVF analyses
8		Tan/orange/white/red clay	
9	7.5		
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P217-B4**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/2/2021**			WEATHER CONDITIONS	**Partly cloudy, 85°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	7.2	Asphalt/gravel Tan/brown sand	P217-B4-0-2 selected for UVF analyses
2			
3	8.3	Tan/brown clayey sand	
4			
5	8.7	Tan/white clay	P217-B4-4-6 selected for UVF analyses
6			
7	8.6		
8		Tan/orange/white/red clay	
9	8.4		
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P217-B5**	BORING DEPTH (ft)	**15**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/2/2021**			WEATHER CONDITIONS	**Partly cloudy, 85°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	4.9	Asphalt/gravel Tan sand	
2			
3	5.1		P217-B5-2-4 selected for UVF analyses
4		Tan/brown sand	
5	5.4	Tan/brown clayey sand	
6			
7	5.6	Tan/orange/white/red clay	P217-B5-6-8 selected for UVF analyses
8			
9	4.1		
10			
11	7.2		
12			
13	7.5	Tan/white clayey sand	P217-B5-12-14 selected for UVF analyses
14			
15	7.1		
16		Boring terminated at 15 feet bgs	
17			
18			
19			
20			
21			

Log Completed By: **AJF**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P217-B6**	BORING DEPTH (ft)	**15**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/2/2021**			WEATHER CONDITIONS	**Partly cloudy, 85°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	6.6	Asphalt/gravel Tan/brown sand	
2			
3	8.9		P217-B6-2-4 selected for UVF analyses
4		Tan/brown clayey sand	
5	7.5		
6			
7	7.2	Tan/orange/white/red clay	P217-B6-6-8 selected for UVF analyses
8			
9	7.6		
10			
11	8.3	Tan/white/brown clayey sand	P217-B6-10-12 selected for UVF analyses
12			
13	7.8		
14		Tan/white sand	
15	7.4		
16		Boring terminated at 15 feet bgs	
17			
18			
19			
20			
21			

Log Completed By: **AJF**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P217-B7**	BORING DEPTH (ft)	**15**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/2/2021**			WEATHER CONDITIONS	**Partly cloudy, 85°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	42.1	Tan/brown sand, pine tree odor	P217-B7-0-2 selected for UVF analyses
2			
3	24.4	Tan/brown sand	
4			
5	9.7		
6			
7	11.1	Tan sand	P217-B7-6-8 selected for UVF analyses
8			
9	8.8	Tan/brown sand	
10			
11	62.9		P217-B7-10-12 selected for UVF analyses
12		Tan/white sand	
13	10.9		
14			
15	9.8		
16		Boring terminated at 15 feet bgs	
17			
18			
19			
20			
21			

Log Completed By: **AJF**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P217-B8**	BORING DEPTH (ft)	**15**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/2/2021**			WEATHER CONDITIONS	**Partly cloudy, 85°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	8.2	Asphalt/gravel Tan/brown sand	
2			
3	9.4		P217-B8-2-4 selected for UVF analyses
4			
5	10.6	Tan/white clayey sand	P217-B8-4-6 selected for UVF analyses
6			
7	9.4	Tan/orange/white/red clay	
8			
9	9.5		
10			
11	3.6	Tan/white clayey sand	
12			
13	7.7		P217-B8-12-14 selected for UVF analyses
14		Tan/white sand	
15	7.1		
16		Boring terminated at 15 feet bgs	
17			
18			
19			
20			
21			

Log Completed By: **AJF**

Page: **1**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P217-B9**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/2/2021**			WEATHER CONDITIONS	**Partly cloudy, 85°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	5.1	Asphalt/gravel	P217-B9-0-2 selected for UVF analyses
2			
3	0.8	Tan/brown sand	
4			
5	0.3		
6			
7	6.6	Tan sand	P217-B9-6-8 selected for UVF analyses
8			
9	4.0	Tan/brown sand	
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

SOIL BORING FIELD WORKSHEET

BORING #	**P217-B10**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/2/2021**			WEATHER CONDITIONS	**Partly cloudy, 85°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	7.9	Asphalt/gravel Tan/brown sand	
2			
3	7.9		P217-B10-2-4 selected for UVF analyses
4			
5	8.1	Tan/white clayey sand	
6			
7	8.6	Tan/orange/white/red clay	P217-B10-6-8 selected for UVF analyses
8			
9	8.4		
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

SOIL BORING FIELD WORKSHEET

BORING #	**P217-B11**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/2/2021**			WEATHER CONDITIONS	**Partly cloudy, 85°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	5.3	Asphalt/gravel Tan/brown sand	
2			
3	7.3		P217-B11-2-4 selected for UVF analyses
4			
5	7.0	Tan clayey sand	
6			
7	7.9	Tan/orange/white/red clay	P217-B11-6-8 selected for UVF analyses
8			
9	7.0		
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

SOIL BORING FIELD WORKSHEET

BORING #	**P217-B12**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/2/2021**			WEATHER CONDITIONS	**Partly cloudy, 85°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	5.5	Asphalt/gravel Tan/brown sand	
2			
3	5.8	Tan clayey sand	P217-B12-2-4 selected for UVF analyses
4			
5	5.3	Tan/orange/white clay	
6			
7	6.3		P217-B12-6-8 selected for UVF analyses
8			
9	5.1		
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P217-B13**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/2/2021**			WEATHER CONDITIONS	**Partly cloudy, 85°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.0	Ashpalt/gravel Tan/brown sand	
2			
3	0.0		P217-B13-2-4 selected for UVF analyses
4		Tan/white/red clayey sand	
5	0.0		P217-B13-4-6 selected for UVF analyses
6			
7	0.0	Tan/white/orange/red clay	
8			
9	0.0		
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P217-B14**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/2/2021**			WEATHER CONDITIONS	**Partly cloudy, 85°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.0	Asphalt/gravel	P217-B14-0-2 selected for UVF analyses
2		Tan/brown sand	
3	0.0	Brown sand	
4		Tan/brown clayey sand	
5	0.0		
6			
7	0.0	Tan/white/orange/red clay	P217-B14-6-8 selected for UVF analyses
8			
9	0.0		
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

SOIL BORING FIELD WORKSHEET

BORING #	**P217-B15**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**9/2/2021**			WEATHER CONDITIONS	**Partly cloudy, 85°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.0	Gravel Tan sand	
2			
3	0.0		P217-B15-2-4 selected for UVF analyses
4		Tan/brown sand	
5	0.0		
6		Tan sand	
7	0.0		
8		Tan/brown clayey sand	
9	0.0		P217-B15-8-10 selected for UVF analyses
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			

Log Completed By: **AJF**

APPENDIX B

PHOTOGRAPHIC LOG

Photograph 1:
View of building and suspected dispenser island at parcel 217, looking north.

Photograph 2:
Old vehicles located at parcel 217, facing northeast.

Photograph 3:
View of area with probable USTs (brown pine straw covered area), facing northeast.

Photograph 4:
View of IET advancing direct push soil sampler at parcel 217.

Photograph 5:
View of on-Site UVF analysis setup.

APPENDIX C

GEOPHYSICAL REPORT

PYRAMID GEOPHYSICAL SERVICES
(PROJECT 2021-201)

GEOPHYSICAL SURVEY

METALLIC UST INVESTIGATION:
PARCEL 217
NCDOT PROJECT R-5709 (50205.1.1)

10531 NC-211, ABERDEEN, NC

August 25, 2021

Report prepared for: **Helen P. Corley, LG, RSM, BCES**
Wood, PLC
2801 Yorkmont Road #100
Charlotte, NC 28208

Prepared by: _____

Eric C. Cross, P.G.
NC License #2181

Reviewed by: _____

Douglas A. Canavello, P.G.
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C257: GEOLOGY C1251: ENGINEERING

GEOPHYSICAL INVESTIGATION REPORT
Parcel 217 - 10531 NC-211
Aberdeen, Moore County, North Carolina

Table of Contents

Figures

Appendices

LIST OF ACRONYMS

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

EXECUTIVE SUMMARY

Project Description: Pyramid Environmental (Pyramid) conducted a geophysical investigation for Wood, PLC at Parcel 217, located at 10531 NC-211, in Aberdeen, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project R-5709). The survey was designed to extend from the existing edge of pavement into the proposed ROW and/or proposed easements, whichever distance was greater. Conducted from August 10-12, 2021, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

Geophysical Results: The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. A total of seven EM anomalies were identified. Several of the EM anomalies were directly attributed to visible cultural features at the ground surface. One large EM feature was characteristic of buried structures such as USTs. GPR was performed across the significant unknown buried metal anomaly as well as around all sources of significant metallic interference to confirm that the interference did not obscure any significant structures such as USTs. Two probable USTs were identified at the location of the significant metallic anomaly. Both probable USTs were approximately 26 feet long and 7 feet wide. No evidence of additional buried structures such as USTs was observed.

Collectively, the geophysical data recorded evidence of two probable USTs at Parcel 217.

INTRODUCTION

Pyramid Environmental conducted a geophysical investigation for Wood, PLC at Parcel 217, located at 10531 NC-211, in Aberdeen, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project R-5709). The survey was designed to extend from the existing edge of pavement into the proposed ROW and/or proposed easements, whichever distance was greater. Conducted from August 10-12, 2021, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

The site consisted of a commercial building surrounded by asphalt and grass surfaces. An apparent former pump island was visible in front of the building. An aerial photograph showing the survey area boundaries and ground-level photographs are shown in **Figure 1**.

FIELD METHODOLOGY

The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. Pyramid collected the EM data using a Geonics EM61-MK2 (EM61) metal detector integrated with a Geode External GPS/GLONASS receiver. The integrated GPS system allows the location of the instrument to be recorded in real-time during data collection, resulting in an EM data set that is geo-referenced and can be overlain on aerial photographs and CADD drawings. A boundary grid was established around the perimeter of the site with marks every 10 feet to maintain orientation of the instrument throughout the survey and assure complete coverage of the area.

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

generally parallel survey lines, spaced five feet apart. The data were downloaded to a computer and reviewed in the field and office using the Geonics NAV61 and Surfer for Windows Version 15.0 software programs.

GPR data were acquired across select EM anomalies on August 12, 2021, using a Geophysical Survey Systems, Inc. (GSSI) SIR 4000 control unit coupled to a 350 MHz HS antenna. Data were collected both in reconnaissance fashion as well as along formal transect lines across EM features. The GPR data were viewed in real-time using a vertical scan of 512 samples, at a rate of 48 scans per second. GPR data were viewed down to a maximum depth of approximately 6 feet, based on dielectric constants calculated by the SIR 4000 unit in the field during the reconnaissance scans. GPR transects across specific anomalies were saved to the hard drive of the DF unit for post-processing and figure generation.

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

Geophysical Surveys for Underground Storage Tanks
on NCDOT Projects

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

DISCUSSION OF RESULTS

Discussion of EM Results

A contour plot of the EM61 results obtained across the survey area at the property is presented in **Figure 2**. Each EM anomaly is numbered for reference in the figure. The

following table presents the list of EM anomalies and the cause of the metallic response, if known:

LIST OF METALLIC ANOMALIES IDENTIFIED BY EM SURVEY

Metallic Anomaly #	Cause of Anomaly	Investigated with GPR
1	Metal Barrels	
2	**Two Probable USTs**	✓
3	Surface Metal Debris	✓
4	Building and Metal Doors	✓
5	Trailers, Vehicles, Lights	✓
6	Surface Metal Debris	
7	Pump Island	✓

Several of the EM anomalies were directly attributed to visible cultural features at the ground surface, including metal barrels, surface metallic debris, the building and doors, trailers, vehicles, lights, and the apparent pump island. EM Anomaly 2 was a significant buried metallic feature that was suggestive of USTs and was investigated by GPR. GPR was also performed around the building, trailers/vehicles, metal on the ground, and across the pump island to confirm that the metallic interference did not obscure any significant structures such as USTs.

Discussion of GPR Results

Figure 3 presents the locations of the formal GPR transects performed at the property as well as select transect images. All of the transect images are included in **Appendix A**. A total of fifteen formal GPR transects were performed at the site.

GPR Transects 1-3 were performed across EM Anomaly 2. These transects recorded two discreet, high-amplitude hyperbolic reflectors and two distinct lateral reflectors that were characteristic of USTs. These features have been characterized as two probable USTs. Both probable USTs were approximately 26 feet long and 7 feet wide. **Figure 4** provides the locations and sizes of the two probable USTs, overlain on an aerial, along with ground-level photographs. The remaining transects showed evidence of possible buried utilities and/or debris. No evidence of additional buried structures such as USTs was observed.

Collectively, the geophysical data recorded evidence of two probable USTs at Parcel 217. **Figure 5** provides an overlay of the metal detection results and the two probable USTs on the NCDOT engineering plans for reference.

SUMMARY & CONCLUSIONS

Pyramid's evaluation of the EM61 and GPR data collected at Parcel 217 in Aberdeen, North Carolina, provides the following summary and conclusions:

- The EM61 and GPR surveys provided reliable results for the detection of metallic USTs within the accessible portions of the geophysical survey area.
- Several of the EM anomalies were directly attributed to visible cultural features at the ground surface. One large EM feature was characteristic of buried structures such as USTs.
- GPR was performed across the significant unknown buried metal anomaly as well as around all sources of significant metallic interference to confirm that the interference did not obscure any significant structures such as USTs.
- Two probable USTs were identified at the location of the significant metallic anomaly. Both probable USTs were approximately 26 feet long and 7 feet wide. No evidence of additional buried structures such as USTs was observed.
- Collectively, the geophysical data recorded evidence of two probable USTs at Parcel 217.

LIMITATIONS

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

concrete, or other restrictions to the accessibility of the geophysical instruments could not be fully investigated.

APPROXIMATE BOUNDARIES OF GEOPHYSICAL SURVEY AREA

View of Survey Area (Facing Approximately Northwest)

View of Survey Area (Facing Approximately Southeast)

N

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PROJECT: PARCEL 217 ABERDEEN, NORTH CAROLINA NCDOT PROJECT R-5709	TITLE: PARCEL 217 - GEOPHYSICAL SURVEY BOUNDARIES AND SITE PHOTOGRAPHS	DATE: 8/16/2021 PYRAMID PROJECT #: 2021-201	CLIENT: Wood, PLC **FIGURE 1**

EM61 METAL DETECTION RESULTS

EVIDENCE OF TWO PROBABLE METALLIC USTs WAS OBSERVED.

The contour plot shows the differential results of the EM61 instrument in millivolts (mV). The differential results focus on larger metallic objects such as USTs and drums. The EM data were collected on August 10, 2021, using a Geonics EM61-MK2 instrument. Verification GPR data were collected using a GSSI SIR 4000 instrument with a 350 MHz HS antenna on August 12, 2021.

EM61 Metal Detection Response (millivolts)

N

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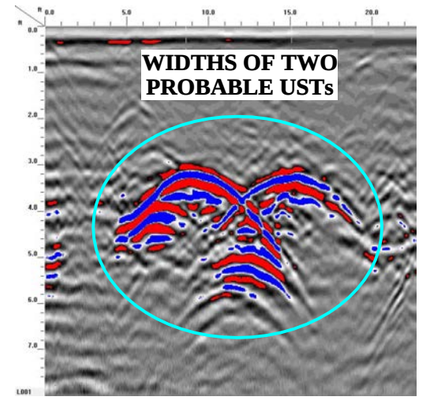
PROJECT: PARCEL 217 ABERDEEN, NORTH CAROLINA NCDOT PROJECT R-5709	TITLE: PARCEL 217 - EM61 METAL DETECTION CONTOUR MAP	DATE: 8/16/2021	CLIENT: Wood, PLC
		PYRAMID PROJECT #: 2021-201	**FIGURE 2**

GPR TRANSECT LOCATIONS



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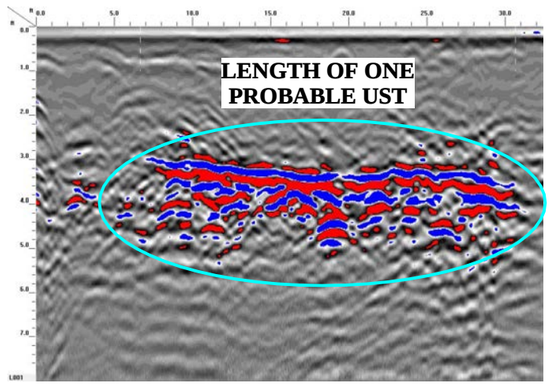

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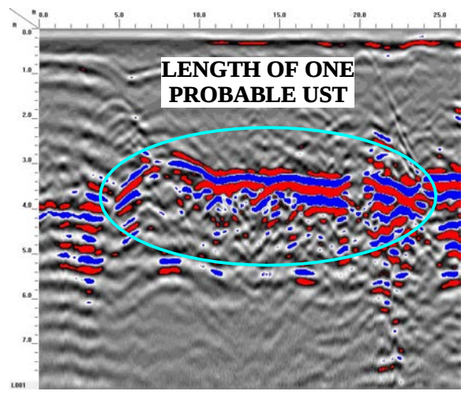

GPR TRANSECT 3 (T3)

N

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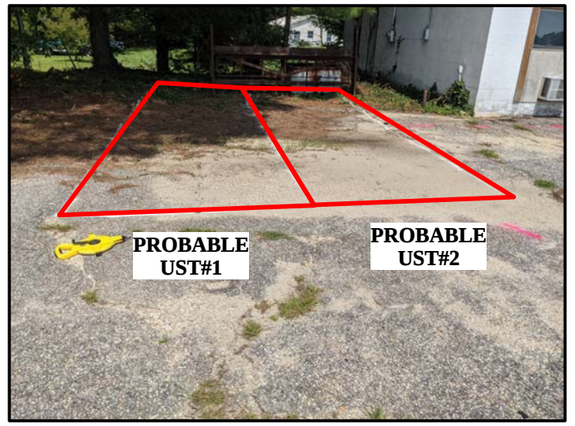
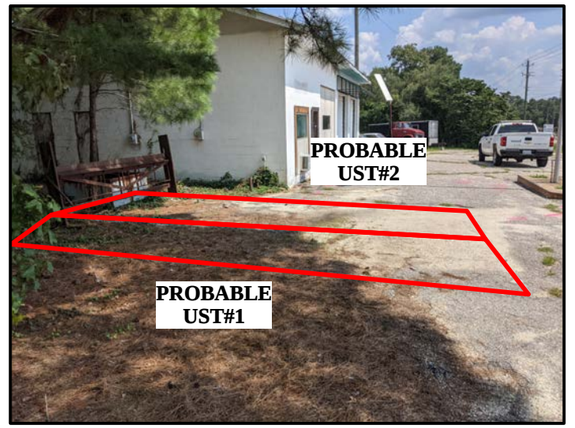
PROJECT: PARCEL 217 ABERDEEN, NORTH CAROLINA NCDOT PROJECT R-5709	TITLE: PARCEL 217 - GPR TRANSECT LOCATIONS AND SELECT IMAGES	DATE: 8/16/2021 PYRAMID PROJECT #: 2021-201	CLIENT: Wood, PLC **FIGURE 3**

LOCATIONS OF TWO PROBABLE USTs



View of Two Probable USTs
(Facing Approximately Northeast)



View of Two Probable USTs
(Facing Approximately Southeast)

N

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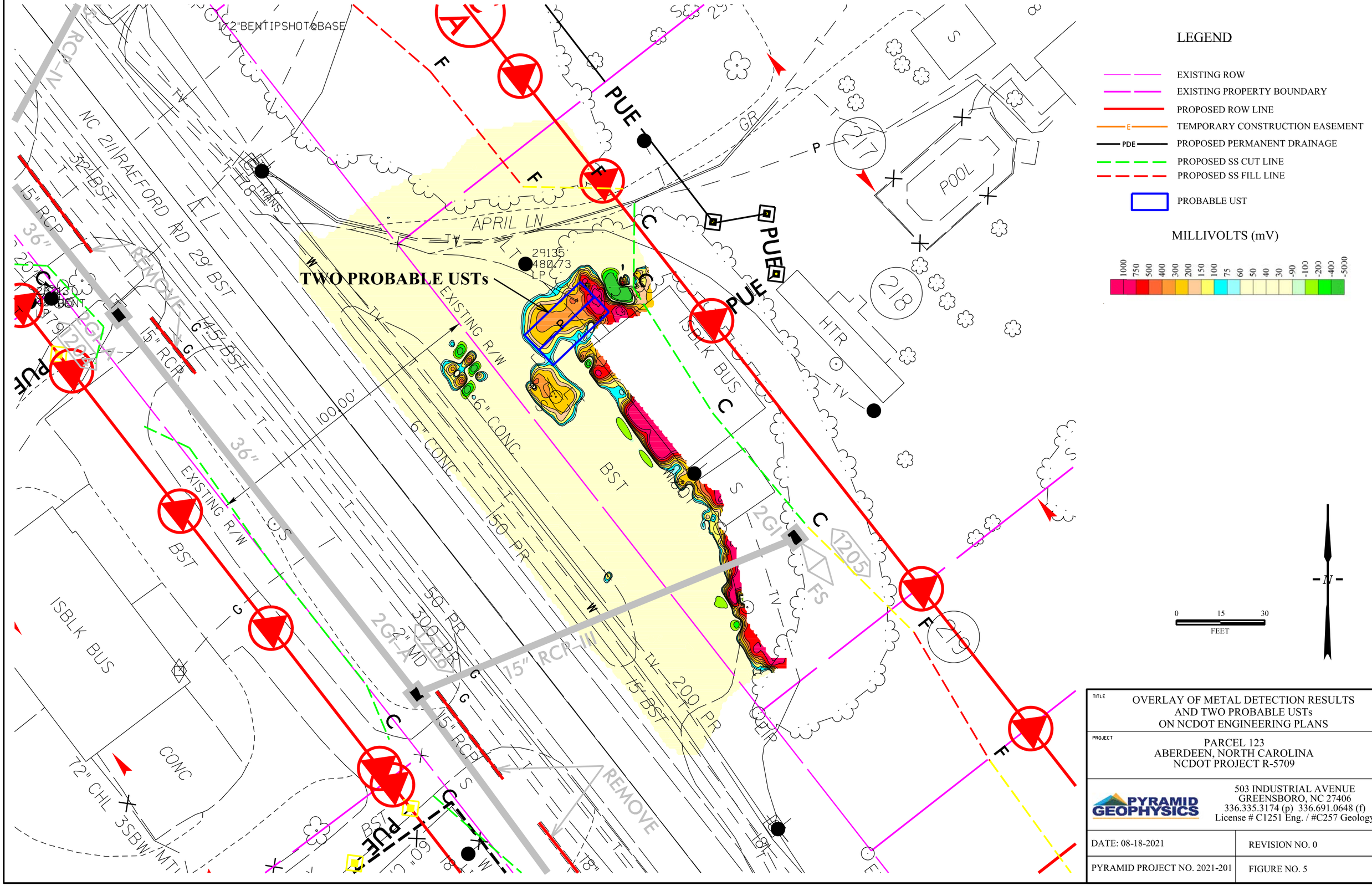
PROJECT: PARCEL 217 ABERDEEN, NORTH CAROLINA NCDOT PROJECT R-5709	TITLE: PARCEL 217 - LOCATIONS AND SIZES OF TWO PROBABLE USTs	DATE: 8/16/2021 PYRAMID PROJECT #: 2021-201	CLIENT: Wood, PLC **FIGURE 4**



TITLE

OVERLAY OF METAL DETECTION RESULTS
AND TWO PROBABLE USTs
ON NCDOT ENGINEERING PLANS

PROJECT

PARCEL 123
ABERDEEN, NORTH CAROLINA
NCDOT PROJECT R-5709

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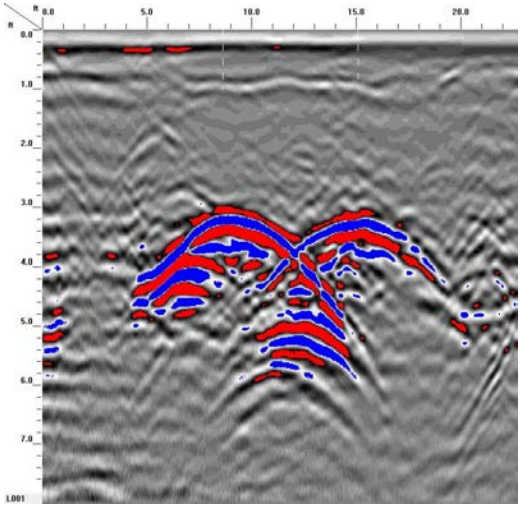
DATE: 08-18-2021	REVISION NO. 0
PYRAMID PROJECT NO. 2021-201	FIGURE NO. 5

Appendix A – GPR Transect Images



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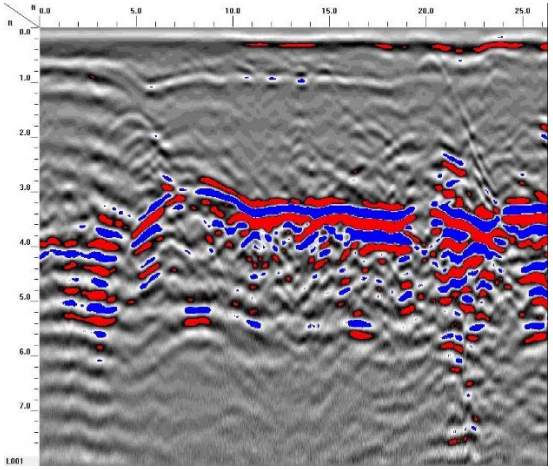

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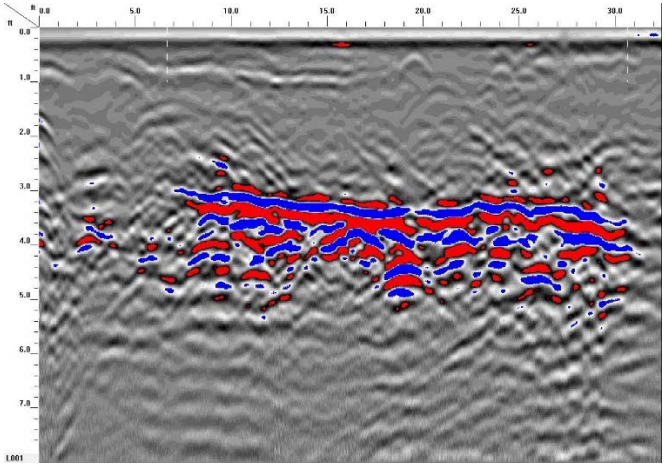

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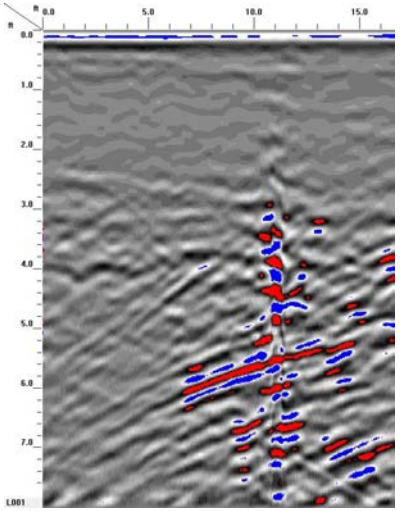

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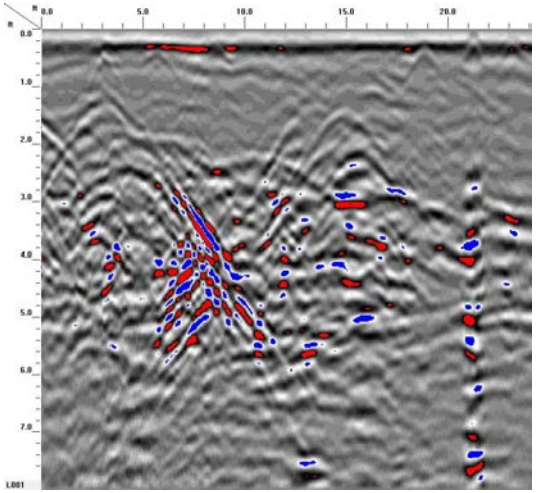

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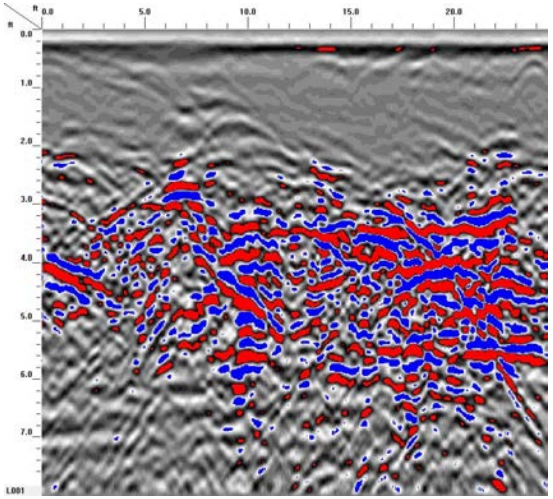

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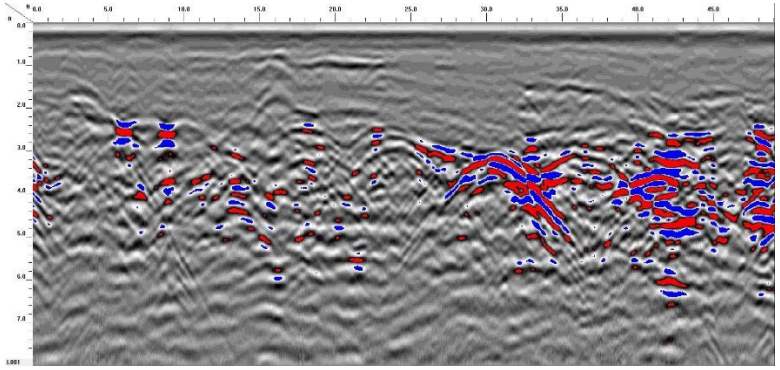

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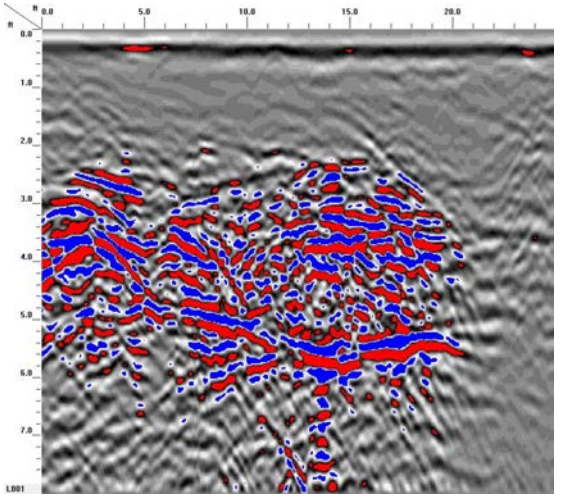

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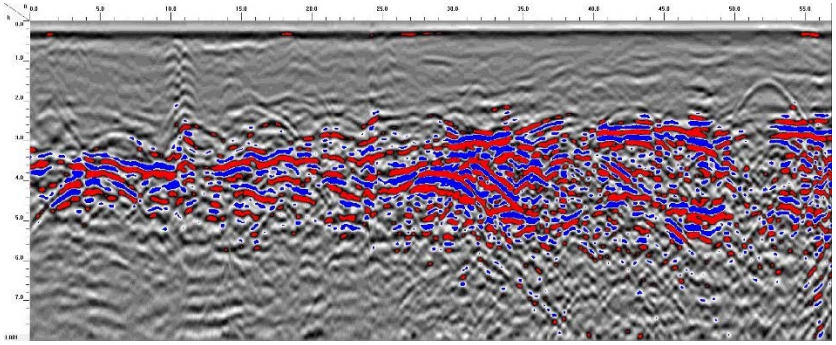

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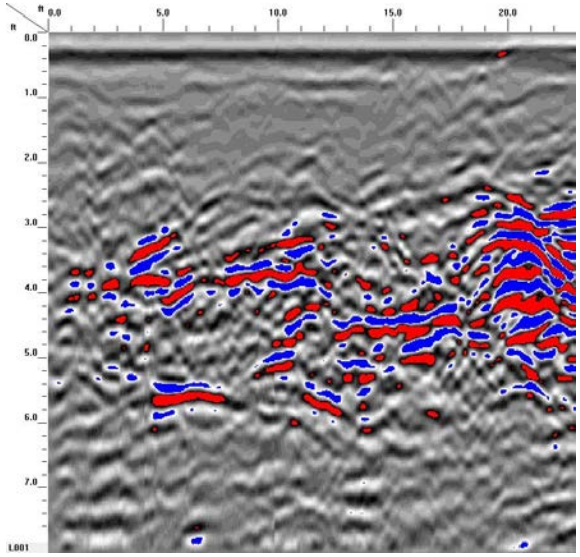

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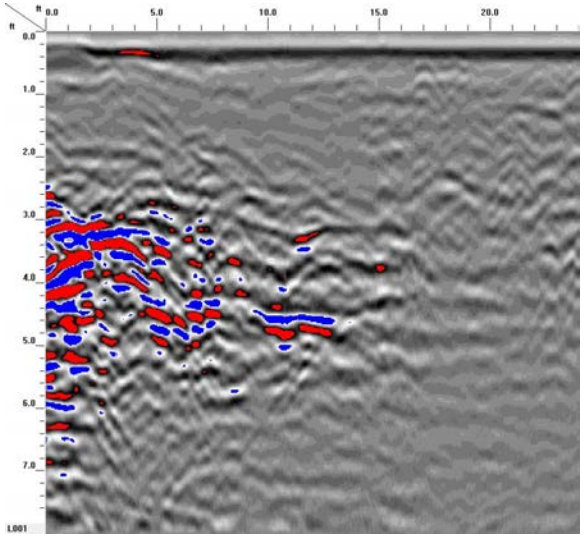

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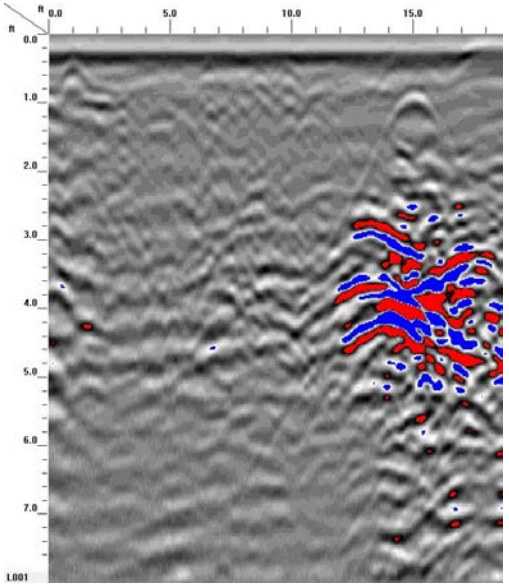

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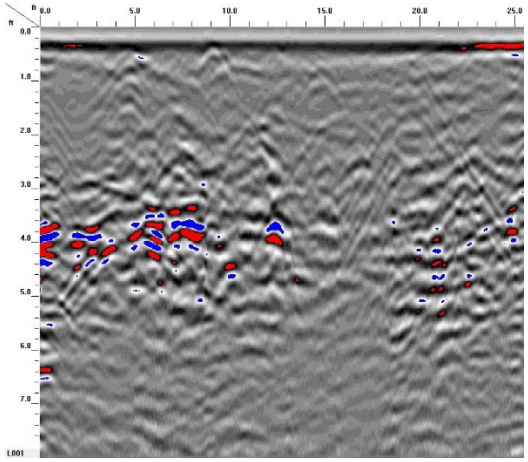

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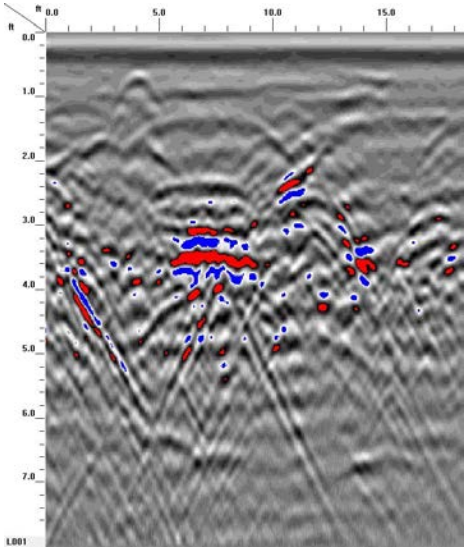

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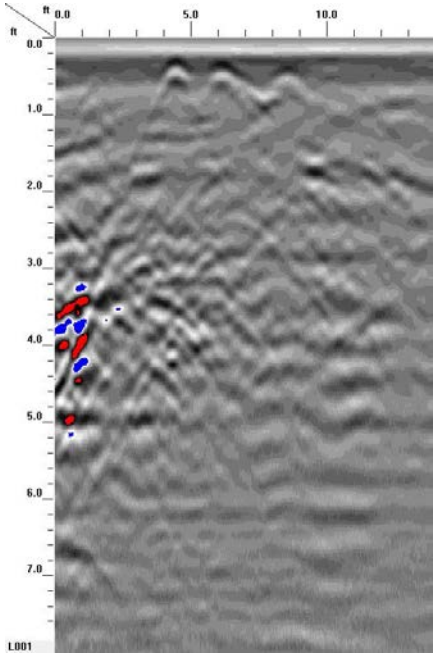


GPR TRANSECT 15

APPENDIX D

UVF HYDROCARBON ANALYTICAL RESULTS

Hydrocarbon Analysis Results

Client: Wood
Address: 2801 Yorkmont Road
Charlotte, NC

Contact: Helen Corley

Project: P217

Samples taken Thursday, September 2, 2021
Samples extracted Thursday, September 2, 2021
Samples analysed Thursday, September 2, 2021

Operator DRH

H09382

Matrix	Sample ID	Dilution used	BTEX C6-C9	GRO C5-C10	DRO C10-C35	TPH C5-C35	Total Aromatics C10-C35	16 EPA PAHs	BaP	% Ratios C5:10	% Ratios C10:C 18	% Ratios C18+	HC Fingerprint Match
Soil	P217-B1-2-4	8.0	<0.2	<0.2	<0.08	0.007	0.007	0.002	<0.0	0	53.9	46.1	Residual HC
Soil	P217-B1-6-8	10.0	<0.25	<0.25	<0.1	<0.25	<0.005	<0.005	<0.003	0	0	0	PHC ND,(FCM)
Soil	P217-B2-2-4	7.0	<0.17	<0.17	6.2	6.2	0.3	0.018	<0.001	0	89.8	10.2	Deg Fuel 76.7%,(FCM)
Soil	P217-B2-6-8	11.0	<0.27	<0.27	<0.11	<0.27	<0.006	<0.006	<0.003	0	0	0	PHC ND,(FCM)
Soil	P217-B3-0-2	11.0	<0.27	<0.27	22	22	7.4	0.3	0.007	0	85.1	14.9	V.Deg.Light Fuel 89.9%,(FCM)
Soil	P217-B3-6-8	8.0	<0.2	<0.2	<0.08	<0.2	<0.004	<0.004	<0.002	0	0	0	PHC ND,(FCM)
Soil	P217-B4-0-2	8.0	<0.2	<0.2	7.2	7.2	2.7	0.17	0.001	0	91.2	8.8	Deg Fuel 80.6%,(FCM)
Soil	P217-B4-4-6	8.0	<0.2	<0.2	7.1	7.1	0.4	0.027	<0.0	0	92.3	7.7	Deg Fuel 90.9%,(FCM)

Initial Calibrator QC check OK

Final FCM QC Check OK 96.6%

Analysis by QED HC-1 Analyser

Concentration values in mg/kg for soil 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 for hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

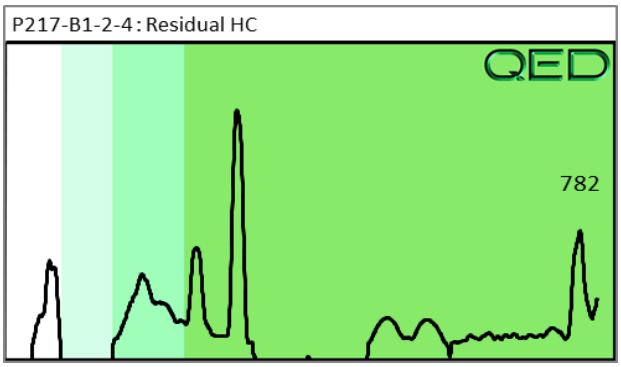
HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only : % Ratios estimated carbon number proportions : (OCR)/(Q) = Outside cal range, values and HC match estimates : ND = Not Detected

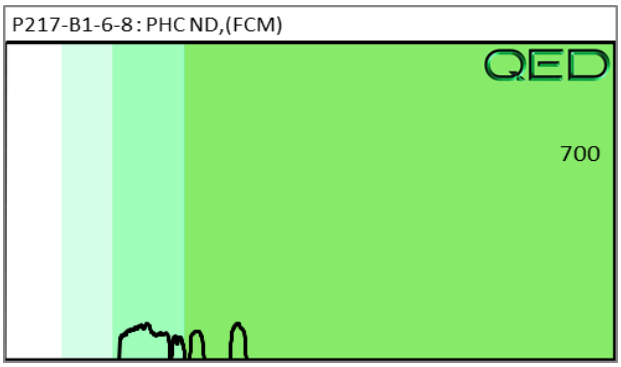
(B) = Blank Drift : (M) = Adjusted value : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : SB = sample selected as site background

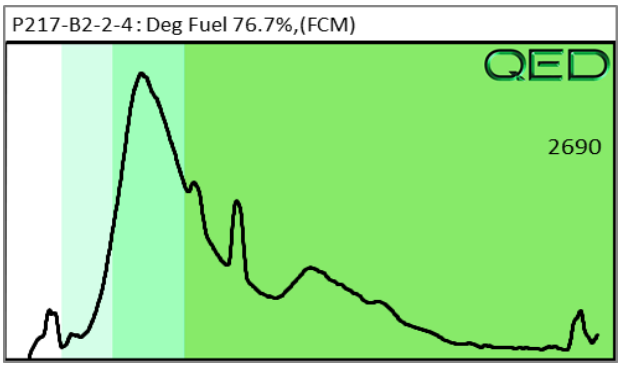
(TD) = Calibration outside limit

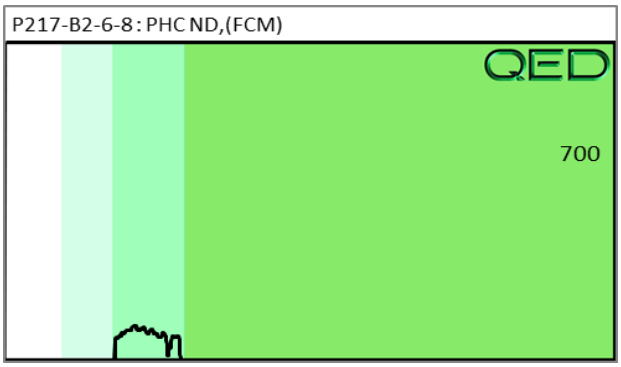
QED Hydrocarbon Fingerprints

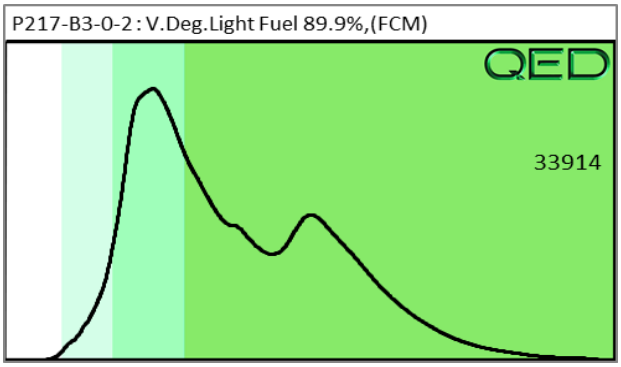
Project: P217

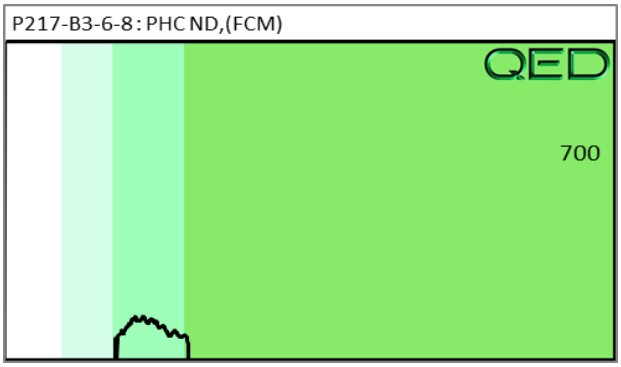


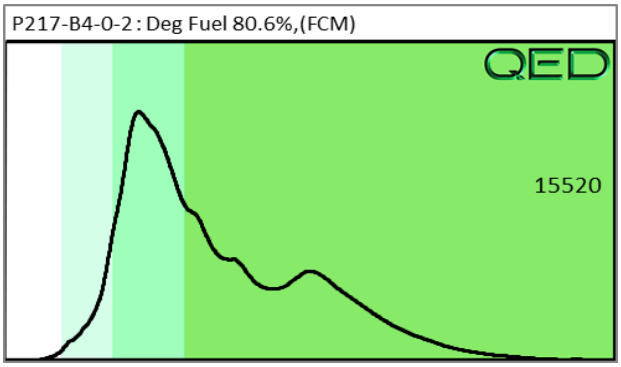


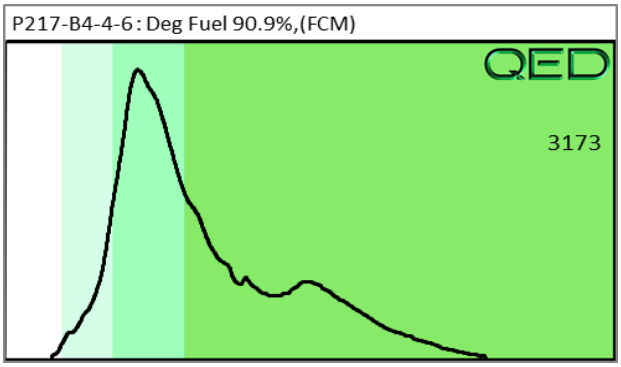












Hydrocarbon Analysis Results

Client: Wood
Address: 2801 Yorkmont Road
Charlotte, NC 28208

Contact: Helen Corley

Project: P217

Samples taken Thursday, September 2, 2021
Samples extracted Thursday, September 2, 2021
Samples analysed Thursday, September 2, 2021

Operator DRH

H09382

Matrix	Sample ID	Dilution used	BTEX C6-C9	GRO C5-C10	DRO C10-C35	TPH C5-C35	Total Aromatics C10-C35	16 EPA PAHs	BaP	% Ratios C5:10	% Ratios C10:C 18	% Ratios C18+	HC Fingerprint Match
Soil	P217-B5-2-4	11.0	<0.27	35.9	0.6	36.57	0.4	0.012	<0.006	99	0.9	0.1	V.Deg.PHC 98.5%,(FCM)
Soil	P217-B5-6-8	9.0	<0.22	<0.22	<0.09	<0.22	<0.005	<0.005	<0.003	0	0	0	PHC ND,(FCM)
Soil	P217-B5-12-14	10.0	<0.25	<0.25	8.8	8.8	0.25	0.014	<0.003	0	91.2	8.8	Deg Fuel 84%,(FCM)
Soil	P217-B6-2-4	10.0	<0.25	<0.25	8.8	8.8	0.14	0.006	<0.003	0	95.2	4.8	Deg Fuel 91.8%,(FCM)
Soil	P217-B6-6-8	8.0	<0.2	<0.2	<0.08	<0.2	<0.004	<0.004	<0.002	0	0	0	PHC ND,(FCM)
Soil	P217-B6-10-12	12.0	<0.3	<0.3	4.8	4.8	2.6	0.07	0.001	0	91.8	8.2	V.Deg.PHC 93.7%,(FCM)
Soil	P217-B7-0-2	12.0	<0.3	<0.3	0.8	0.8	0.4	0.016	<0.001	0	84.7	15.3	V.Deg.PHC 74.7%,(FCM)
Soil	P217-B7-6-8	8.0	<0.2	<0.2	0.1	0.1	0.04	0.002	<0.002	0	81	19	V.Deg.PHC 87.1%,(FCM)
Soil	P217-B7-10-12	8.0	<0.2	<0.2	2.2	2.2	1	0.05	0.001	0	82.3	17.7	V.Deg.Light Fuel 90%,(FCM)
Soil	P217-B8-2-4	7.0	<0.17	<0.17	1.1	1.1	0.4	0.02	0.001	0	86.5	13.5	V.Deg.PHC 96%,(FCM)

Initial Calibrator QC check OK Final FCM QC Check OK 96.4%

Analysis by QED HC-1 Analyser

Concentration values in mg/kg for soil 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 for hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

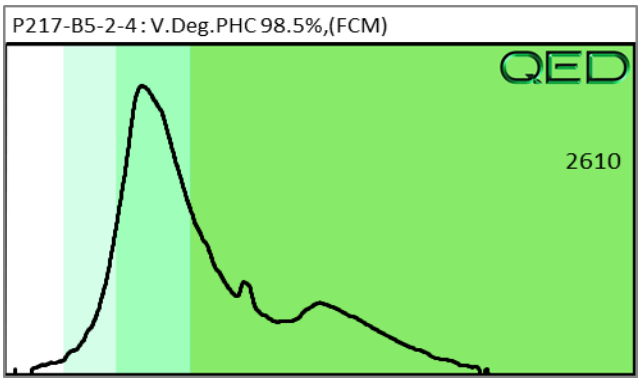
HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only : % Ratios estimated carbon number proportions : (OCR)/(Q) = Outside cal range, values and HC match estimates : ND = Not Detected

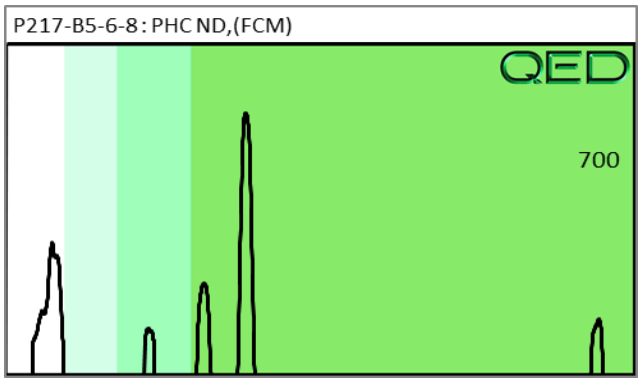
(B) = Blank Drift : (M) = Adjusted value : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : SB = sample selected as site background

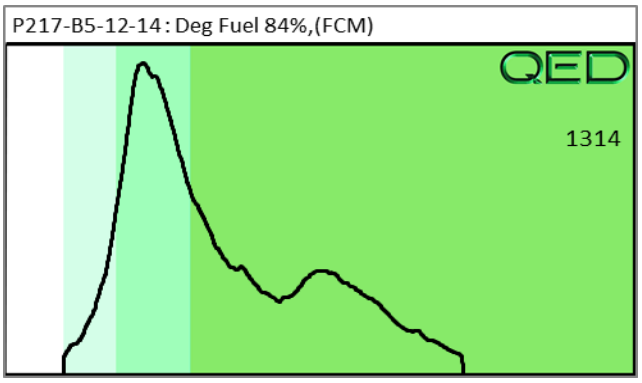
(TD) = Calibration outside limit

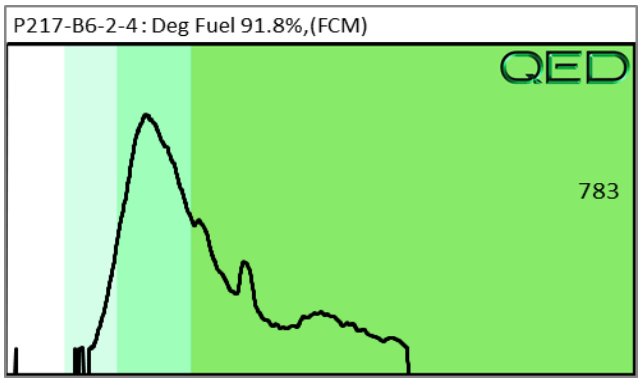
QED Hydrocarbon Fingerprints

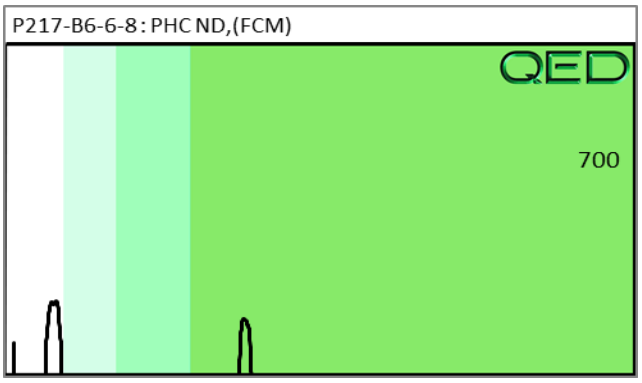
Project: P217

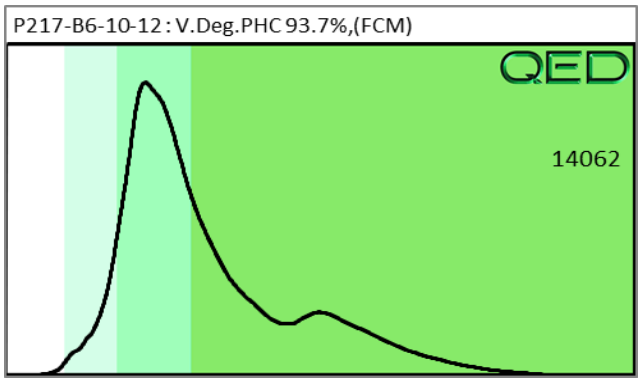


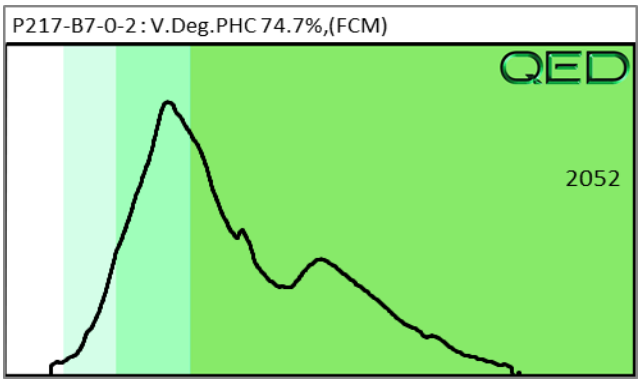


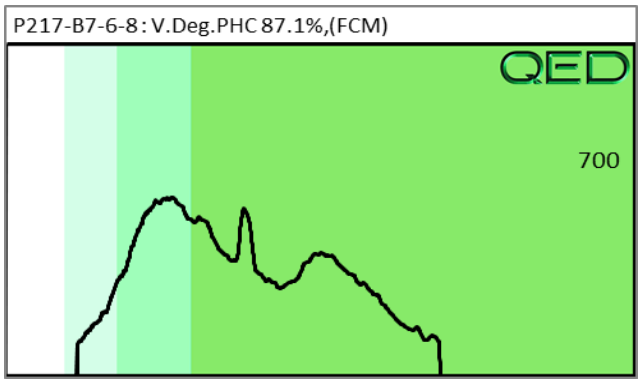


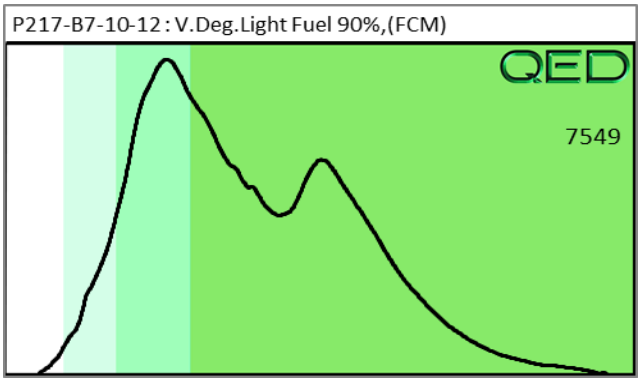


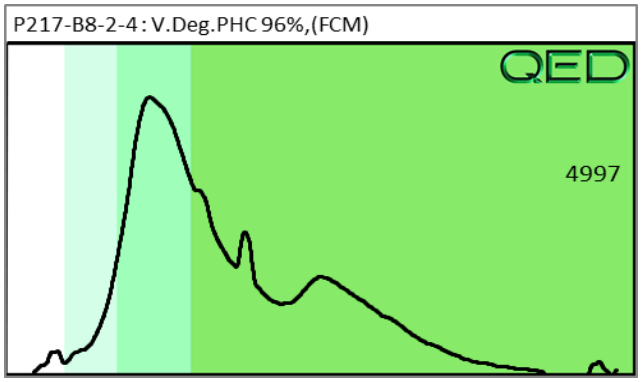












Hydrocarbon Analysis Results

Client: Wood
Address: 2801 Yorkmont Road
Charlotte, NC 28208

Contact: Helen Corley

Project: P217

Samples taken Thursday, September 2, 2021
Samples extracted Thursday, September 2, 2021
Samples analysed Thursday, September 2, 2021

Operator DRH

H09382

Matrix	Sample ID	Dilution used	BTEX C6-C9	GRO C5-C10	DRO C10-C35	TPH C5-C35	Total Aromatics C10-C35	16 EPA PAHs	BaP	% Ratios			HC Fingerprint Match
										C5:10	C10:C18	C18+	
Soil	P217-B8-4-6	12.0	<0.3	<0.3	0.05	0.05	0.05	0.006	<0.004	0	84.4	15.6	Residual HC
Soil	P217-B8-12-14	7.0	<0.17	<0.17	6.2	6.2	0.15	0.009	<0.002	0	93.3	6.7	Deg Fuel 96.5%,(FCM)

Initial Calibrator QC check OK

Final FCM QC Check OK 100.9%

Analysis by QED HC-1 Analyser

Concentration values in mg/kg for soil 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 for hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

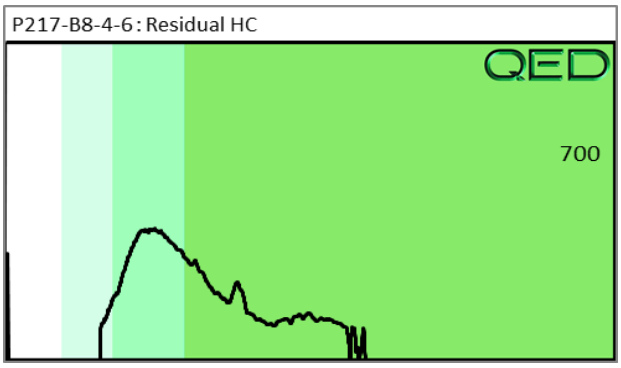
HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only : % Ratios estimated carbon number proportions : (OCR)/(Q) = Outside cal range, values and HC match estimates : ND = Not Detected

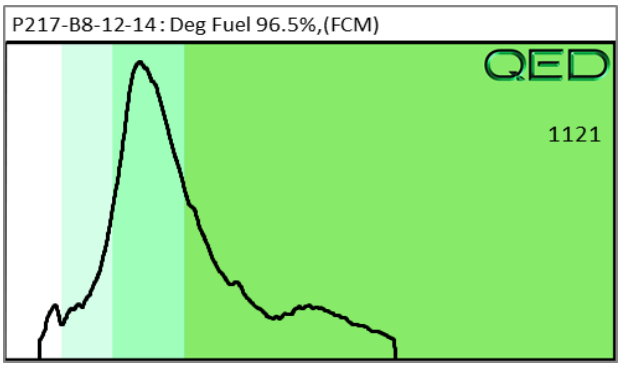
(B) = Blank Drift : (M) = Adjusted value : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : SB = sample selected as site background

(TD) = Calibration outside limit

QED Hydrocarbon Fingerprints

Project: P217





Hydrocarbon Analysis Results

Client: Wood
Address 2801 Yorkmont Road
Charlotte, NC 28208

Contact: Helen Corley

Project: P217

Samples taken Thursday, September 2, 2021
Samples extracted Thursday, September 2, 2021
Samples analysed Thursday, September 2, 2021

Operator DRH

H09382

Matrix	Sample ID	Dilution used	BTEX C6-C9	GRO C5-C10	DRO C10-C35	TPH C5-C35	Total Aromatics C10-C35	16 EPA PAHs	BaP	% Ratios C5:10	% Ratios C10:C 18	% Ratios C18+	HC Fingerprint Match
Soil	P217-B9-0-2	7.0	<0.17	<0.17	0.027	0.027	0.025	0.003	<0.002	0	76	24	Residual HC
Soil	P217-B9-6-8	10.0	<0.25	<0.25	0.25	0.25	0.24	0.025	<0.003	0	84.9	15.1	Residual PHC
Soil	P217-B10-2-4	9.0	<0.22	<0.22	8.5	8.5	0.5	0.027	<0.006	0	87	13	V.Deg.Light Fuel 89.7%,(FCM)
Soil	P217-B10-6-8	21.0	<0.5	<0.5	<0.21	<0.5	<0.011	<0.011	<0.006	0	0	0	PHC ND,(FCM)
Soil	P217-B11-2-4	8.0	<0.2	<0.2	1.8	1.8	0.9	0.05	0.001	0	77.9	22.1	V.Deg.PHC 79.5%,(FCM)
Soil	P217-B11-6-8	11.0	<0.27	<0.27	<0.11	0.015	0.015	<0.0	<0.003	0	34	66	PHC ND,(FCM),(BO)
Soil	P217-B12-2-4	7.0	<0.17	22.9	9	31.9	2.8	0.15	0.002	90.7	8.2	1	No Match found
Soil	P217-B12-6-8	9.0	<0.22	<0.22	8	8	0.18	0.011	<0.003	0	93.4	6.6	Deg Fuel 77.1%,(FCM)

Initial Calibrator QC check OK

Final FCM QC Check OK 99.9%

Analysis by QED HC-1 Analyser

Concentration values in mg/kg for soil 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 for hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only : % Ratios estimated carbon number proportions : (OCR)/(Q) = Outside cal range, values and HC match estimates : ND = Not Detected

(B) = Blank Drift : (M) = Adjusted value : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : SB = sample selected as site background

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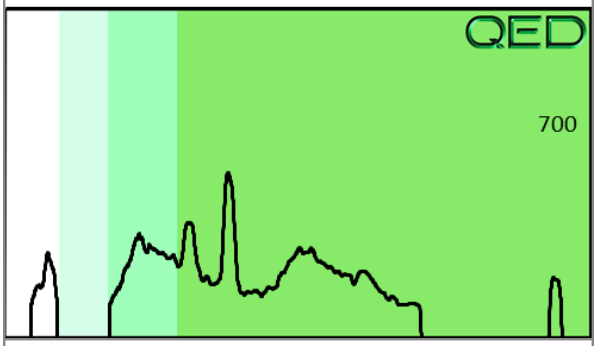
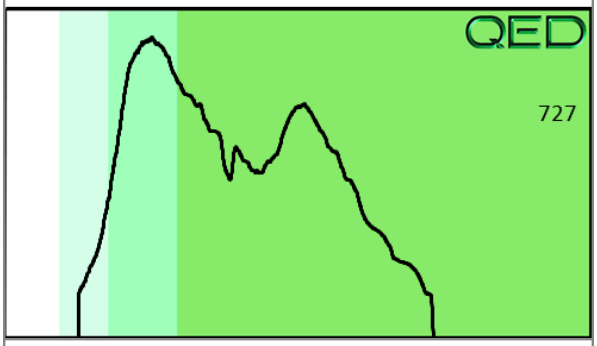
QED Hydrocarbon Fingerprints

Project: P217

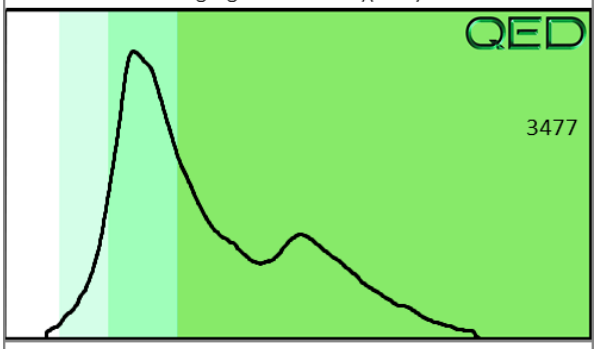
P217-B9-0-2 : Residual HC



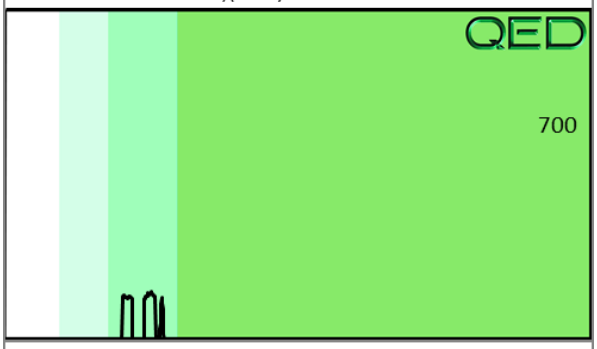
P217-B9-4-6 : Residual PHC



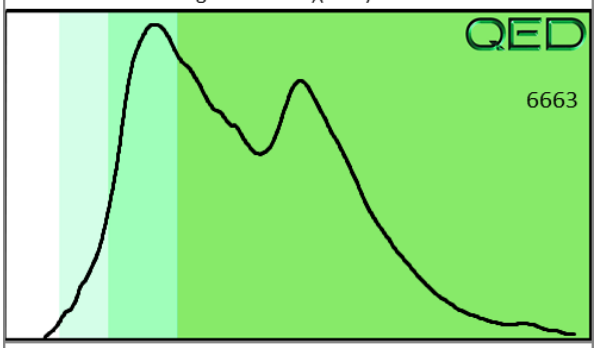
P217-B10-2-4 : V.Deg.Light Fuel 89.7%,(FCM)



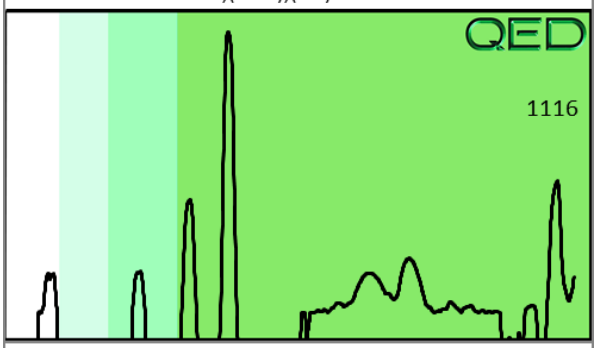
P217-B10-6-8 : PHC ND,(FCM)



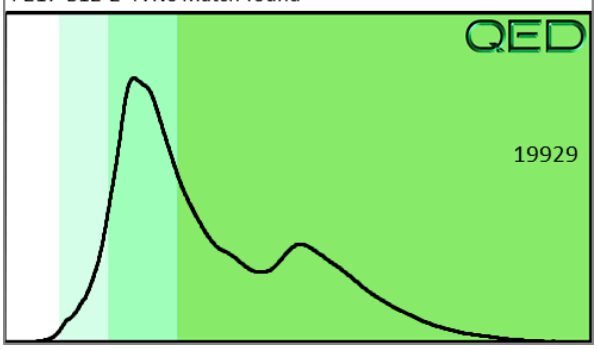
P217-B11-2-4 : V.Deg.PHC 79.5%,(FCM)



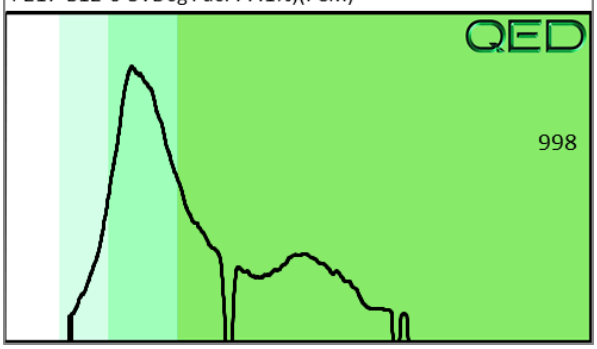
P217-B11-6-8 : PHC ND,(FCM),(BO)



P217-B12-2-4 : No Match found



P217-B12-6-8 : Deg Fuel 77.1%,(FCM)



Hydrocarbon Analysis Results

Client: Wood
Address 2801 Yorkmont Rd
Charlotte, NC 28208

Contact: Helen Corley

Project: P217

Samples taken Thursday, September 2, 2021
Samples extracted Thursday, September 2, 2021
Samples analysed Thursday, September 2, 2021

Operator DRH

H09382

Matrix	Sample ID	Dilution used	BTEX C6-C9	GRO C5-C10	DRO C10-C35	TPH C5-C35	Total Aromatics C10-C35	16 EPA PAHs	BaP	% Ratios			HC Fingerprint Match
										C5:10	C10:C 18	C18+	
Soil	P217-B13-2-4	10.0	<0.25	<0.25	1.3	1.3	0.7	0.04	0.001	0	64.6	35.4	V.Deg.PHC 58.8%,(FCM)
Soil	P217-B13-4-6	14.0	<0.3	<0.3	12.7	12.7	0.3	0.019	<0.004	0	90.3	9.7	V.Deg.Light Fuel 98%,(FCM)
Soil	P217-B14-0-2	11.0	<0.27	<0.27	0.9	0.9	0.4	0.025	0.001	0	70.2	29.8	V.Deg.PHC 63.9%,(FCM)
Soil	P217-B14-6-8	8.0	<0.2	<0.2	0.04	0.04	0.03	0.004	<0.002	0	84.5	15.5	Residual HC
Soil	P217-B15-2-4	12.0	<0.3	<0.3	0.6	0.6	0.3	0.016	0.001	0	75.9	24.1	V.Deg.PHC 76.6%,(FCM)
Soil	P217-B15-8-10	11.0	<0.27	<0.27	<0.11	0.008	0.008	0.001	<0.003	0	0	100	Residual HC

Initial Calibrator QC check OK

Final FCM QC Check OK 96.9%

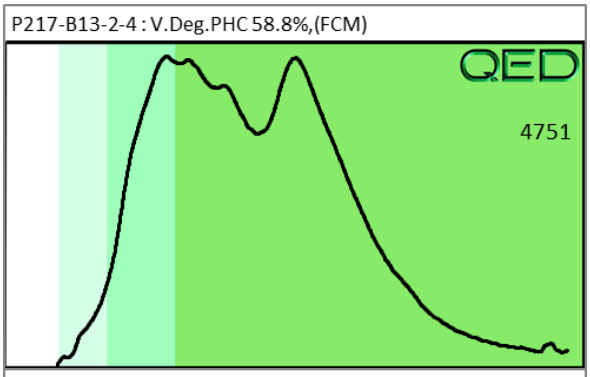
Analysis by QED HC-1 Analyser

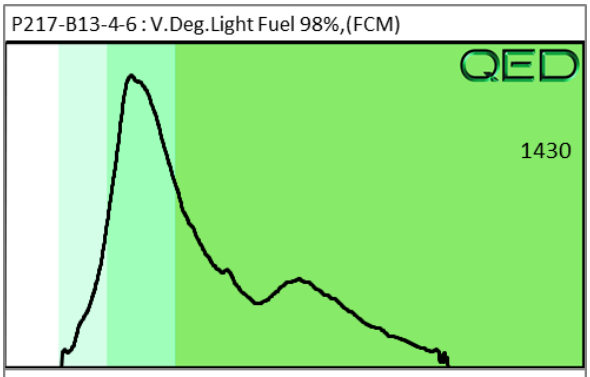
Concentration values in mg/kg for soil and mg/L for water samples. Soil values uncorrected for moisture or stone content. Fingerprints provide a tentative hydrocarbon identification.

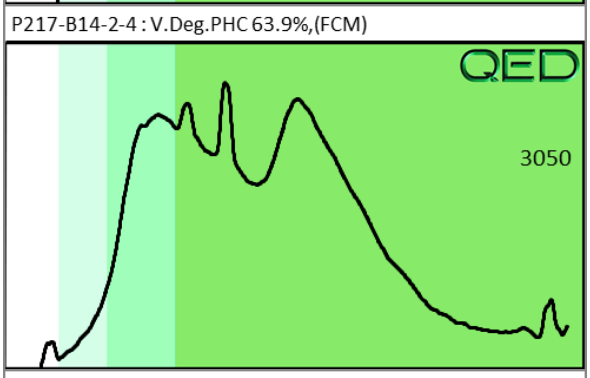
Abbreviations :- FCM = Results calculated using Fundamental Calibration Mode : % = confidence for hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only : % Ratios estimated carbon number proportions : (OCR)/(Q) = Outside cal range, values and HC match estimates : ND = Not Detected (B) = Blank Drift : (M) = Adjusted value : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : SB = sample selected as site background (TD) = Calibration outside limit

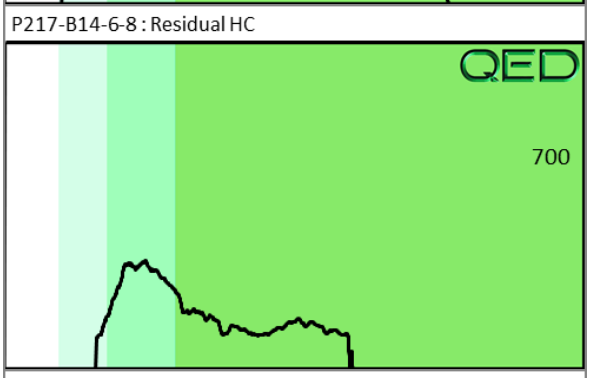
QED Hydrocarbon Fingerprints

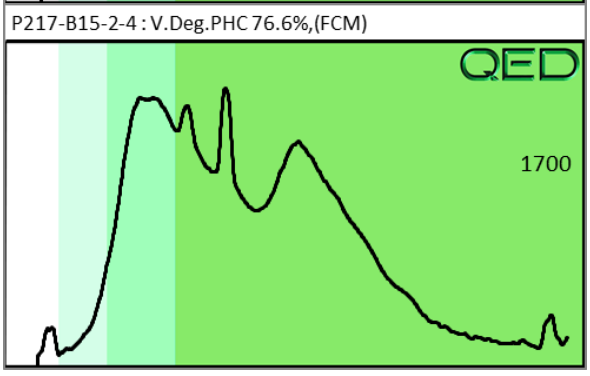
Project: P217

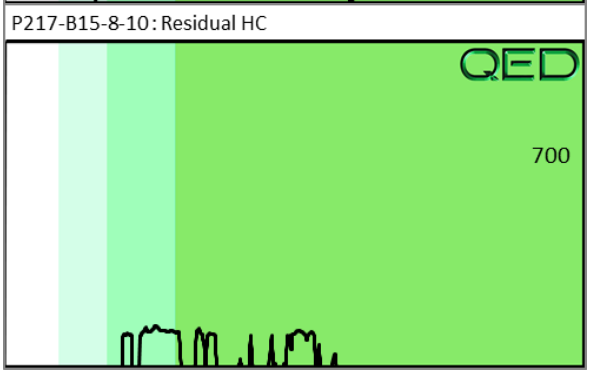












Wood Environment & Infrastructure Solutions, Inc.
2801 Yorkmont Road, Suite 100
Charlotte, North Carolina 2820
Licensures: NC Engineering F-1253, Geology C-2478
T: 704-357-8600
www.woodplc.com

November 5, 2021

Dr. Dennis Li, LG
GeoEnvironmental Project Manager
Geotechnical Engineering Unit
North Carolina Department of Transportation
1589 Mail Service Center
Raleigh, NC 27699-1589

Subject: **Report of UXO/MEC Investigation**
Parcel 218 – Sharon Bullard Property
6485 Aberdeen Road
Raeford, North Carolina

State Project: R-5709
WBS Element: 50205.1.1
County: Hoke
Wood Project: 20478R5709

Dear Dr. Li:

Wood Environment and Infrastructure Solutions, Inc. (Wood) is pleased to submit this report for the investigation of possible buried unexploded ordnance (UXO) or munitions and explosives of concern (MEC) at the above referenced Site. During correspondence between the parcel owner and the North Carolina Department of Transportation (NCDOT), the parcel owner noted the possibility of UXO and/or MEC buried at the Site. In response, the NCDOT requested a geophysical survey and a UXO/MEC intrusive investigation be performed at the Site within areas that will be affected by the proposed widening of NC 211 Hwy from US 15-501 in Aberdeen, North Carolina to SR 1244 (West Palmer Street)/SR 1311 (Mockingbird Hill Road) in Raeford, North Carolina. The Site location and vicinity are presented in **Figure 1**. The following report describes the geophysical survey and UXO/MEC investigation at Parcel 218.

Project Information

Parcel 218 is identified as the Sharon Bullard property in the NCDOT MicroStation survey file and is located at 6485 Aberdeen Road. Currently, the Site is occupied by remnants of a brick garage and residential structures. Remaining portions of the Site consist of grass-covered and wooded areas. The Site layout is shown on **Figure 2**. During correspondence between the parcel owner and the NCDOT, the parcel owner noted the possibility of UXO or MEC buried on Site. The NCDOT requested a geophysical

survey be performed at the parcel to identify buried metallic object in areas to be affected by construction activities. Based on the results of the geophysical survey, a limited UXO/MEC intrusive investigation was performed.

Field Activities

Prior to commencing field activities at the Site, several tasks were accomplished in preparation for the subsurface investigation. A Health and Safety Plan (HASP) was created with the Site-specific health and safety information necessary for the field activities, including protocol for COVID-19. In addition, a Work Plan (dated October 4, 2021) was submitted to the NCDOT. The Work Plan included a description of the proposed staffing, planning and preparations for the fieldwork, UXO/MEC intrusive investigation and removal activities, the disposition of UXO/MEC, munition debris, and/or scrap metal, and Site restoration activities. North Carolina 811 was contacted on September 28, 2021, for the parcel.

Geophysical Survey Results

Wood personnel and our geophysical survey subcontractor Pyramid Geophysical Services (Pyramid) mobilized to the Site to conduct a geophysical investigation on August 11 and 12, 2021. Pyramid used electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) equipment to survey areas on the northern portion of the parcel that will be affected by the proposed widening of NC 211 Hwy. Four EM anomalies were identified within the area surveyed. Pyramid designated the anomalies #1 to #4. EM anomalies #2, #3, and #4 were attributed to a sign, a buried utility, and building ruins, respectively. Anomaly #1 was comprised of ten EM features, P218-A to P218-J. The ten EM features were identified as possible buried UXO or metallic debris. The estimated depth to the top of the features ranged from 0.5 to 4 feet below the ground surface. The locations of EM features P218-A to P218-J are shown on Figure 2. The geophysical survey did not identify evidence of USTs within the area surveyed. The complete Pyramid geophysics report is included as an attachment.

Vegetation Clearing and Utility Locating

The vegetation clearing was performed by Wood personnel on October 4, 2021. Wood used a push lawn mower and string trimmer to mow the tall grass at the parcel. After the vegetation was cleared, Wood personnel used a hand-held geographic positioning system (GPS) unit to locate and mark the ten EM features identified by Pyramid. Each location was marked with a flag with the feature's ID letter displayed on the flag.

Utility locating was performed by Pyramid personnel on October 5, 2021. The utility locating effort identified several buried fiber optic telephone and communication lines along the northwestern and northeastern parcel boundaries. Two of the buried fiber optic lines located along the northwestern parcel

boundary were observed to be in close proximity to EM feature P218-A. In addition, a buried telephone line was observed extending from the northern corner of the parcel to the residential structure remnants.

UXO/MEC Intrusive Investigation

The UXO/MEC investigation was performed by Wood personnel on October 6, 2021. Prior to beginning the intrusive activities, a safety tailgate meeting was held to discuss the proposed scope of work, the Site-specific HASP, and to identify an exclusion zone for non-UXO Wood personnel and Site visitors. The exclusion zone was determined based upon the munitions with the greatest fragmentation distance (MGFD) and lacking information on MGFD for the parcel, an exclusion zone of approximately 200 feet was set. Non-UXO Wood personnel and Site visitors remained near the southwestern parcel corner along Montrose Road while the intrusive activities were performed.

Following the safety tailgate meeting, the two Wood UXO technicians began the intrusive activities. Due to the close proximity of buried fiber optic lines, EM feature P218-A was not investigated by the UXO technicians. At EM features P218-B to P218-J, the technicians began the intrusive activities by confirming the presence of a buried metal object using a Schonstedt magnetic locator. The technicians then manually uncovered and exposed the metal object(s). After determining it was safe, the technicians removed the metal object from the hand-dug hole. After the object was removed, the hole was scanned with the Schonstedt to confirm no metal objects remained buried at the location. Once the location was cleared by the technicians, the non-UXO Wood personnel were allowed to approach the location to document and photograph the metal object.

Buried UXO/MEC or munition debris were not encountered at Parcel 218 during the intrusive investigation activities. The buried metallic objects encountered at EM features P218-B to P218-J were determined to be scrap metal and included objects such as a metal pipe, a lawn mower blade, and a grate. A summary of the objects with their approximate size and the approximate depths is included in the attached Table. Photographs of the objects are included in the attached Photolog. Since the metallic objects were determined to be scrap metal and not UXO/MEC or munition debris, they were placed on an existing debris pile at the parcel and the holes were backfilled.

Closing

Wood appreciates this opportunity to assist you on this project and recommends no further action at Parcel 218. Should you have any questions or need additional information, please do not hesitate to contact the undersigned.

Sincerely,

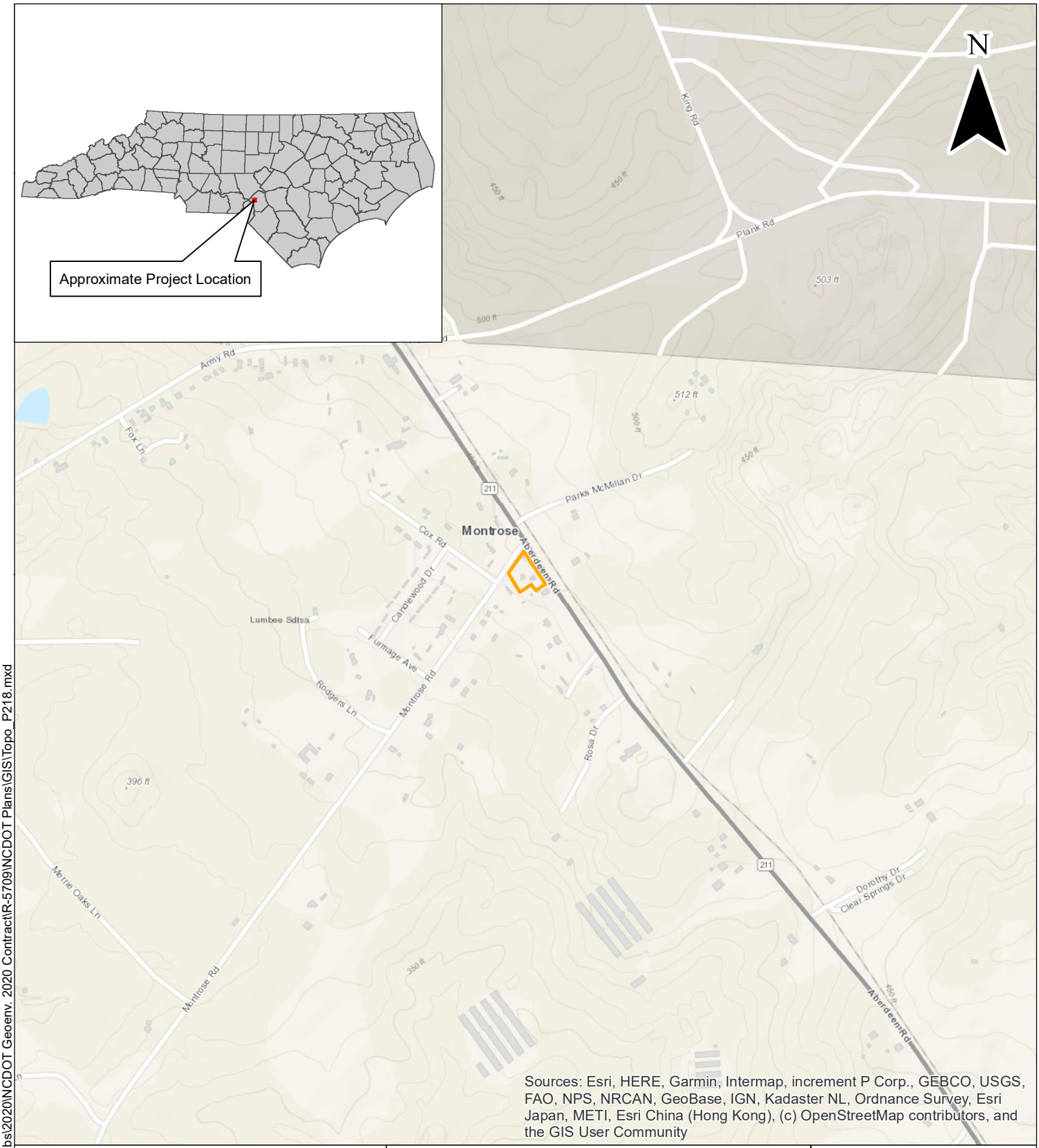
Wood Environment & Infrastructure Solutions, Inc.

Andrew J. Frantz, REM
Senior Scientist

Helen P. Corley, LG, BCES
Principal Hydrogeologist

Attachments

FIGURES



wood.
Wood Environment & Infrastructure Solutions, Inc.
2801 Yorkmont Road, Suite 100
Charlotte, NC 28208
(704) 357-8600

VICINITY MAP
R-5709 - PARCEL 218
6485 ABERDEEN ROAD
ABERDEEN, NORTH CAROLINA

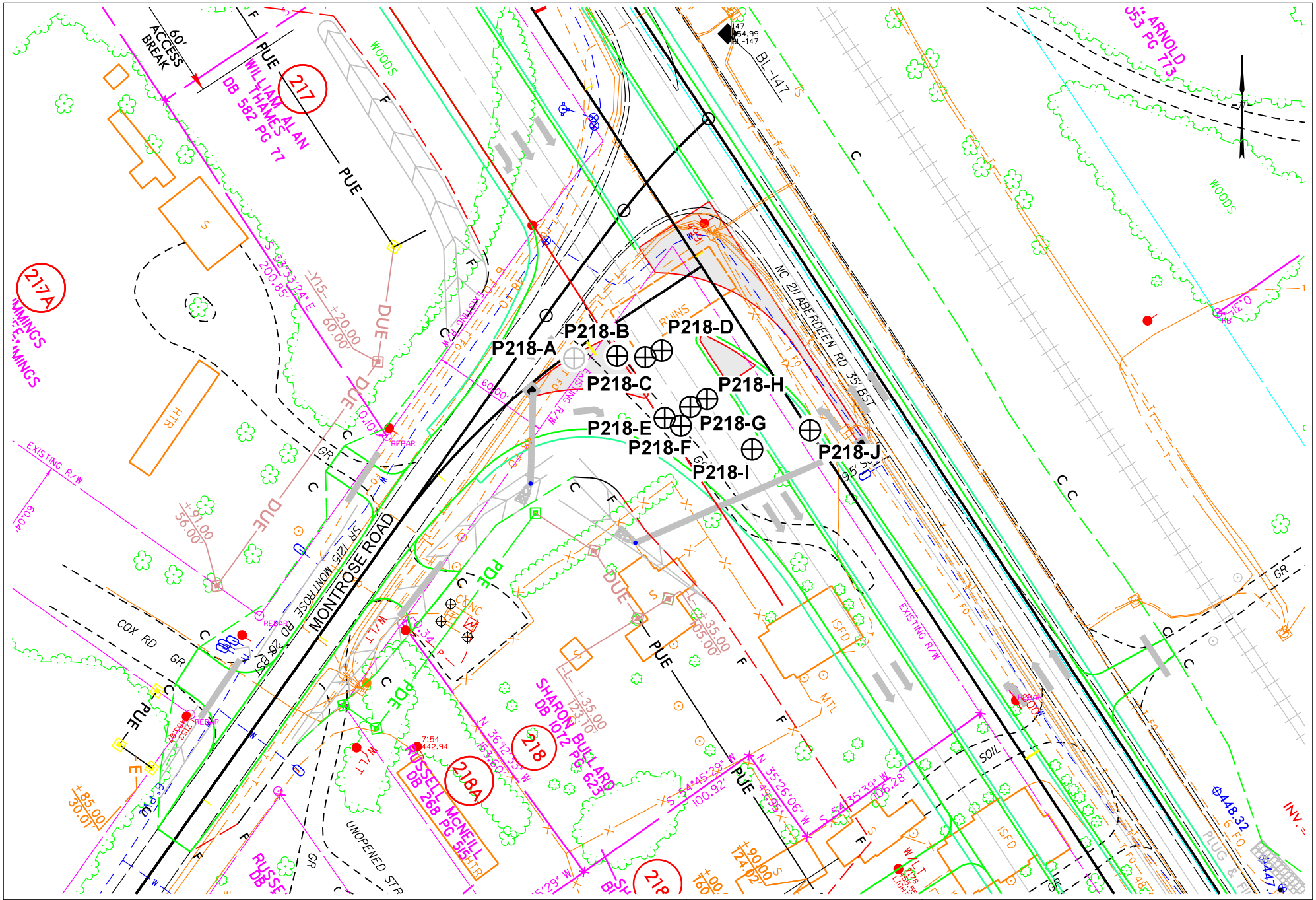
PREPARED BY:	LMM
DATE:	11/3/2021
CHECKED BY:	HPC
DATE:	11/3/2021
PROJECT NO:	20478R5709
FIGURE:	1

Legend

Site Boundary

0 1,000 2,000 Feet

Document Path: P:\6228 Environmental\Jobs\2020\NCDOT Geoenv. 2020 Contract\R-5709\NCDOT Plans\GIS\Topo_P218.mxd



⊕ APPROXIMATE LOCATION OF EM FEATURE

⊕ LOCATION NOT EXPLORED DUE TO CLOSE PROXIMITY TO FIBER OPTIC LINE

25' 0' 25' 50'
12.5'
(ENGLISH)

wood.

EM FEATURE LOCATION MAP
R-5709 - PARCEL 218
6485 ABERDEEN ROAD
RAEFORD, NORTH CAROLINA

PREPARED BY:	DATE:	CHECKED BY:	DATE:	JOB NUMBER	FIGURE
LMM	11/3/21	HPC	11/3/21	20478R5709	2

TABLE

Table 1: Summary of EM Features
R-5709, Parcel 218 - Sharon Bullard Property
Raeford, North Carolina
Wood Project: 20478R5709

Feature ID	Object Encountered at Feature Location	Approximate Size of Object	Approximate Depth to Top of Object (feet)
P218-A	Not investigated due to nearby buried fiber optic lines		
P218-B	Small scrap metal and lawn mower blade	Small scrap - 6-inches long Blade - 15-inches long	0.33
P218-C	Debris pile at surface	1.5-feet long by 2-feet wide	0.00
P218-D	Metal pipe	24-inches long	0.25
P218-E	3 pieces of scrap metal	Scrap 1 - 3-inches long Scrap 2 - 3-inches long Scrap 3 - Undetermined, to big too remove	2.00
P218-F	Small piece of a magnet	1-inch long	0.16
P218-G	Lawn mower blade	15-inches long	0.16
P218-H			
P218-I	Small scrap metal	3-inches long	0.16
P218-J	Metal grate	15-inches long	0.08

Notes:

1. Features investigated on October 6, 2021

PHOTOLOG

Photograph 1: Geophysical survey activities at Parcel 218, facing east.

Photograph 2: Investigation area following mowing activities, facing southeast.

Photograph 3: Investigation area following mowing activities, facing northwest.

Photograph 4: Area outside of exclusion zone near southwest parcel corner, facing southwest.

Photograph 5:
Location of P218-A and paint markings indicating buried utilities (fiber optic lines), facing northwest.

Photograph 6:
Location of P218-A and paint markings indicating buried utilities (fiber optic lines), facing northeast.

Photograph 7:
Location of P218-A and paint marking indicating buried utility (fiber optic line) beneath flag location.

Photograph 8:
Scrap metal and lawn mower blade at location P218-B. Glove for scale.

Photograph 9:
Debris pile located at location P128-C.

Photograph 10:
Metal pipe located at location P218-D.

Photograph 11:
Scrap metal at location P218-E.

Photograph 12:
Scrap metal at location P218-E. Boot for scale.

Photograph 13:
Piece of magnet at location P218-F.

Photograph 14:
Lawn mower blade at locations P218-G and P218-H.

Photograph 15:
Scrap metal at location P218-I.

Photograph 16:
Grate at location P218-J.

PYRAMID GEOPHYSICAL REPORT

PYRAMID GEOPHYSICAL SERVICES
(PROJECT 2021-201)

GEOPHYSICAL SURVEY

INVESTIGATION OF BURIED METAL OBJECTS:
PARCEL 218
NCDOT PROJECT R-5709 (50205.1.1)

6485 NC-211, RAEFORD, NC

August 18, 2021

Report prepared for: **Helen P. Corley, LG, RSM, BCES**
Wood, PLC
2801 Yorkmont Road #100
Charlotte, NC 28208

Prepared by: _____

Eric C. Cross, P.G.
NC License #2181

Reviewed by: _____

Douglas A. Canavello, P.G.
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C257: GEOLOGY C1251: ENGINEERING

GEOPHYSICAL INVESTIGATION REPORT
Parcel 218 - 6485 NC-211
Raeford, Hoke County, North Carolina

Table of Contents

Figures

Appendices

LIST OF ACRONYMS

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

EXECUTIVE SUMMARY

Project Description: Pyramid Environmental (Pyramid) conducted a geophysical investigation for Wood, PLC (Wood) at Parcel 218, located at 6485 NC-211, in Raeford, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project R-5709). The survey area was indicated to Pyramid by a Wood staff member on-site at the time of data collection. It was Pyramid's understanding that site research and property owner interviews conducted by Wood suggested a possibility that the site may contain buried unexploded ordinance (UXO). Conducted on August 11-12, 2021, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area and to identify any possible UXO or other buried metallic debris.

Geophysical Results: The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. It was Pyramid's understanding that site research and property owner interviews conducted by Wood suggested a possibility that the site may contain buried UXO. This survey was designed to investigate the site both for USTs as well as smaller buried metallic anomalies that may be associated with UXO. A total of four EM anomalies were identified. Analysis of the metal detection survey indicated that some of the EM anomalies were directly attributed to visible cultural features at the ground surface.

Typically, the EM survey utilizes differential data from the top and bottom coils of the instrument to identify larger metallic objects such as USTs. To identify potential UXO, this survey utilized bottom coil data to emphasize the responses resulting from smaller metallic objects. Evidence of multiple smaller buried metallic objects was identified during the survey. GPR surveys across the minor metallic features indicated they were present at depths ranging from 0.5-4.0 feet below the ground surface.

Collectively, the geophysical data recorded no evidence of metallic USTs at Parcel 218. The survey did record evidence of a total of ten minor buried metal anomalies. These

features may be associated with UXO or other minor metallic debris. If the nature of the buried metal anomalies is to be determined, Pyramid recommends excavation and physical sampling at these ten locations to verify the cause of each metallic feature. A contractor with experience in dealing with UXO should likely be consulted to determine proper excavation procedures.

INTRODUCTION

Pyramid Environmental conducted a geophysical investigation for Wood, PLC at Parcel 218, located at 6485 NC-211, in Raeford, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project R-5709). The survey area was indicated to Pyramid by a Wood staff member on-site at the time of data collection. It was Pyramid's understanding that site research and property owner interviews conducted by Wood suggested a possibility that the site may contain buried UXO. Conducted on August 11-12, 2021, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area and to identify any possible UXO or other buried metallic debris.

The site consisted of an abandoned building and grass surfaces. An aerial photograph showing the survey area boundaries and ground-level photographs are shown in **Figure 1**.

FIELD METHODOLOGY

The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. Pyramid collected the EM data using a Geonics EM61-MK2 (EM61) metal detector integrated with a Geode External GPS/GLONASS receiver. The integrated GPS system allows the location of the instrument to be recorded in real-time during data collection, resulting in an EM data set that is geo-referenced and can be overlain on aerial photographs and CADD drawings. A boundary grid was established around the perimeter of the site with marks every 10 feet to maintain orientation of the instrument throughout the survey and assure complete coverage of the area.

According to the instrument specifications, the EM61 can detect a metal drum down to a maximum depth of approximately 8 feet. Smaller objects (1-foot or less in size) can be detected to a maximum depth of 4 to 5 feet. Objects associated with UXO typically fall

into the smaller range of buried metal, and, therefore, are usually analyzed in the EM results using the bottom coil dataset, which helps to visualize all metal identified during the survey within the instrument's capabilities. The EM61 data were digitally collected at approximately 0.8-foot intervals along north-south trending or east-west trending, generally parallel survey lines, spaced five feet apart. The data were downloaded to a computer and reviewed in the field and office using the Geonics NAV61 and Surfer for Windows Version 15.0 software programs.

GPR data were acquired across select EM anomalies on August 12, 2021, using a Geophysical Survey Systems, Inc. (GSSI) SIR 4000 control unit coupled to a 350 MHz HS antenna. Data were collected both in reconnaissance fashion as well as along formal transect lines across EM features. The GPR data were viewed in real-time using a vertical scan of 512 samples, at a rate of 48 scans per second. GPR data were viewed down to a maximum depth of approximately 6 feet, based on dielectric constants calculated by the SIR 4000 unit in the field during the reconnaissance scans. GPR transects across specific anomalies were saved to the hard drive of the DF unit for post-processing and figure generation.

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

Geophysical Surveys for Underground Storage Tanks
on NCDOT Projects

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

DISCUSSION OF RESULTS

Discussion of EM Results

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

LIST OF METALLIC ANOMALIES IDENTIFIED BY EM SURVEY

Metallic Anomaly #	Cause of Anomaly	Investigated with GPR
1A-J	Possible UXO or Metallic Debris	✓
2	Sign	
3	Utility	
4	Building	

Some of the EM anomalies were directly attributed to visible cultural features at the ground surface, including a sign, a utility, and a building. Typically, the EM survey utilizes differential data from the top and bottom coils of the instrument to identify larger metallic objects such as USTs. As mentioned above, UXO may not manifest itself in the differential dataset. To identify potential UXO, this survey utilized bottom coil data to emphasize the responses resulting from smaller metallic objects. EM Anomalies 1A-J were investigated with GPR to further examine the size, depth, and nature of these features.

Discussion of GPR Results

Figure 3 presents the locations of the formal GPR transects performed at the property as well as select transect images. All of the transect images are included in **Appendix A**. A total of fifteen formal GPR transects were performed at the site. These transects were performed across all locations containing metallic anomalies not associated with known visible cultural features at the ground surface. The following table contains depth to the possible targets identified during the survey.

GPR Transect(s)	Anomaly #	Depth of Target (ft.)
1-2	1A	0.5-2.5
3-5	1E & 1F	1-2
6-7	1J	0-1
8-9	1H	1-2
10	1G	0-1
11	1I	0-1
12	1B	0-3
13-15	1C & 1D	2-4

Collectively, the geophysical data recorded no evidence of metallic USTs at Parcel 218. The survey did record evidence of a total of ten minor buried metal anomalies, ranging in depth from 0.5-4.0 feet below the ground surface. These features may be associated with UXO or other minor metallic debris. **Figure 4** provides an overlay of the metal detection results on the NCDOT engineering plans for reference.

SUMMARY & CONCLUSIONS

Pyramid's evaluation of the EM61 and GPR data collected at Parcel 218 in Raeford, North Carolina, provides the following summary and conclusions:

- It was Pyramid's understanding that site research and property owner interviews conducted by Wood suggested a possibility that the site may contain buried UXO.
- This survey was designed to investigate the site both for USTs as well as smaller buried metallic anomalies that may be associated with UXO.
- Analysis of the metal detection survey indicated that some of the EM anomalies were directly attributed to visible cultural features at the ground surface.
- Typically, the EM survey utilizes differential data from the top and bottom coils of the instrument to identify larger metallic objects such as USTs. To identify potential UXO, this survey utilized bottom coil data to emphasize the responses resulting from smaller metallic objects. Evidence of multiple smaller buried metallic objects was identified during the survey.
- GPR surveys across the minor metallic features indicated they were present at

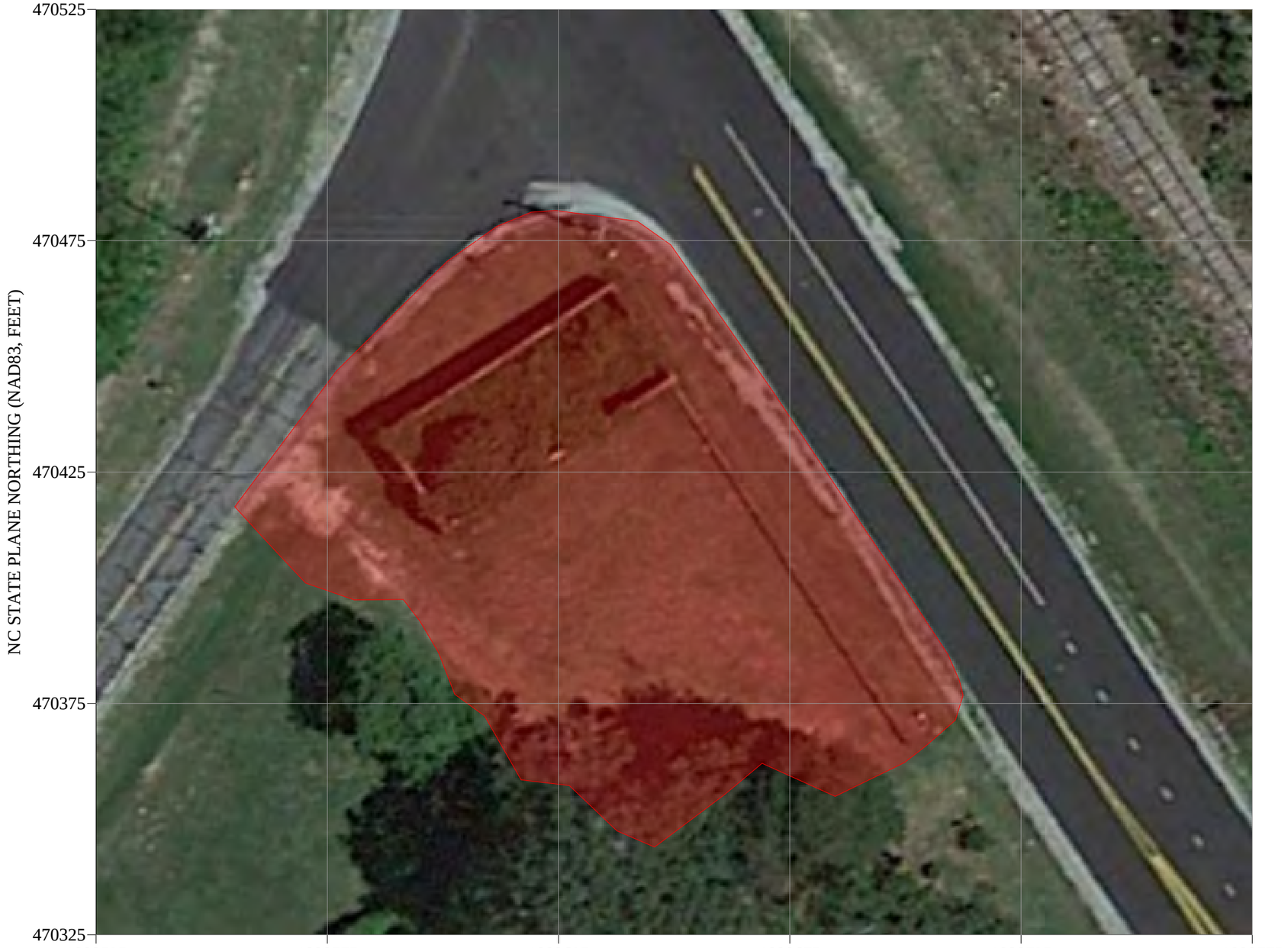
depths ranging from 0.5-4.0 feet below the ground surface.

- Collectively, the geophysical data recorded no evidence of metallic USTs at Parcel 218. The survey did record evidence of ten minor buried metal anomalies. These features may be associated with UXO or other minor metallic debris.
- If the nature of the buried metal anomalies is to be determined, Pyramid recommends excavation and physical sampling at these ten locations to verify the cause of each metallic feature. A contractor with experience in dealing with UXO should likely be consulted to determine proper excavation procedures.

LIMITATIONS

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

APPROXIMATE BOUNDARIES OF GEOPHYSICAL SURVEY AREA



View of Survey Area (Facing Approximately Northeast)

View of Survey Area (Facing Approximately South)

N

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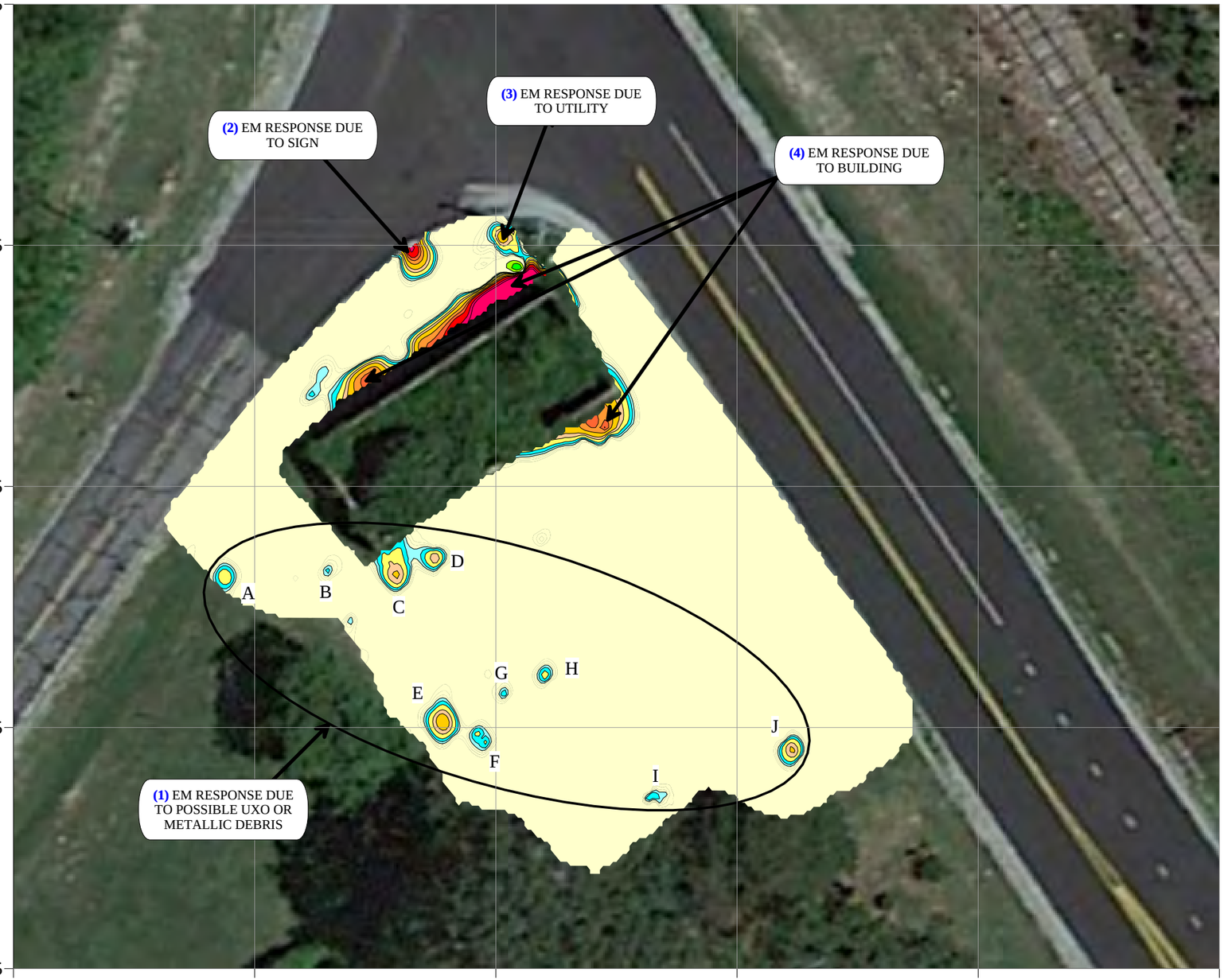
PROJECT	PARCEL 218 RAEFORD, NORTH CAROLINA NCDOT PROJECT R-5709
TITLE	PARCEL 218 - GEOPHYSICAL SURVEY BOUNDARIES AND SITE PHOTOGRAPHS
DATE	8/16/2021
CLIENT	Wood, PLC
PYRAMID PROJECT #:	2021-201
	FIGURE 1

EM61 METAL DETECTION RESULTS



NO EVIDENCE OF METALLIC USTs WAS OBSERVED.

The contour plot shows the bottom coil results of the EM61 instrument in millivolts (mV). The bottom coil presents a higher-amplitude response to any metal identified by the instrument. Differential data (difference between top and bottom coils) were not used for this parcel in order to focus on smaller buried metallic objects. The EM data were collected on August 11, 2021, using a Geonics EM61-MK2 instrument. Verification GPR data were collected using a GSSI SIR 4000 controller equipped with a 350 MHz HS antenna on August 12, 2021.

EM61 Metal Detection Response (millivolts)

N

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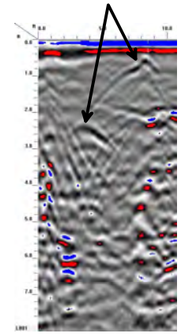
PROJECT: PARCEL 218 RAEFORD, NORTH CAROLINA NCDOT PROJECT R-5709	TITLE: PARCEL 218 - EM61 METAL DETECTION CONTOUR MAP	DATE: 8/16/2021	CLIENT: Wood, PLC
		PYRAMID PROJECT #: 2021-201	**FIGURE 2**

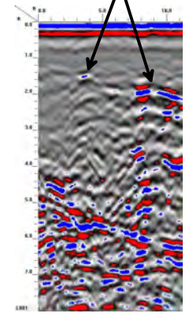
GPR TRANSECT LOCATIONS

BURIED METALLIC DEBRIS

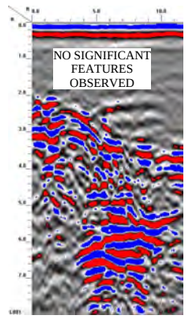


GPR TRANSECT 1 (T1)

BURIED METALLIC DEBRIS

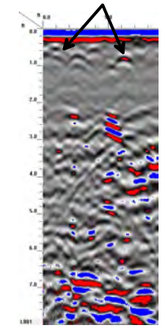


GPR TRANSECT 4 (T4)



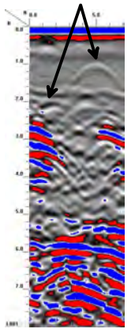
GPR TRANSECT 5 (T5)

BURIED METALLIC DEBRIS



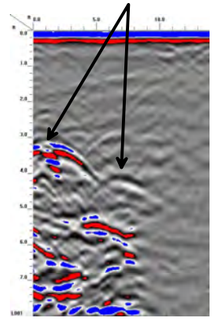
GPR TRANSECT 7 (T7)

BURIED METALLIC DEBRIS



GPR TRANSECT 9 (T9)

BURIED METALLIC DEBRIS



GPR TRANSECT 13 (T13)

N

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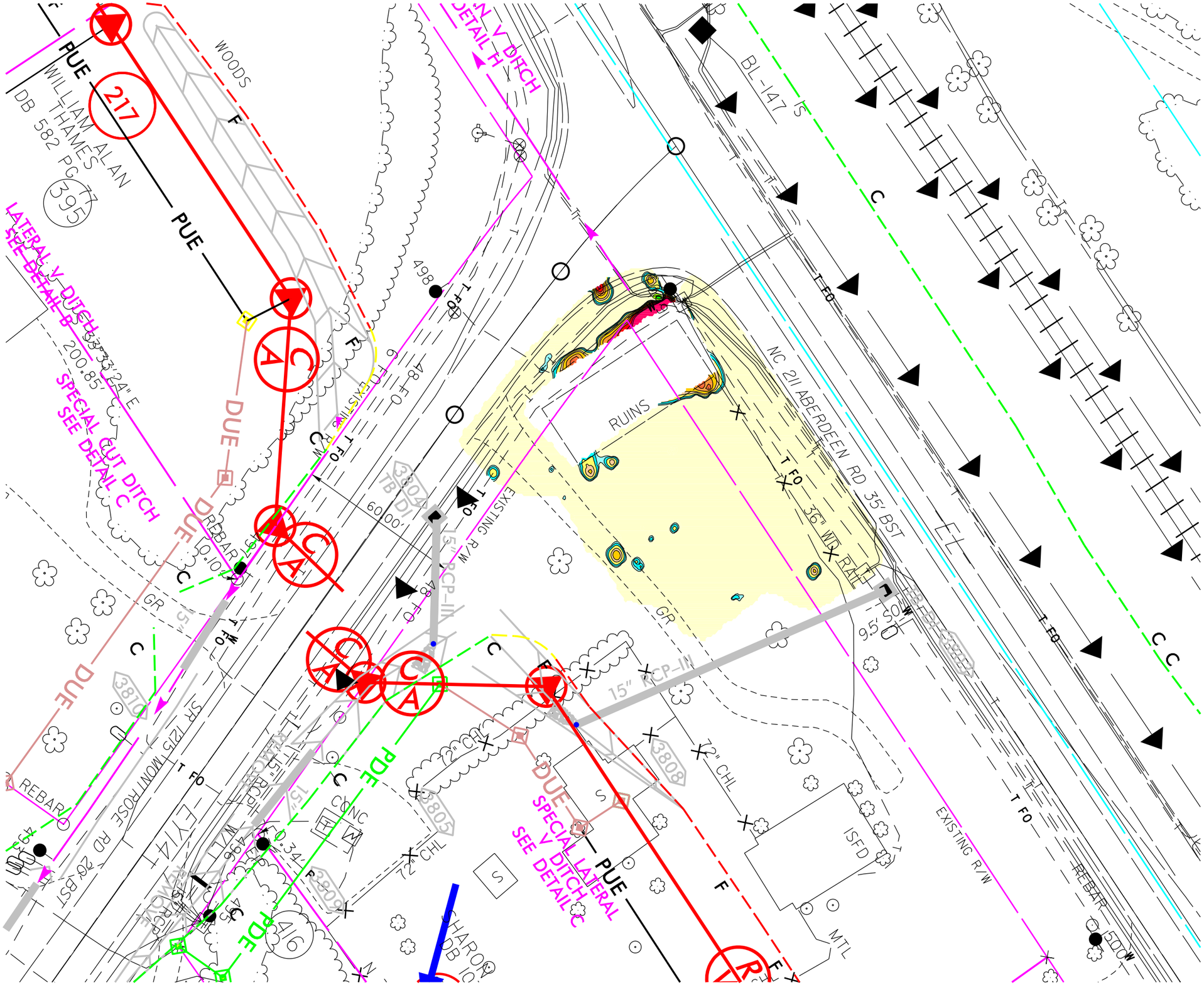
PROJECT	PARCEL 218 RAEFORD, NORTH CAROLINA NCDOT PROJECT R-5709	TITLE	PARCEL 218 - GPR TRANSECT LOCATIONS AND SELECT IMAGES	DATE 8/16/2021 PYRAMID PROJECT #: 2021-201
				CLIENT Wood, PLC **FIGURE 3**



TITLE

OVERLAY OF METAL DETECTION RESULTS
ON NCDOT ENGINEERING PLANS

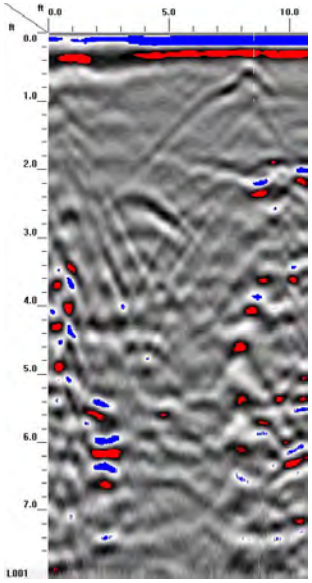
PROJECT

PARCEL 218
RAEFORD, NORTH CAROLINA
NCDOT PROJECT R-5709

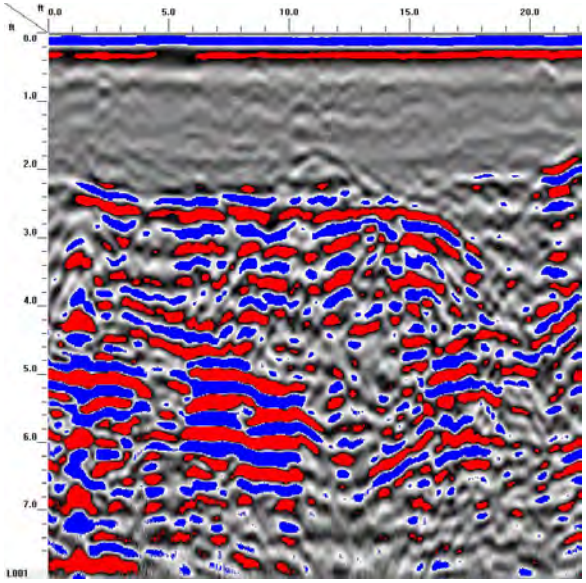
PYRAMID GEOPHYSICS
503 INDUSTRIAL AVENUE
GREENSBORO, NC 27406
336.335.3174 (p) 336.691.0648 (f)
License # C1251 Eng. / #C257 Geology

DATE: 08-18-2021	REVISION NO. 0
PYRAMID PROJECT NO. 2021-149	FIGURE NO. 4

Appendix A – GPR Transect Images



GPR TRANSECT 1



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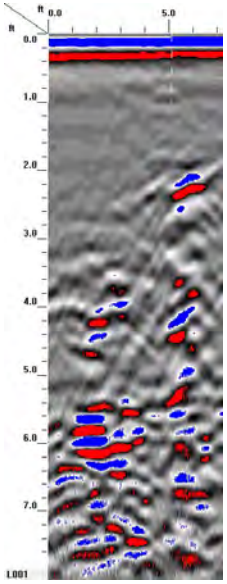

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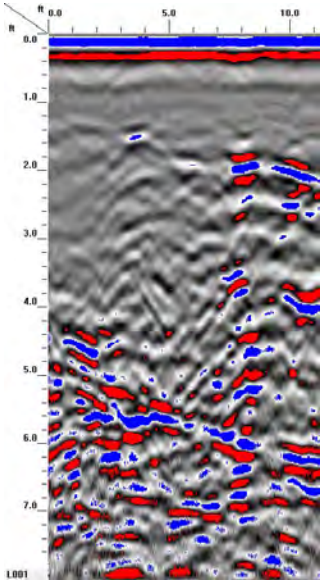
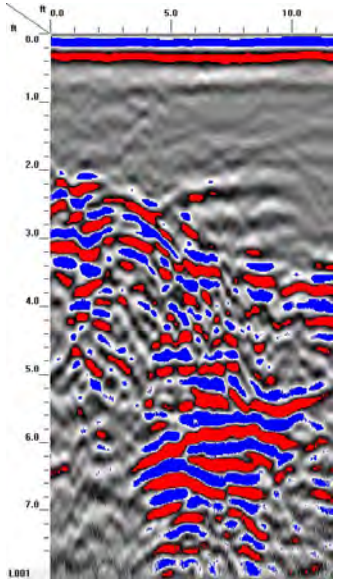


GPR TRANSECT 4



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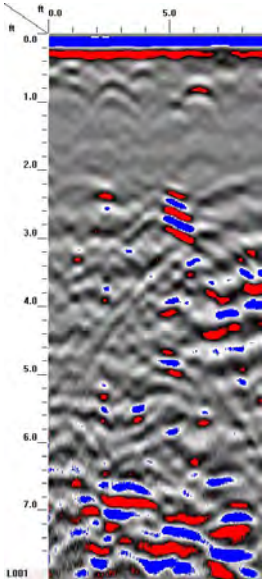

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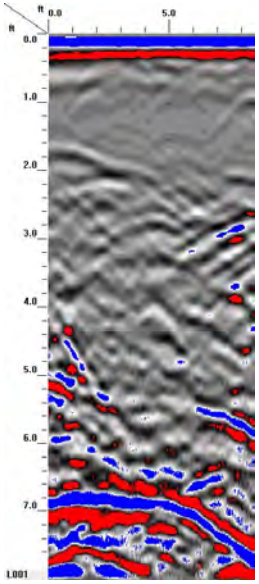

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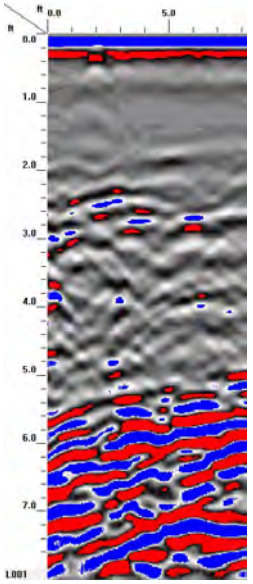

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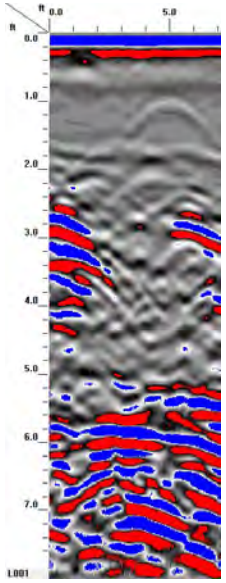

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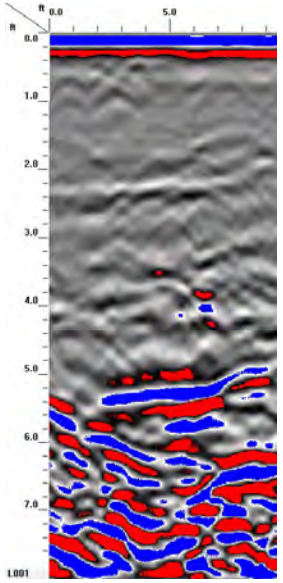

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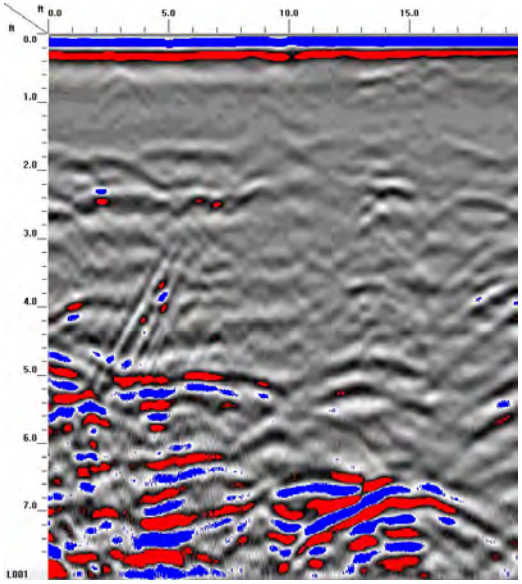

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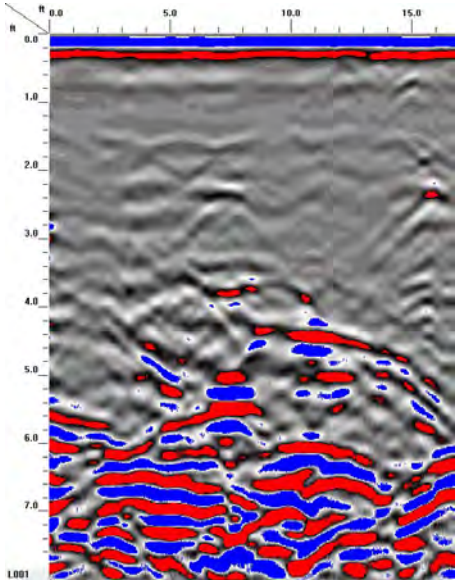

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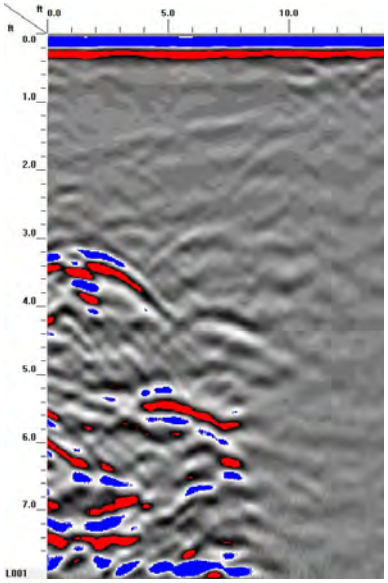

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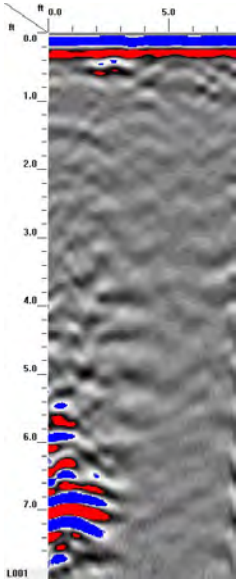

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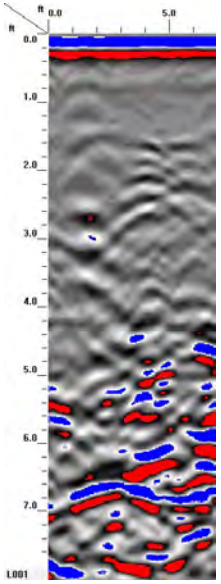

GPR TRANSECT 14

North Carolina Department of Transportation

Phase II Investigation
State Project: R-5709
WBS Element: 50205.1.1
Moore County

Parcel 229
Donald Earl and Karen & Charles Gillis – Jay's Food Mart Property
10827 NC 211 Hwy
Aberdeen, North Carolina
October 27, 2021

Wood Environment & Infrastructure Solutions, Inc.
Project: 20478R5709

Andrew Frantz, REM
Senior Scientist

Helen Corley, LG, BCES
Principal Hydrogeologist

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APPENDICES

1.0 INTRODUCTION

In response to the North Carolina Department of Transportation (NCDOT) Request for Proposal, dated June 2, 2021, Wood Environment & Infrastructure Solutions, Inc. (Wood) has performed a Phase II Investigation for Parcel 229 (Site). The investigation was conducted in accordance with Wood's Technical and Cost proposal dated June 18, 2021, and NCDOT's July 6, 2021, Notice to Proceed. NCDOT contracted Wood to perform the Phase II Investigation at the parcel, within areas that will be affected by the proposed widening of NC 211 Hwy from US 15-501 in Aberdeen, North Carolina to SR 1244 (West Palmer Street)/SR 1311 (Mockingbird Hill Road) in Raeford, North Carolina.

The Site is located in the eastern quadrant of the intersection of NC 211 Hwy and East Indiana Avenue, as shown on the Vicinity Map, **Figure 1**. The parcel, which is located at 10827 NC 211 Hwy, is currently occupied by an active Pure gasoline station with Jay's Food Mart convenience store, Moor County Mattress Brokers, and M&M Automotive used car dealership. The Site is identified as Parcel 229, Donald Earl and Karen & Charles Gillis – Jay's Food Mart Property, within the NCDOT MicroStation survey file and is in Aberdeen of Moore County, North Carolina. The area of investigation at Parcel 229 is approximately 1.51-acres as shown on **Figure 2**.

The Site is reported as a gasoline station and convenience store with four underground storage tanks (USTs) in the 2019 NCDOT Phase I Report. The four USTs are located outside of the area of investigation for this Phase II Investigation. According to the NCDEQ UST Database, the USTs were installed in December 1989. No releases related to the UST system have been reported and NCDEQ documentation for Parcel 229 was not present on the North Carolina Laserfiche online database. Wood reviewed the NCDOT Historical Aerial Imagery Index, and Parcel 229 was not covered by photographs in the index.

The following report describes a geophysical survey and subsurface field investigation at the Site, with results from our ultraviolet fluorescence (UVF) soil analyses and evaluation for potential soil contamination within the Site.

2.0 GEOLOGY

2.1 Regional Geology

The Site is located within the Coastal Plain Physiographic Province of North Carolina. According to the 1985 State Geologic Map of North Carolina, the area is within the Pinehurst Formation and is underlain by medium- to coarse-grained sand with cross-bedding and rhythmic bands of clayey sand.

2.2 Site Geology

Site geology was observed through the advancement of 18 shallow soil borings (P229-B1 to P229-B18). The borings were advanced to an approximate depth of 10 feet below ground surface (bgs). Groundwater was not encountered during boring advancement. Figure 2 presents the boring locations and Site layout. Soils encountered in the borings consisted mostly of tan to brown to gold to orange sand overlaying tan to orange to gray clayey sand. Staining and petroleum odors were not observed in the borings. Based on observations of topography of the Site vicinity, the groundwater flow direction is inferred to be generally toward the south. Boring logs are presented in **Appendix A**.

3.0 FIELD ACTIVITIES

3.1 Preliminary Activities

Prior to commencing field sampling activities at the Site, several tasks were accomplished in preparation for the subsurface investigation. A Health and Safety Plan (HASP) was created with the Site-specific health and safety information necessary for the field activities, including protocol for COVID-19. North Carolina 811 was contacted on August 24, 2021, for the parcel.

Pyramid Geophysical Services of Greensboro, North Carolina (Pyramid) was retained to conduct a geophysical investigation. Probe Utility Locating (PUL) was retained to perform utility locating activities at the Site. Innovative Environmental Technologies, Inc. (IET) of Concord, North Carolina was retained by Wood to perform the direct push sampling for soil

borings, and UVF instrumentation was rented from Red Lab, LLC (Red Lab) of Wilmington, North Carolina.

Boring locations were strategically placed within the parcel to maximize the opportunity to encounter potential contaminated soil and evaluate areas of subsurface design features.

3.2 Site Reconnaissance

Wood personnel visited the parcel on June 8, 2021, and observed that the Site was occupied with a gasoline station and convenience store with four USTs, a mattress store, and a used car dealership. The USTs were observed to be located outside of the investigation area. In addition, six fuel dispensers were observed during the Site reconnaissance with four of the dispensers located within the area of investigation. A photographic log is included in **Appendix B**.

3.3 Geophysical Survey Results and Utility Locating

The geophysical survey was conducted by Pyramid personnel on August 10 and 11, 2021. The Pyramid geophysical investigation using electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys was focused on the areas to the northwest, west, and south of the gas station and convenience store, as these areas were most likely to contain USTs. A total of eight EM anomalies were identified, with the majority of the anomalies attributed to visible cultural features located at the ground surface. The GPR survey identified evidence of underground utility lines and suspected buried debris; however, significate structures such as USTs were not observed. The complete Pyramid geophysics report is included as **Appendix C**.

Utility locating was performed by PUL personnel on August 25, 2021. The utility locating effort identified buried water lines, buried electrical lines, buried fuel lines, and several buried telephone and communication lines. A buried water line was observed along the western parcel boundary parallel to East Indiana Avenue and along the southern parcel boundary parallel to NC 211 Hwy. The water service line for the convenience store enters on the northern side of the building and the water service lines for the mattress store and used car dealership enter on the western sides of the two buildings. Buried electrical lines were observed extending from the Site buildings to light poles and fuel dispensers. Buried fuel lines were observed extending from the four USTs to the fuel dispensers. Several buried

telephone and communication lines were observed along the western parcel boundary parallel to East Indiana Avenue and along the southern parcel boundary parallel to NC 211 Hwy. Overhead power lines were observed along the southern parcel boundary parallel to NC 211 Hwy.

3.4 Soil Sampling

On August 30, 2021, Wood and IET mobilized to the Site to advance 18 shallow soil borings (P229-B1 to P299-B18). The borings were advanced via direct-push technology to an approximate depth of 10 feet bgs. Boring locations targeted potential environmental sources at the Site and future drainage features.

The purpose of soil sampling was to assess if a petroleum release had impacted the Site and if so, to estimate the volume of impacted soil that might require special handling during NCDOT construction activities. IET advanced a soil sampler to the target depth at each boring location using an AMS PowerProbe. To minimize the potential for cross-contamination between samples, a new polyvinyl chloride PVC sleeve (tube) was inserted into the sampler for each soil interval. Visual and olfactory observations relative to the soil cores were recorded by Wood personnel. The soil types encountered in the borings were recorded to prepare soil boring logs. Wood conducted field screening for volatile organic compounds (VOCs) of the soil borings with a photoionization detector (PID). The portion of each soil core with the highest PID reading was selected from the 0–5 foot interval and the 5-10 foot interval for analysis of total petroleum hydrocarbons (TPH), diesel range organics (DRO), gasoline range organics (GRO), benzene, toluene, ethylbenzene, and xylene (BTEX), total aromatics, and polycyclic aromatic hydrocarbons (PAH) by UVF. Neither groundwater nor bedrock were encountered in the borings. Thirty-six soil samples were collected from the 18 borings at the Site for onsite UVF analysis.

4.0 SOIL SAMPLING RESULTS

Based on August 30, 2021, PID screening and UVF hydrocarbon analysis, evidence of petroleum hydrocarbon impacts was not identified. The NCDEQ Action Levels of 100 milligrams per kilogram (mg/kg) for DRO and 50 mg/kg for GRO were not exceeded in the 18 borings advanced at the Site.

PID readings for the 18 borings ranged from not detected in borings P229-B1, B2, B4, B5, B6, B7, B8, B9, and B14 to 1.1 parts per million (ppm) in sample P229-B10-6-8 collected from 6 to 8 feet bgs. The PID field screening results for samples selected for UVF analysis are summarized in **Table 1** and the full list of PID readings are provided on the boring logs in Appendix A.

Results from the on-Site UVF petroleum soil analyses are presented in **Table 2**, with instrument generated tables in **Appendix D**. Several categories of analyses were measured such as: DRO, GRO, TPH, PAHs, and total aromatics. **Figure 3** presents the GRO and DRO results for the August 2021 investigation.

GRO or DRO detections in the 36 soil samples collected at the Site did not exceed their respective NCDEQ Action Levels. The hydrocarbon results from the QED QROS Hydrocarbon Analyzer are provided in Appendix D.

5.0 CONCLUSIONS

Based on the Site observations and UVF analysis, petroleum-impacted soil contamination was not identified as defined by localized exceedances of the NCDEQ Action Levels of 50 mg/kg for GRO and 100 mg/kg for DRO.

The following bulleted summary is based upon Wood's evaluation of field observations and on-Site quantitative analyses of samples collected from the Site on August 30, 2021.

- The Site is occupied by an active gasoline station and convenience store with four USTs, a mattress store, and a used car dealership. The four USTs are located outside of the area of investigation. In addition, six fuel dispensers are located at the Site with four of the dispensers located within the aera of investigation.

- The geophysical survey did not identify evidence of USTs within the area of investigation.

- Eighteen soil borings were advanced to roughly 10 feet bgs in the NCDOT ROW investigation area to collect soil samples for on-Site UVF analysis. Thirty-six soil samples were collected for on-Site UVF analysis.

- UVF analysis of 36 soil samples collected did not identify petroleum-impacted soil.

6.0 RECOMMENDATIONS

Based on these Phase II Investigation results, Wood does not recommend further soil investigation. Wood notes that the four fuel dispensers located within the investigation area lie within the ROW and thus should be removed, in general accordance with the NCDEQ guidelines.

TABLES

Table 1: Summary of PID Screening Results
R-5709, Parcel 229 - Donald Earl & Karen & Charles Gillis – Jay's Food Mart Property
Aberdeen, North Carolina
Wood Project: 20478R5709

Boring ID	Depth of Sample Interval	PID Reading
P229-B1	2-4	0.0
	6-8	0.0
P229-B2	4-6	0.2
	8-10	0.0
P229-B3	2-4	0.0
	6-8	0.0
P229-B4	2-4	0.0
	6-8	0.0
P229-B5	2-4	0.0
	6-8	0.0
P229-B6	2-4	0.0
	8-10	0.0
P229-B7	0-2	0.0
	6-8	0.0
P229-B8	2-4	0.0
	8-10	0.0
P229-B9	0-2	0.0
	4-6	0.0
P229-B10	2-4	0.6
	6-8	1.1
P229-B11	2-4	0.0
	4-6	0.8
P229-B12	2-4	0.7
	6-8	0.9
P229-B13	2-4	0.0
	6-8	1.0
P229-B14	2-4	0.0
	6-8	0.0
P229-B15	2-4	0.0
	6-8	0.4
P229-B16	2-4	0.3
	4-6	0.1
P229-B17	2-4	0.0
	6-8	0.3
P229-B18	0-2	0.1
	4-6	0.3

Notes:

1. Samples collected on 8/30/21
2. Depths shown in feet below ground surface (bgs)
3. PID = Photoionization Detector
4. PID readings shown in parts per million (ppm)

Prepared By/Date: AJF 9/8/21

Checked By/Date: DRH 10/4/21

Table 2: UVF Hydrocarbon Soil Sampling Results
R-5709, Parcel 229 - Donald Earl & Karen & Charles Gillis – Jay's Food Mart Property
Aberdeen, North Carolina
Wood Project: 20478R5709

Sample ID Number	Sample Depth (ft. bgs)	BTEX (mg/kg)	GRO (mg/kg)	DRO (mg/kg)	PAHs (mg/kg)
P229-B1-2-4	2-4	<0.2	<0.2	<0.08	<0.004
P229-B1-6-8	6-8	<0.17	<0.17	<0.07	<0.004
P229-B2-4-6	4-6	<0.15	<0.15	0.1	0.002
P229-B2-8-10	8-10	<0.15	<0.15	<0.06	<0.003
P229-B3-2-4	2-4	<0.17	<0.17	<0.07	<0.004
P229-B3-6-8	6-8	<0.15	<0.15	<0.06	<0.003
P229-B4-2-4	2-4	<0.17	<0.17	<0.07	0.001
P229-B4-6-8	6-8	<0.15	<0.15	<0.06	<0.003
P229-B5-2-4	2-4	<0.2	<0.2	0.05	0.003
P229-B5-6-8	6-8	<0.12	<0.12	4.4	0.002
P229-B6-2-4	2-4	<0.15	<0.15	0.9	0.016
P229-B6-8-10	8-10	<0.12	<0.12	<0.05	<0.003
P229-B7-0-2	0-2	<0.15	<0.15	0.4	0.01
P229-B7-6-8	6-8	<0.12	<0.12	<0.05	<0.003
P229-B8-2-4	2-4	<0.12	<0.12	0.1	0.003
P229-B8-8-10	8-10	<0.12	<0.12	<0.05	<0.003
P229-B9-0-2	0-2	<0.6	<0.6	24.1	0.4
P229-B9-4-6	4-6	<0.3	<0.3	<0.14	<0.007
P229-B10-2-4	2-4	<0.3	<0.3	<0.15	<0.008
P229-B10-6-8	6-8	<0.17	<0.17	<0.07	<0.004
P229-B11-2-4	2-4	<0.17	<0.17	<0.07	<0.004
P229-B11-4-6	4-6	<0.17	<0.17	<0.07	<0.004
P229-B12-2-4	2-4	<0.22	<0.22	<0.09	<0.005
P229-B12-6-8	6-8	<0.2	<0.2	<0.08	<0.004
P229-B13-2-4	2-4	<0.2	<0.2	<0.08	<0.004
P229-B13-6-8	6-8	<0.22	<0.22	<0.09	<0.005
P229-B14-2-4	2-4	<0.4	<0.4	<0.19	<0.01
P229-B14-6-8	6-8	<0.12	<0.12	<0.05	<0.003
P229-B15-2-4	2-4	<0.2	<0.2	<0.08	<0.004
P229-B15-6-8	6-8	<0.2	<0.2	<0.08	0.001
P229-B16-2-4	2-4	<0.17	<0.17	0.18	0.019
P229-B16-4-6	4-6	<0.17	<0.17	0.08	0.001
P229-B17-2-4	2-4	<0.22	<0.22	<0.09	<0.005
P229-B17-6-8	6-8	<0.2	<0.2	<0.08	<0.004
P229-B18-0-2	0-2	<0.17	<0.17	0.5	0.015
P229-B18-4-6	4-6	<0.17	<0.17	<0.07	<0.004
NC State Action Level		**N/A**	**50**	**100**	**N/A**

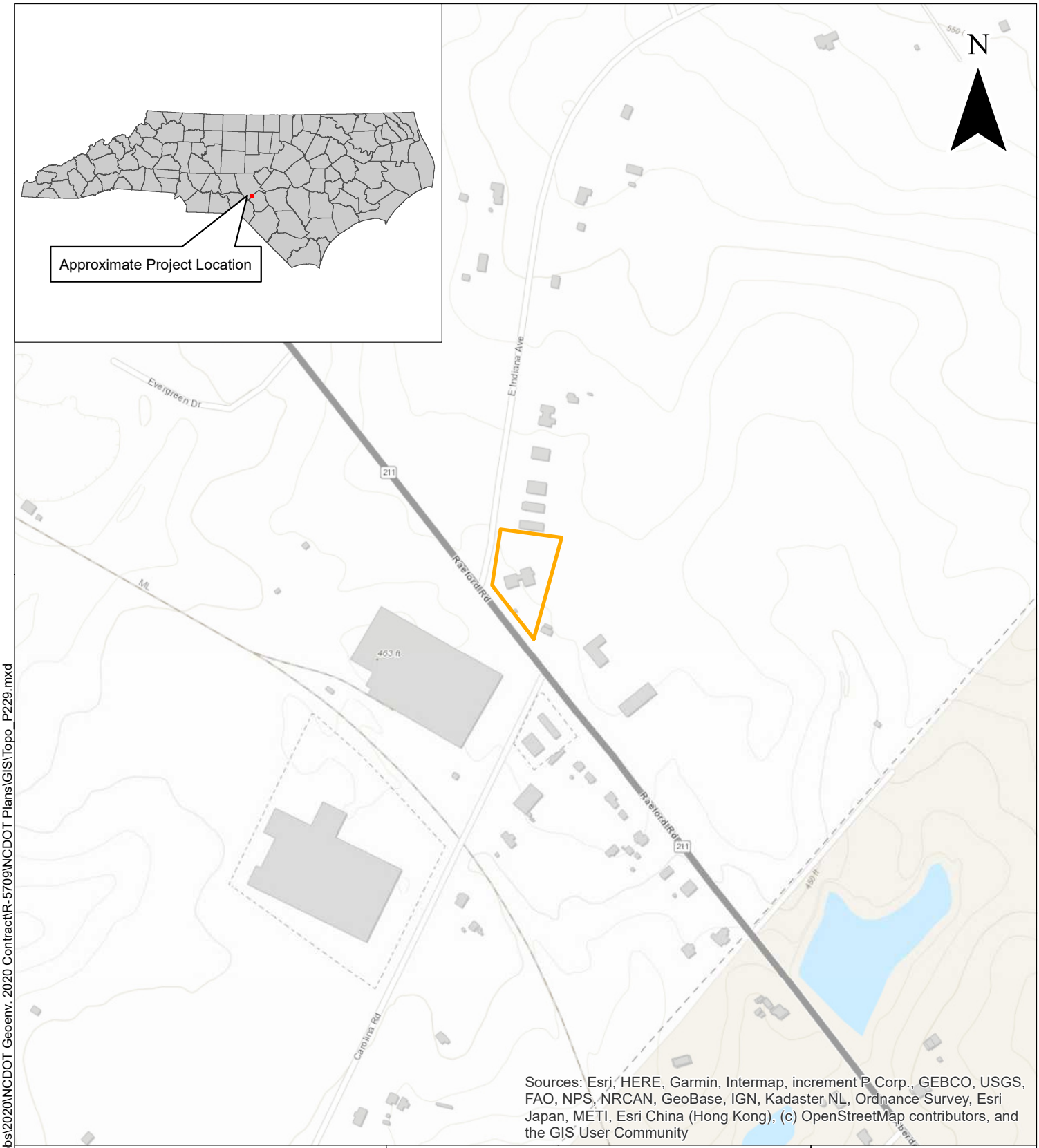
Notes:

1. Samples collected on August 30, 2021
2. Depths shown in feet below ground surface (bgs)
3. Concentrations shown in milligrams per kilogram (mg/kg)
4. BTEX = Benzene, toluene, ethylbenzene, xylene
5. GRO = Gasoline Range Organics
6. DRO = Diesel Range Organics
7. PAHs = Polycyclic aromatic hydrocarbons
8. N/A = Not applicable
9. Bold values exceed respective NC State Action Level

Prepared By/Date: DRH 9/9/21

Checked By/Date: AJF 9/28/21

FIGURES



wood.
Wood Environment & Infrastructure Solutions, Inc.
2801 Yorkmont Road, Suite 100
Charlotte, NC 28208
(704) 357-8600

VICINITY MAP
R5709-PARCEL 229
10827 NC 211 HWY
ABERDEEN, NORTH CAROLINA

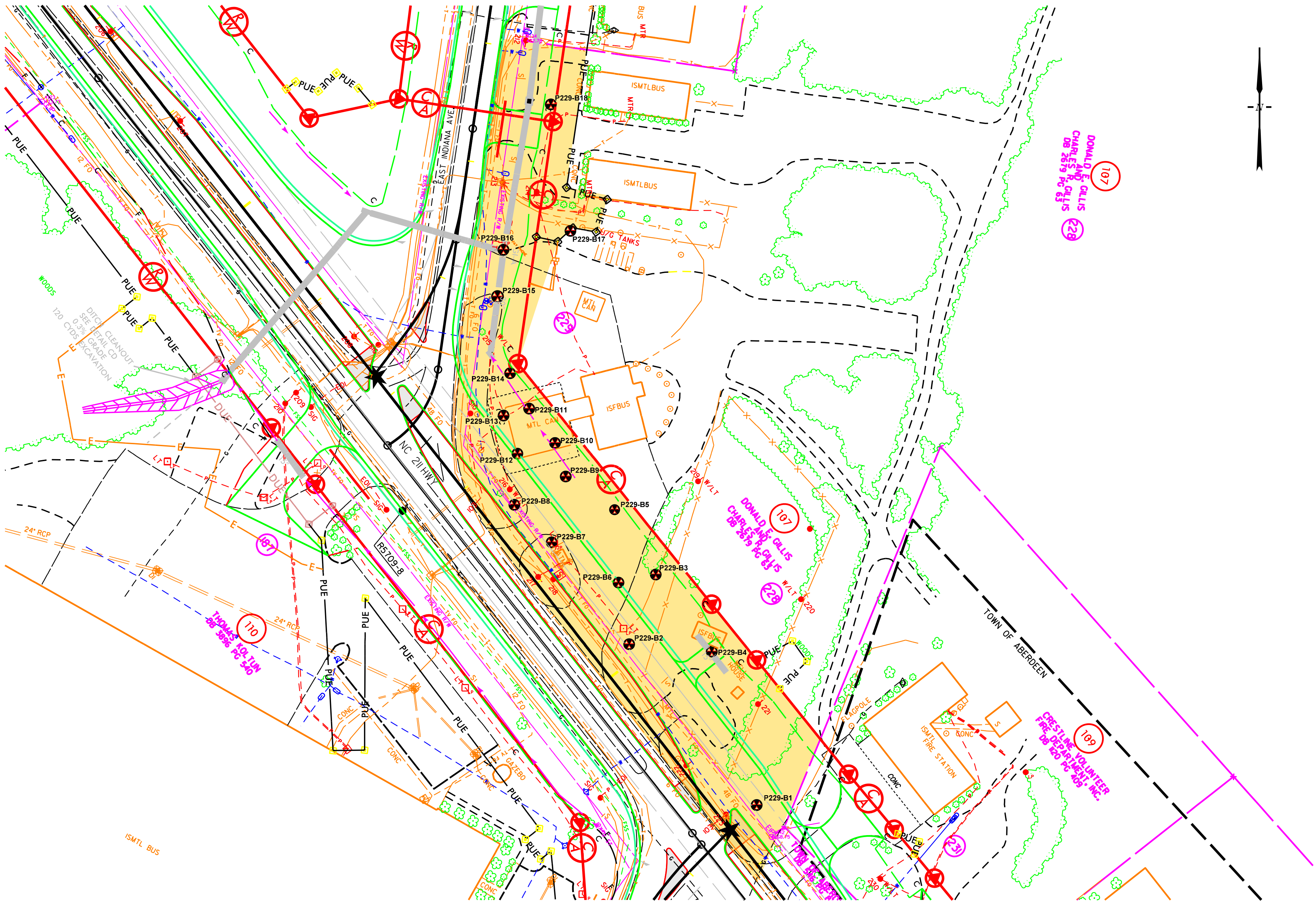
PREPARED BY:	LMM
DATE:	9/30/2021
CHECKED BY:	HPC
DATE:	9/30/2021
PROJECT NO:	20478R5709
FIGURE:	1

Legend

Site Boundary

0 500 1,000 Feet

Document Path: P:\6228 Environmental\jobs\2020\NCDOT Geoenv. 2020 Contract\R-5709\NCDOT Plans\GIS\Topo_P229.mxd



APPROXIMATE BORING LOCATION

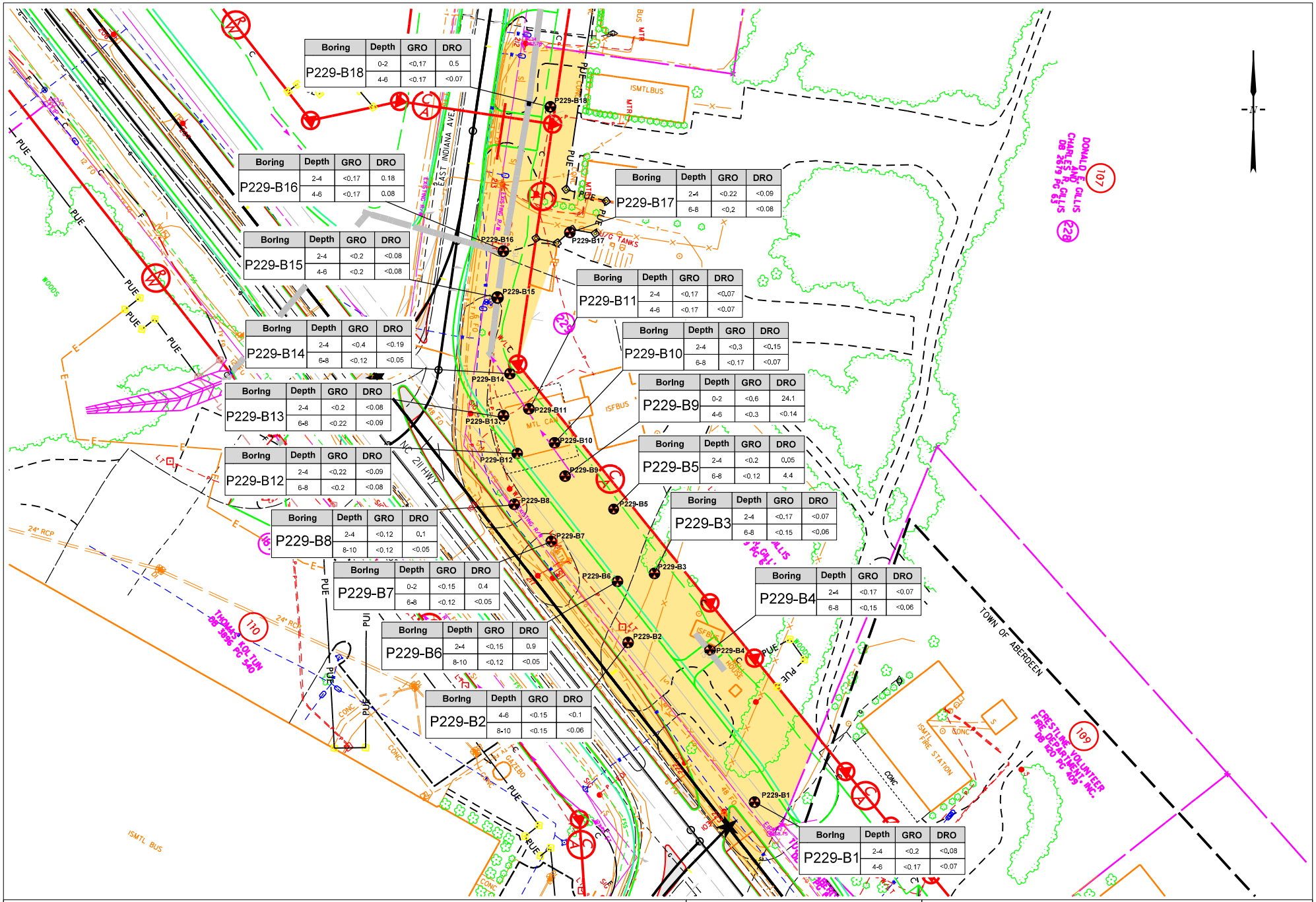
AREA OF INVESTIGATION

70' 0' 35' 70'
17.5'
(ENGLISH)

wood.

SITE MAP WITH BORING LOCATIONS
R-5709 - PARCEL 229
10827 NC 211 HWY
ABERDEEN, NORTH CAROLINA

PREPARED BY:	DATE:	CHECKED BY:	DATE:	JOB NUMBER	FIGURE
LMM	10/15/21	HPC	10/15/21	20478R5709	2



Boring	Depth	GRO	DRO
P229-B18	0-2	<0.17	0.5
	4-6	<0.17	<0.07

Boring	Depth	GRO	DRO
P229-B16	2-4	<0.17	0.18
	4-6	<0.17	0.08

Boring	Depth	GRO	DRO
P229-B17	2-4	<0.22	<0.09
	6-8	<0.2	<0.08

Boring	Depth	GRO	DRO
P229-B15	2-4	<0.2	<0.08
	4-6	<0.2	<0.08

Boring	Depth	GRO	DRO
P229-B11	2-4	<0.17	<0.07
	4-6	<0.17	<0.07

Boring	Depth	GRO	DRO
P229-B14	2-4	<0.4	<0.19
	6-8	<0.12	<0.05

Boring	Depth	GRO	DRO
P229-B10	2-4	<0.3	<0.15
	6-8	<0.17	<0.07

Boring	Depth	GRO	DRO
P229-B13	2-4	<0.2	<0.08
	6-8	<0.22	<0.09

Boring	Depth	GRO	DRO
P229-B9	0-2	<0.6	24.1
	4-6	<0.3	<0.14

Boring	Depth	GRO	DRO
P229-B12	2-4	<0.22	<0.09
	6-8	<0.2	<0.08

Boring	Depth	GRO	DRO
P229-B5	2-4	<0.2	0.05
	6-8	<0.12	4.4

Boring	Depth	GRO	DRO
P229-B8	2-4	<0.12	0.1
	8-10	<0.12	<0.05

Boring	Depth	GRO	DRO
P229-B3	2-4	<0.17	<0.07
	6-8	<0.15	<0.06

Boring	Depth	GRO	DRO
P229-B7	0-2	<0.15	0.4
	6-8	<0.12	<0.05

Boring	Depth	GRO	DRO
P229-B4	2-4	<0.17	<0.07
	6-8	<0.15	<0.06

Boring	Depth	GRO	DRO
P229-B6	2-4	<0.15	0.9
	8-10	<0.12	<0.05

Boring	Depth	GRO	DRO
P229-B2	4-6	<0.15	<0.1
	8-10	<0.15	<0.06

Boring	Depth	GRO	DRO
P229-B1	2-4	<0.2	<0.08
	4-6	<0.17	<0.07

APPROXIMATE BORING LOCATION

AREA OF INVESTIGATION

DEPTHS SHOWN IN FEET BELOW GROUND SURFACE
CONCENTRATIONS SHOWN IN MILLIGRAMS PER KILOGRAM (mg/kg)
GRO=GASOLINE RANGE ORGANICS
DRO=DIESEL RANGE ORGANICS
GRO STATE ACTION LEVEL = 50 mg/kg
DRO STATE ACTION LEVEL = 100 mg/kg
BOLD CONCENTRATION EXCEEDS RESPECTIVE STATE ACTION LEVEL

70' 0' 35' 70'
17.5'
(ENGLISH)

wood.

ANALYTICAL RESULTS MAP
R-5709 - PARCEL 229
10827 NC 211 HWY
ABERDEEN, NORTH CAROLINA

PREPARED BY:	DATE:	CHECKED BY:	DATE:	JOB NUMBER	FIGURE
LMM	10/15/21	HPC	10/15/21	20478R5709	3

APPENDIX A

BORING LOGS

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P229-B1**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**8/30/2021**			WEATHER CONDITIONS	**Partly sunny, 97°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.0	Top soil/organics	
2		Tan/light brown sand	
3	0.0		P229-B1-2-4 selected for UVF analyses
4		Orange/tan sand	
5	0.0		
6		Orange/tan clayey sand	
7	0.0		P229-B1-6-8 selected for UVF analyses
8		Orange/red clayey sand	
9	0.0		
10			
11		Boring terminated at 10 feet bgs	
12			
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Log Completed By: **AJF**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P229-B2**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**8/30/2021**			WEATHER CONDITIONS	**Partly sunny, 97°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.0	Tan/gold sand	
2			
3	0.0		
4		Tan/brown sand	
5	0.2		P229-B2-4-6 selected for UVF analyses
6			
7	0.0	Orange/tan clayey sand	
8			
9	0.0	Orange/red clayey sand	P229-B1-8-10 selected for UVF analyses
10			
11		Boring terminated at 10 feet bgs	
12			
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wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P229-B3**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**8/30/2021**			WEATHER CONDITIONS	**Partly sunny, 97°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.0	Tan/gray sand	
2		Tan sand	
3	0.0		P229-B3-2-4 selected for UVF analyses
4			
5	0.0	Orange/tan sand	
6			
7	0.0	Orange/tan clayey sand	P229-B3-6-8 selected for UVF analyses
8			
9	0.0		
10			
11		Boring terminated at 10 feet bgs	
12			
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SOIL BORING FIELD WORKSHEET

BORING #	**P229-B4**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**8/30/2021**			WEATHER CONDITIONS	**Partly sunny, 97°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.0	Tan sand	
2			
3	0.0	Tan/gold sand	P229-B4-2-4 selected for UVF analyses
4			
5	0.0	Tan/brown sand	
6		Orange/tan sand	
7	0.0		P229-B4-6-8 selected for UVF analyses
8		Orange/tan clayey sand	
9	0.0		
10			
11		Boring terminated at 10 feet bgs	
12			
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SOIL BORING FIELD WORKSHEET

BORING #	**P229-B5**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**8/30/2021**			WEATHER CONDITIONS	**Partly sunny, 97°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.0	Asphalt/gravel Tan sand	
2			
3	0.0		P229-B5-2-4 selected for UVF analyses
4		Tan/gold sand	
5	0.0		
6		Orange/tan clayey sand	
7	0.0	Orange/red clayey sand	P229-B5-6-8 selected for UVF analyses
8			
9	0.0		
10			
11		Boring terminated at 10 feet bgs	
12			
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wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P229-B6**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**8/30/2021**			WEATHER CONDITIONS	**Partly sunny, 97°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.0	Asphalt/gravel Tan/gray sand	
2			
3	0.0	Tan sand	P229-B6-2-4 selected for UVF analyses
4			
5	0.0	Orange/tan sand	
6			
7	0.0	Orange/tan clayey sand	
8			
9	0.0		P229-B6-8-10 selected for UVF analyses
10			
11		Boring terminated at 10 feet bgs	
12			
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wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P229-B7**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**8/30/2021**			WEATHER CONDITIONS	**Partly sunny, 97°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.0	Tan/gray sand	P229-B7-0-2 selected for UVF analyses
2			
3	0.0		
4			
5	0.0	Tan/gold sand	
6			
7	0.0	Orange/tan sand	P229-B7-6-8 selected for UVF analyses
8		Orange/tan clayey sand	
9	0.0		
10			
11		Boring terminated at 10 feet bgs	
12			
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wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P229-B8**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**8/30/2021**			WEATHER CONDITIONS	**Partly sunny, 97°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.0	Tan sand	
2			
3	0.0	Tan/gray sand	P229-B8-2-4 selected for UVF analyses
4			
5	0.0		
6		Orange/tan sand	
7	0.0		
8		Orange/tan clayey sand	
9	0.0		P229-B8-8-10 selected for UVF analyses
10			
11		Boring terminated at 10 feet bgs	
12			
13			
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wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P229-B9**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**8/30/2021**			WEATHER CONDITIONS	**Partly sunny, 97°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.0	Asphalt/gravel Tan/gray sand	P229-B9-0-2 selected for UVF analyses
2			
3	0.0		
4		Tan/gold sand	
5	0.0		P229-B9-4-6 selected for UVF analyses
6		Orange/tan clayey sand	
7	0.0		
8			
9	0.0	Orange/red clayey sand	
10			
11		Boring terminated at 10 feet bgs	
12			
13			
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Log Completed By: **AJF**

SOIL BORING FIELD WORKSHEET

BORING #	**P229-B10**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**8/30/2021**			WEATHER CONDITIONS	**Partly sunny, 97°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.1	Concrete/gravel	
2		Tan sand	
3	0.6		P229-B10-2-4 selected for UVF analyses
4		Tan/gray sand	
5	0.4		
6			
7	1.1	Tan/gray clayey sand	P229-B10-6-8 selected for UVF analyses
8		Orange/tan clayey sand	
9	0.7		
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
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wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P229-B11**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**8/30/2021**			WEATHER CONDITIONS	**Partly sunny, 97°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.0	Concrete/gravel	
2		Tan/gray sand	
3	0.0		P229-B11-2-4 selected for UVF analyses
4			
5	0.8	Tan sand	P229-B11-4-6 selected for UVF analyses
6			
7	0.0	Orange/tan clayey sand	
8			
9	0.0		
10			
11		Boring terminated at 10 feet bgs	
12			
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Log Completed By: **AJF**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P229-B12**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**8/30/2021**			WEATHER CONDITIONS	**Partly sunny, 97°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.5	Concrete/gravel Tan/gray sand	
2			
3	0.7		P229-B12-2-4 selected for UVF analyses
4		Tan sand	
5	0.4		
6			
7	0.9	Orange/tan sand	P229-B12-6-8 selected for UVF analyses
8			
9	0.7	Orange/tan clayey sand	
10			
11		Boring terminated at 10 feet bgs	
12			
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Log Completed By: **AJF**

SOIL BORING FIELD WORKSHEET

BORING #	**P229-B13**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**8/30/2021**			WEATHER CONDITIONS	**Partly sunny, 97°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.0	Concrete/gravel	
2		Tan/gray sand	
3	0.0		P229-B13-2-4 selected for UVF analyses
4			
5	0.0	Orange/tan sand	
6		Tan sand	
7	1.0		P229-B13-6-8 selected for UVF analyses
8		Orange/tan clayey sand	
9	0.1		
10			
11		Boring terminated at 10 feet bgs	
12			
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14			
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Log Completed By: **AJF**

SOIL BORING FIELD WORKSHEET

BORING #	**P229-B14**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**8/30/2021**			WEATHER CONDITIONS	**Partly sunny, 97°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.0	Asphalt/gravel	
2		Tan sand	
3	0.0		P229-B14-2-4 selected for UVF analyses
4		Tan/gray sand	
5	0.0		
6			
7	0.0	Orange/tan sand	P229-B14-6-8 selected for UVF analyses
8			
9	0.0	Orange/tan clayey sand	
10			
11		Boring terminated at 10 feet bgs	
12			
13			
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wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P229-B15**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**8/30/2021**			WEATHER CONDITIONS	**Partly sunny, 97°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.0	Tan/gold sand	
2			
3	0.0	Tan sand	P229-B15-2-4 selected for UVF analyses
4			
5	0.2	Tan/brown sand	
6			
7	0.4	Orange/tan sand	P229-B15-6-8 selected for UVF analyses
8			
9	0.1	Orange/tan clayey sand	
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
16			
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Log Completed By: **AJF**

wood.

SOIL BORING FIELD WORKSHEET

BORING #	**P229-B16**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**8/30/2021**			WEATHER CONDITIONS	**Partly sunny, 97°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.1	Tan sand	
2			
3	0.3	Tan/gold sand	P229-B16-2-4 selected for UVF analyses
4			
5	0.1	Tan sand	P229-B16-4-6 selected for UVF analyses
6		Orange/tan sand	
7	0.0		
8		Orange/tan clayey sand	
9	0.0		
10			
11		Boring terminated at 10 feet bgs	
12			
13			
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SOIL BORING FIELD WORKSHEET

BORING #	**P229-B17**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**8/30/2021**			WEATHER CONDITIONS	**Partly sunny, 97°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.0	Tan sand	
2			
3	0.0		P229-B17-2-4 selected for UVF analyses
4		Tan/brown sand	
5	0.0		
6		Orange/tan sand	
7	0.3		P229-B17-6-8 selected for UVF analyses
8			
9	0.0	Orange/tan clayey sand	
10			
11		Boring terminated at 10 feet bgs	
12			
13			
14			
15			
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Log Completed By: **AJF**

SOIL BORING FIELD WORKSHEET

BORING #	**P229-B18**	BORING DEPTH (ft)	**10**	NUMBER OF PAGES	**1**
PROJECT #	**20478R5709**			PROJECT NAME	**NCDOT R-5709**
DATE DRILLED	**8/30/2021**			WEATHER CONDITIONS	**Partly sunny, 97°F**
DRILLING SUB-CONTRACTOR	**IET**			DRILL RIG	**AMS PowerProbe**

DEPTH (ft bgs)	PID (ppm)	SOIL DESCRIPTION	SAMPLE INFO
1	0.1	Gravel	P229-B18-0-2 selected for UVF analyses
2		Tan sand	
3	0.1	Tan/gold sand	
4			
5	0.3		P229-B18-4-6 selected for UVF analyses
6		Orange/tan sand	
7	0.0		
8		Orange/tan clayey sand	
9	0.1		
10			
11		Boring terminated at 10 feet bgs	
12			
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APPENDIX B

PHOTOGRAPHIC LOG

Photograph 1:
View of convenience store building at parcel 229, facing southeast.

Photograph 2:
View of four fuel dispenser islands located within the investigation area at parcel 229, facing southeast

Photograph 3:
Northern portion of investigation area at parcel 229, facing north.

Photograph 4:
Southeastern area of investigation area at parcel 229, facing southeast.

Photograph 5:
View of on-Site UVF analysis setup.

Photograph 6:
View of IET advancing direct push soil sampler at parcel 229.

APPENDIX C

GEOPHYSICAL REPORT

PYRAMID GEOPHYSICAL SERVICES
(PROJECT 2021-201)

GEOPHYSICAL SURVEY

METALLIC UST INVESTIGATION:
PARCEL 229
NCDOT PROJECT R-5709 (50205.1.1)

10827 NC-211, ABERDEEN, NC

August 25, 2021

Report prepared for: **Helen P. Corley, LG, RSM, BCES**
Wood, PLC
2801 Yorkmont Road #100
Charlotte, NC 28208

Prepared by: _____
Eric C. Cross, P.G.
NC License #2181

Reviewed by: _____
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NC License #1066

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P: 336.335.3174 F: 336.691.0648
C257: GEOLOGY C1251: ENGINEERING

GEOPHYSICAL INVESTIGATION REPORT
Parcel 229 - 10827 NC-211
Aberdeen, Moore County, North Carolina

Table of Contents

Figures

Appendices

LIST OF ACRONYMS

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

EXECUTIVE SUMMARY

Project Description: Pyramid Environmental (Pyramid) conducted a geophysical investigation for Wood, PLC at Parcel 229, located at 10827 NC-211, in Aberdeen, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project R-5709). The survey area was indicated to Pyramid by Wood, PLC, and generally extended from the existing edge of pavement into the furthest proposed ROW and/or easement. Conducted from August 10-11, 2021, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

Geophysical Results: The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. A total of eight EM anomalies were identified. The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface. GPR was performed around vehicles, across a buried reinforced pipe, beneath the canopy, and across a suspected utility or debris. Evidence of various utility lines and possible debris was observed. No evidence of significant structures such as USTs was observed.

Collectively, the geophysical data did not record any evidence of unknown metallic USTs at Parcel 229. The known USTs servicing the gas station are located outside of the survey area on the north side of the property.

INTRODUCTION

Pyramid Environmental conducted a geophysical investigation for Wood, PLC at Parcel 229, located at 10827 NC-211, in Aberdeen, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project R-5709). The survey area was indicated to Pyramid by Wood, PLC, and generally extended from the existing edge of pavement into the furthest proposed ROW and/or easement. Conducted from August 10-11, 2021, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

The site consisted of an active gas station and canopy surrounded by grass, asphalt, and concrete surfaces. The known USTs servicing the gas station were located outside of the survey area on the north side of the property. An aerial photograph showing the survey area boundaries and ground-level photographs are shown in **Figure 1**.

FIELD METHODOLOGY

The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. Pyramid collected the EM data using a Geonics EM61-MK2 (EM61) metal detector integrated with a Geode External GPS/GLONASS receiver. The integrated GPS system allows the location of the instrument to be recorded in real-time during data collection, resulting in an EM data set that is geo-referenced and can be overlain on aerial photographs and CADD drawings. A boundary grid was established around the perimeter of the site with marks every 10 feet to maintain orientation of the instrument throughout the survey and assure complete coverage of the area.

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

approximately 0.8-foot intervals along north-south trending or east-west trending, generally parallel survey lines, spaced five feet apart. The data were downloaded to a computer and reviewed in the field and office using the Geonics NAV61 and Surfer for Windows Version 15.0 software programs.

GPR data were acquired across select EM anomalies on August 11, 2021, using a Geophysical Survey Systems, Inc. (GSSI) SIR 4000 control unit coupled to a 350 MHz HS antenna. Data were collected both in reconnaissance fashion as well as along formal transect lines across EM features. The GPR data were viewed in real-time using a vertical scan of 512 samples, at a rate of 48 scans per second. GPR data were viewed down to a maximum depth of approximately 6 feet, based on dielectric constants calculated by the SIR 4000 unit in the field during the reconnaissance scans. GPR transects across specific anomalies were saved to the hard drive of the DF unit for post-processing and figure generation.

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

Geophysical Surveys for Underground Storage Tanks
on NCDOT Projects

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

DISCUSSION OF RESULTS

Discussion of EM Results

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

LIST OF METALLIC ANOMALIES IDENTIFIED BY EM SURVEY

Metallic Anomaly #	Cause of Anomaly	Investigated with GPR
1	Hydrant	
2	Reinforced Concrete Pipe	✓
3	Light/Phone	
4	Vehicles	✓
5	Vehicles/ATM	✓
6	Light	
7	Signs	
8	Suspected Debris or Utility	✓

The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface, including a hydrant, a reinforced concrete pipe, a light and phone box, vehicles, an ATM, signs, and an isolated minor feature suspected to be associated with buried debris or a utility. GPR was performed across the reinforced pipe and around the vehicles to confirm that the metallic interference did not obscure any significant structures such as USTs. GPR was also performed beneath the canopy where the GPS signal was not maintained during the EM survey. Lastly, GPR was performed across EM Anomaly 8 to verify it was not associated with any significant structures.

Discussion of GPR Results

Figure 3 presents the locations of the formal GPR transects performed at the property as well as select transect images. All of the transect images are included in **Appendix A**. A total of twenty-two formal GPR transects were performed at the site. GPR Transects 1-2 were performed across the reinforced pipe, verifying its presence. GPR Transects 3-10

were performed beneath the canopy and recorded evidence of various buried utility lines and reinforcement. GPR Transects 11-21 were performed around vehicles and recorded evidence of buried utilities and some minor possible buried debris. GPR Transect 22 was performed across EM Anomaly 8 and recorded evidence of suspected utilities. No evidence of any significant structures such as USTs was observed.

Collectively, the geophysical data did not record any evidence of unknown metallic USTs at Parcel 229. The known USTs servicing the gas station are located outside of the survey area on the north side of the property. **Figure 4** provides an overlay of the metal detection results on the NCDOT engineering plans for reference.

SUMMARY & CONCLUSIONS

Pyramid's evaluation of the EM61 and GPR data collected at Parcel 229 in Aberdeen, North Carolina, provides the following summary and conclusions:

- The EM61 and GPR surveys provided reliable results for the detection of metallic USTs within the accessible portions of the geophysical survey area.
- The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface.
- GPR was performed around vehicles, across a buried reinforced pipe, beneath the canopy, and across a suspected utility or debris. Evidence of various utility lines and possible debris was observed. No evidence of significant structures such as USTs was observed.
- Collectively, the geophysical data did not record any evidence of unknown metallic USTs at Parcel 229. The known USTs servicing the gas station are located outside of the survey area on the north side of the property.

LIMITATIONS

Geophysical surveys have been performed and this report was prepared for Wood, PLC, in accordance with generally accepted guidelines for EM61 and GPR surveys. It is generally

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

APPROXIMATE BOUNDARIES OF GEOPHYSICAL SURVEY AREA

View of Survey Area (Facing Approximately Northwest)

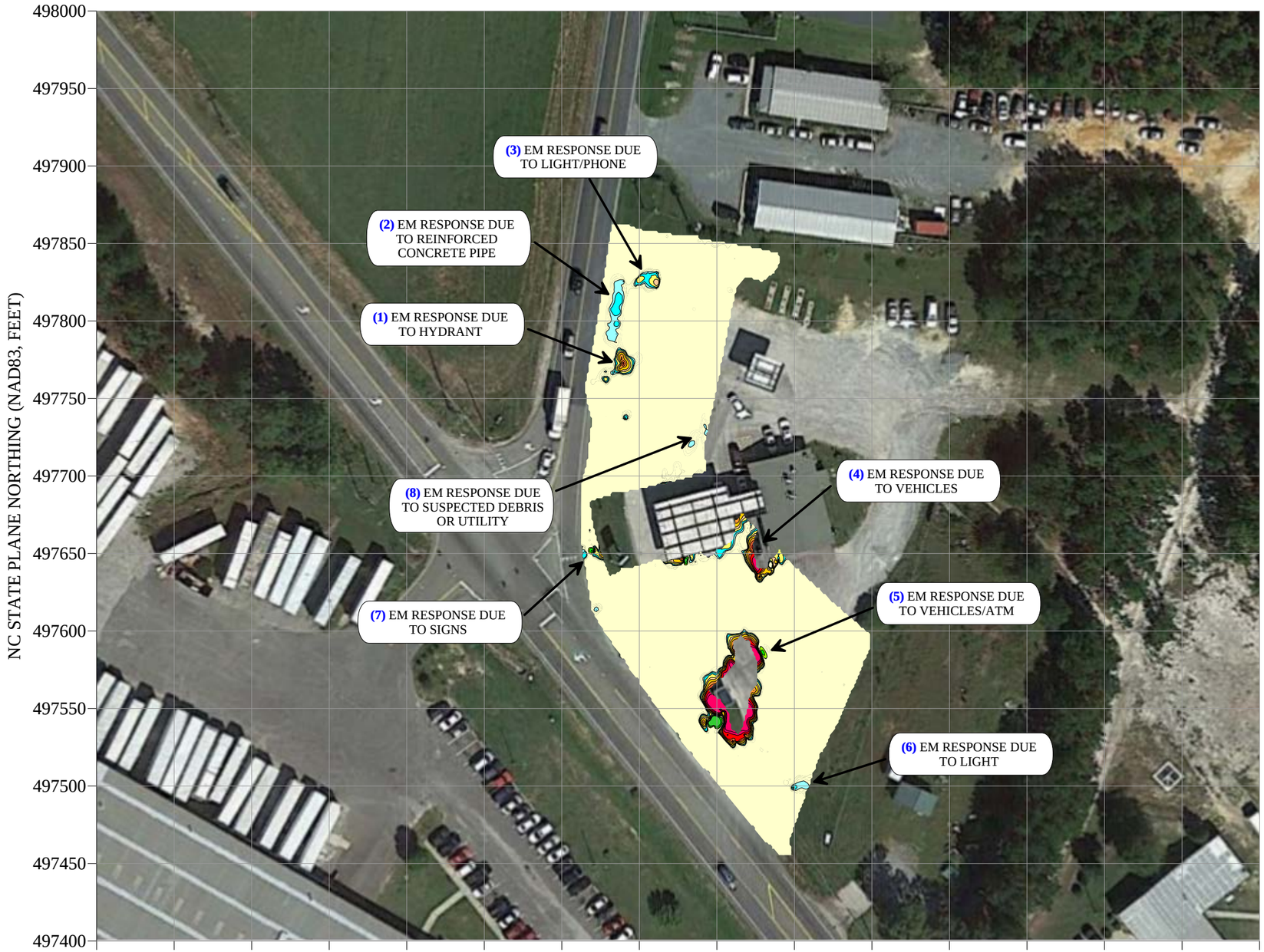
View of Survey Area (Facing Approximately South)

N

PYRAMID GEOPHYSICS
503 INDUSTRIAL AVENUE
GREENSBORO, NC 27406
(336) 335-3174 (p) (336) 691-0648 (f)
License # C1251 Eng. / License # C257 Geology

PROJECT	PARCEL 229 ABERDEEN, NORTH CAROLINA NCDOT PROJECT R-5709
TITLE	PARCEL 229 - GEOPHYSICAL SURVEY BOUNDARIES AND SITE PHOTOGRAPHS
DATE	8/16/2021
CLIENT	Wood, PLC
PYRAMID PROJECT #:	2021-201
	FIGURE 1

EM61 METAL DETECTION RESULTS



NO EVIDENCE OF METALLIC USTs WAS OBSERVED.

The contour plot shows the differential results of the EM61 instrument in millivolts (mV). The differential results focus on larger metallic objects such as USTs and drums. The EM data were collected on August 10, 2021, using a Geonics EM61-MK2 instrument. Verification GPR data were collected using a GSSI SIR 4000 instrument with a 350 MHz HS antenna on August 11, 2021.

EM61 Metal Detection Response (millivolts)

N

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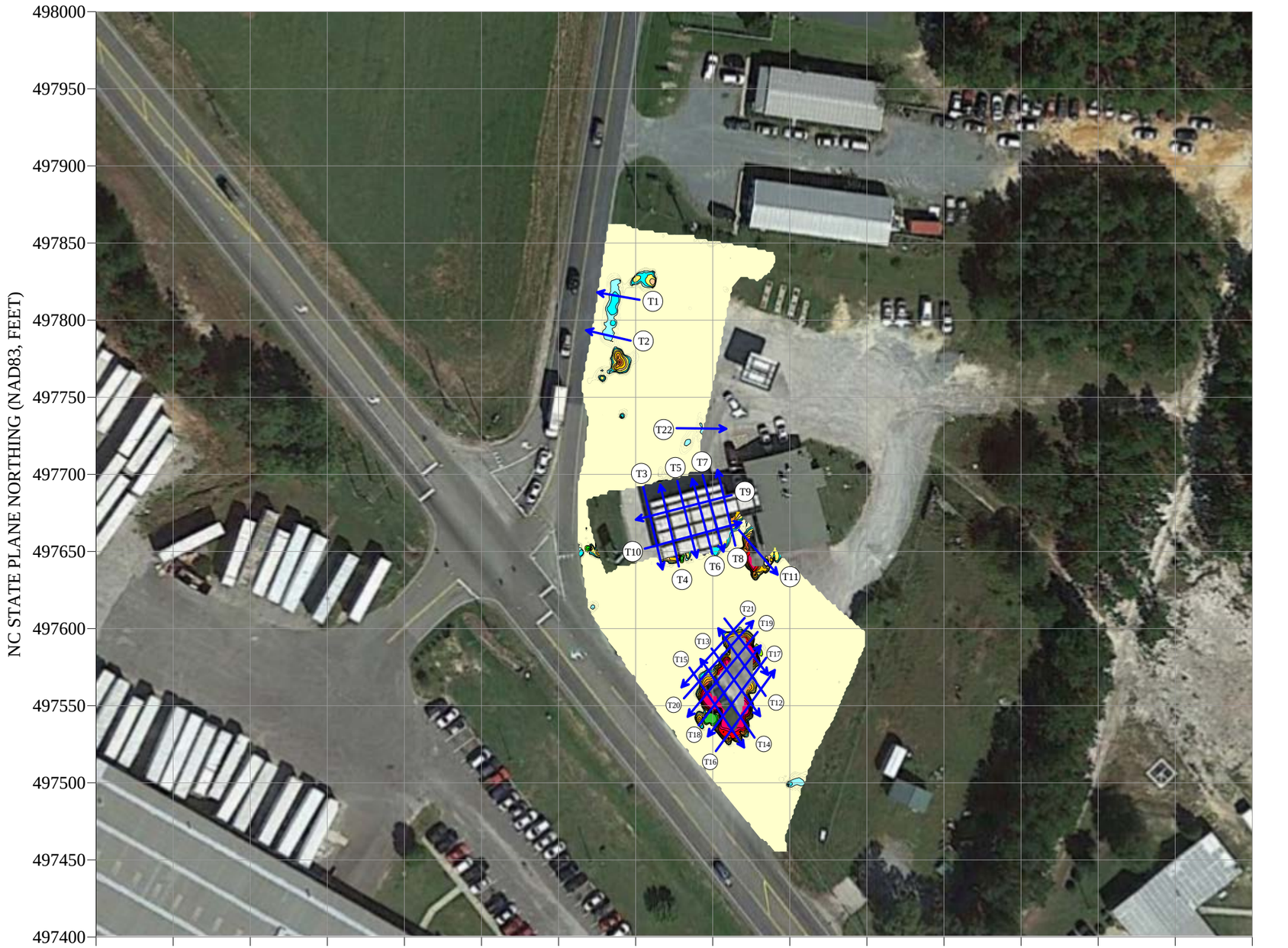
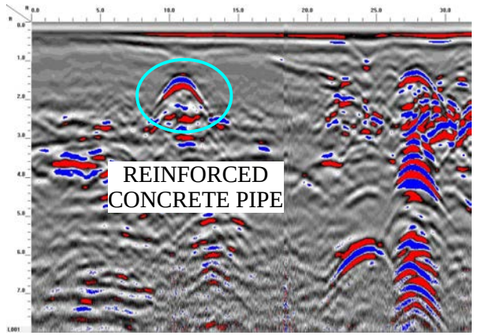
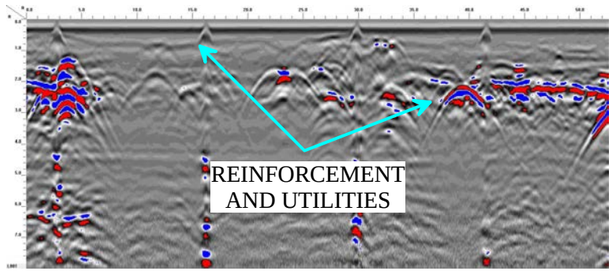
PROJECT: PARCEL 229 ABERDEEN, NORTH CAROLINA NCDOT PROJECT R-5709	TITLE: PARCEL 229 - EM61 METAL DETECTION CONTOUR MAP	DATE: 8/16/2021	CLIENT: Wood, PLC
		PYRAMID PROJECT #: 2021-201	**FIGURE 2**

GPR TRANSECT LOCATIONS

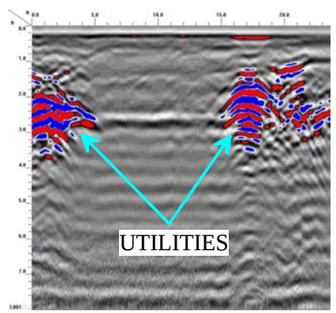




GPR TRANSECT 1 (T1)



GPR TRANSECT 9 (T9)



GPR TRANSECT 22 (T22)

N

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(336) 335-3174 (p) (336) 691-0648 (f)
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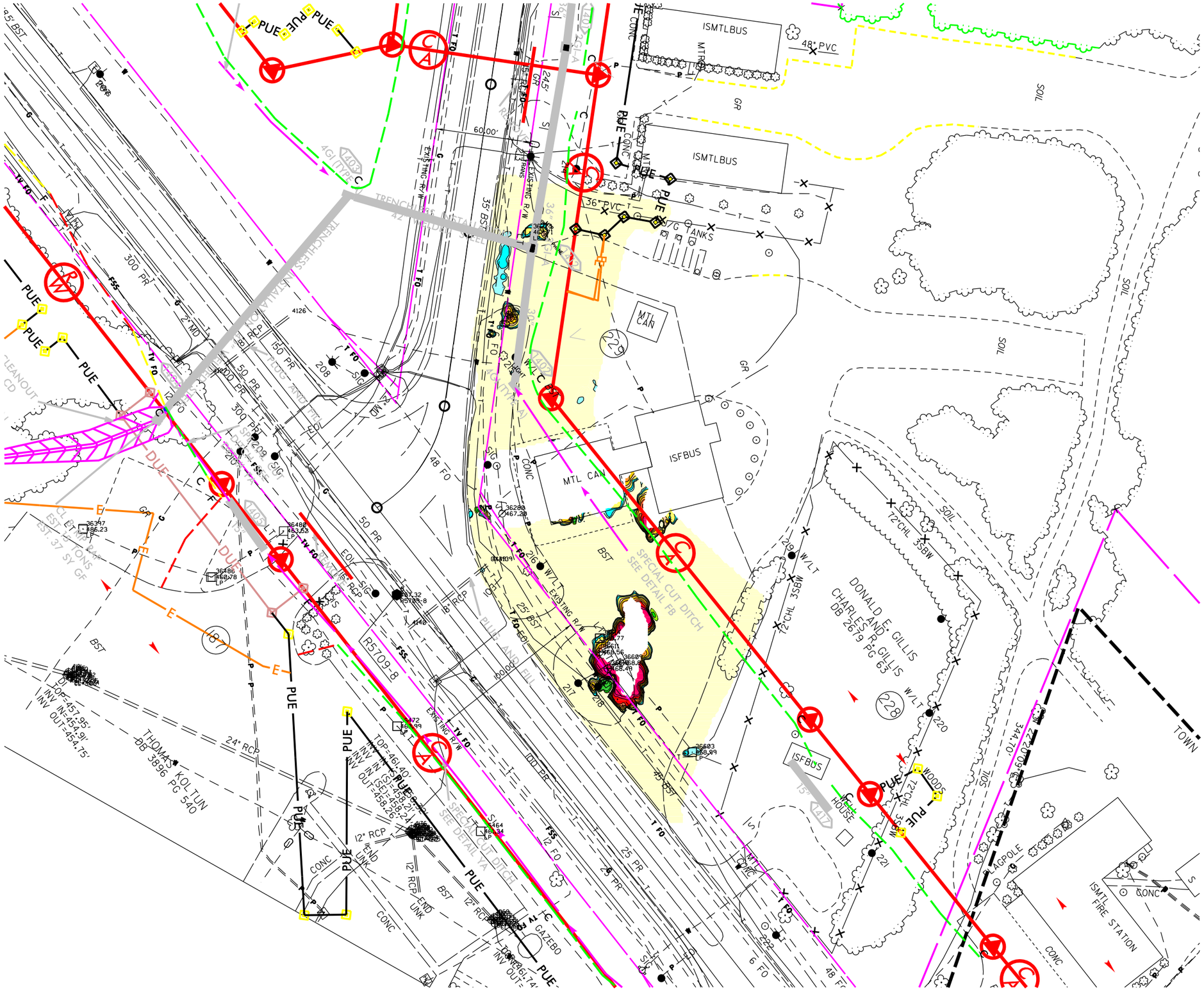
PROJECT	PARCEL 229 ABERDEEN, NORTH CAROLINA NCDOT PROJECT R-5709
TITLE	PARCEL 229 - GPR TRANSECT LOCATIONS AND SELECT IMAGES
DATE	8/16/2021
CLIENT	Wood, PLC
PYRAMID PROJECT #:	2021-201
	FIGURE 3



LEGEND

- EXISTING ROW
- EXISTING PROPERTY BOUNDARY
- PROPOSED ROW LINE
- E — TEMPORARY CONSTRUCTION EASEMENT
- PDE — PROPOSED PERMANENT DRAINAGE
- PROPOSED SS CUT LINE
- PROPOSED SS FILL LINE

MILLIVOLTS (mV)

1000 750 500 400 300 200 150 100 75 60 50 40 30 -90 -100 -200 -400 -5000

TITLE

OVERLAY OF METAL DETECTION RESULTS ON NCDOT ENGINEERING PLANS

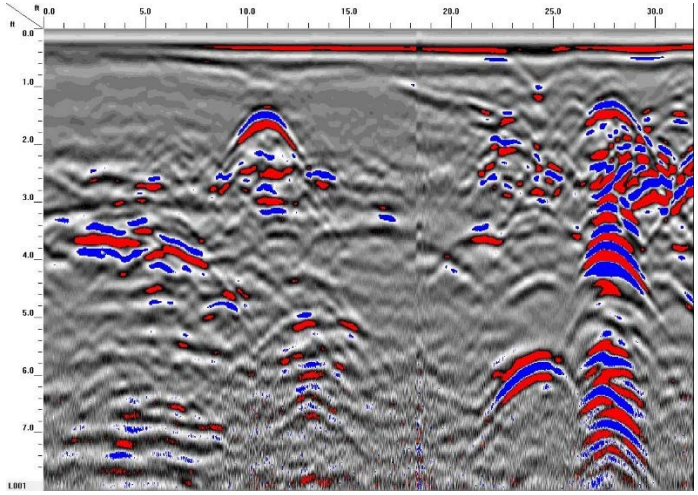
PROJECT

PARCEL 229
ABERDEEN, NORTH CAROLINA
NCDOT PROJECT R-5709

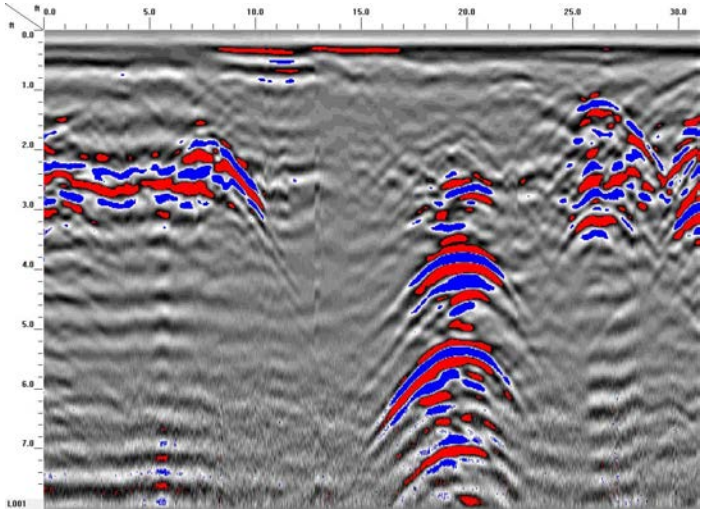
PYRAMID GEOPHYSICS
503 INDUSTRIAL AVENUE
GREENSBORO, NC 27406
336.335.3174 (p) 336.691.0648 (f)
License # C1251 Eng. / #C257 Geology

DATE: 08-18-2021	REVISION NO. 0
PYRAMID PROJECT NO. 2021-201	FIGURE NO. 4

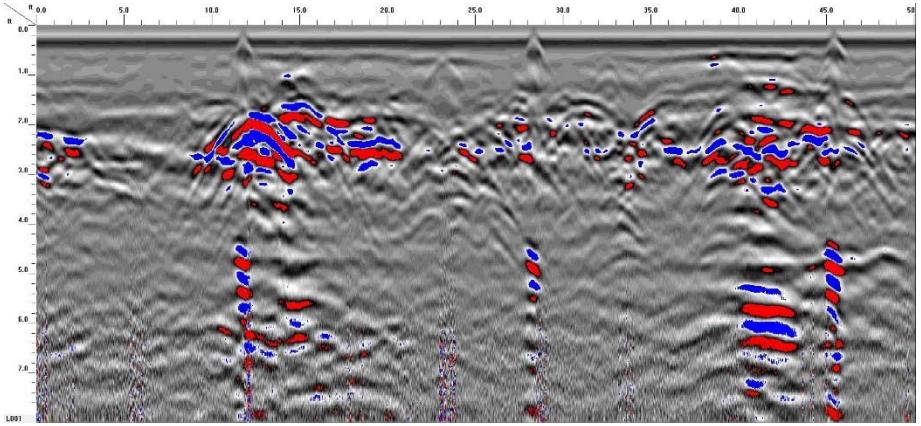
Appendix A – GPR Transect Images



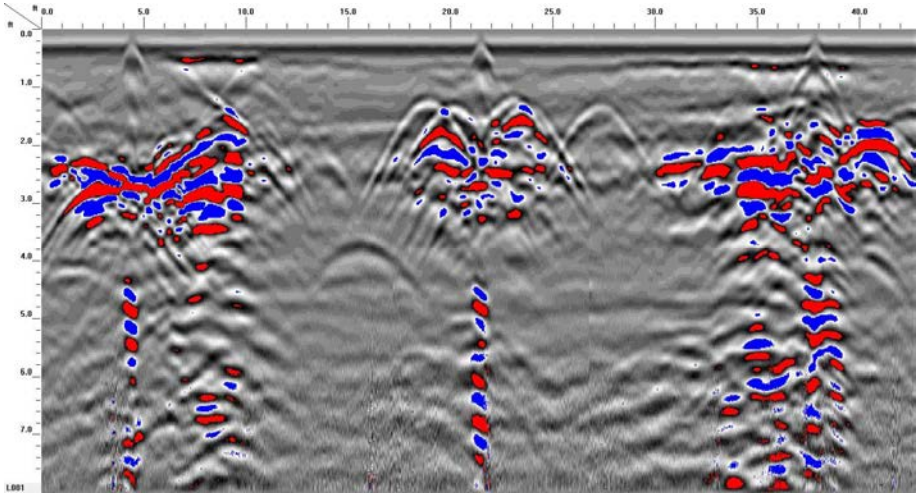
GPR TRANSECT 1



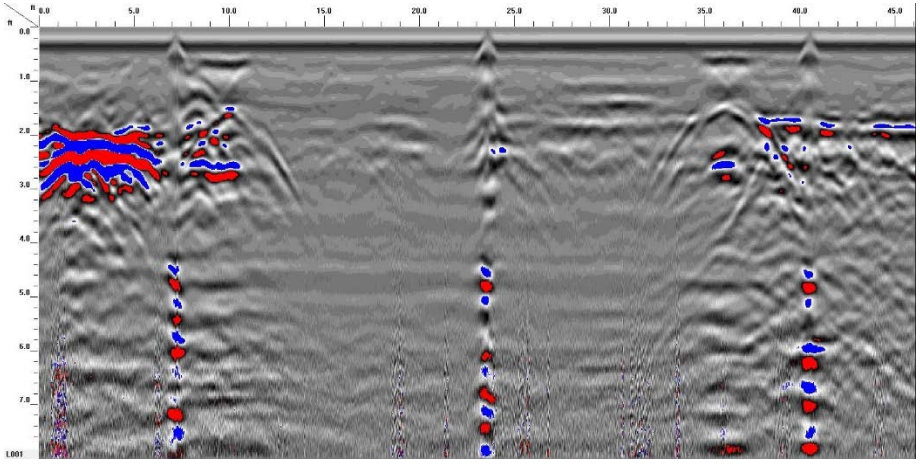
GPR TRANSECT 2



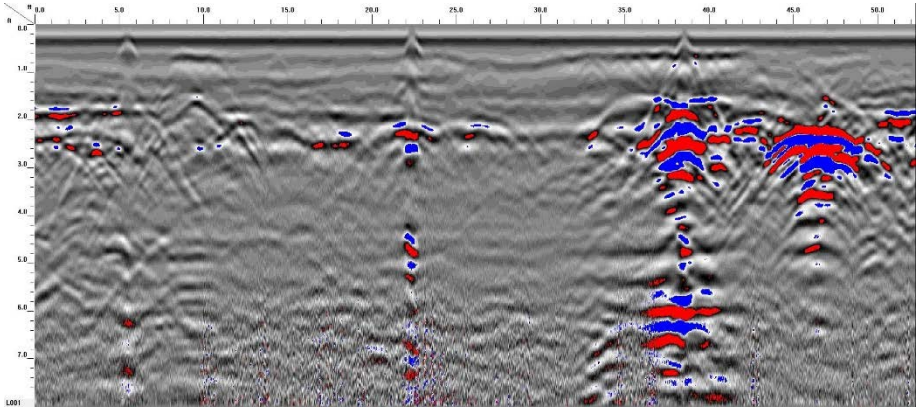
GPR TRANSECT 3



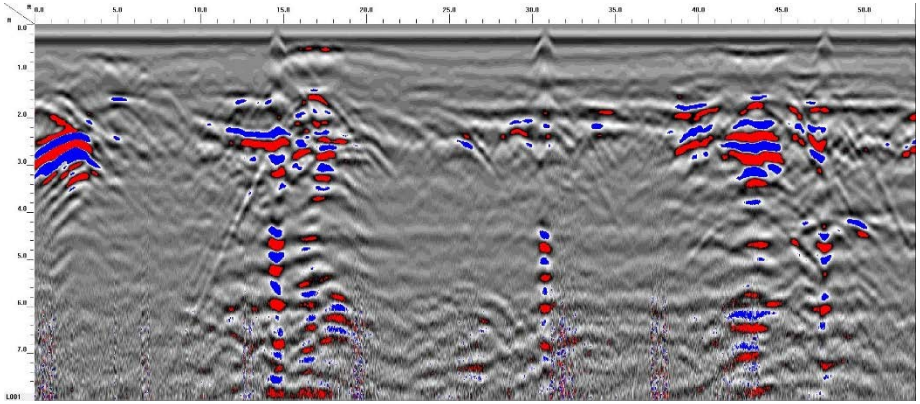
GPR TRANSECT 4



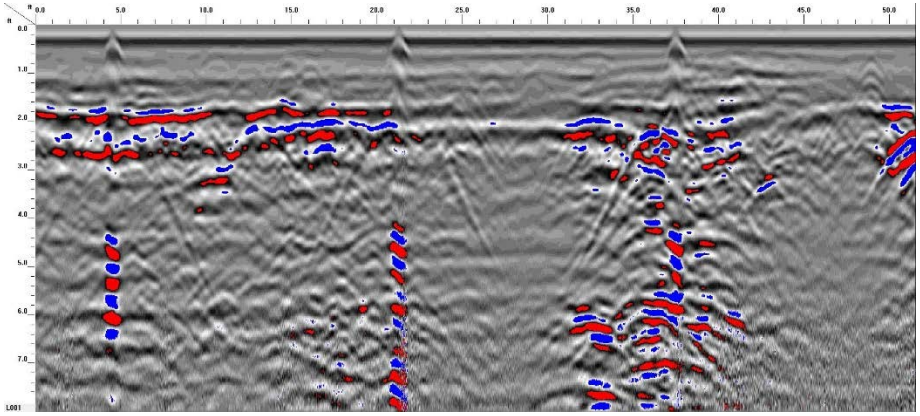
GPR TRANSECT 5



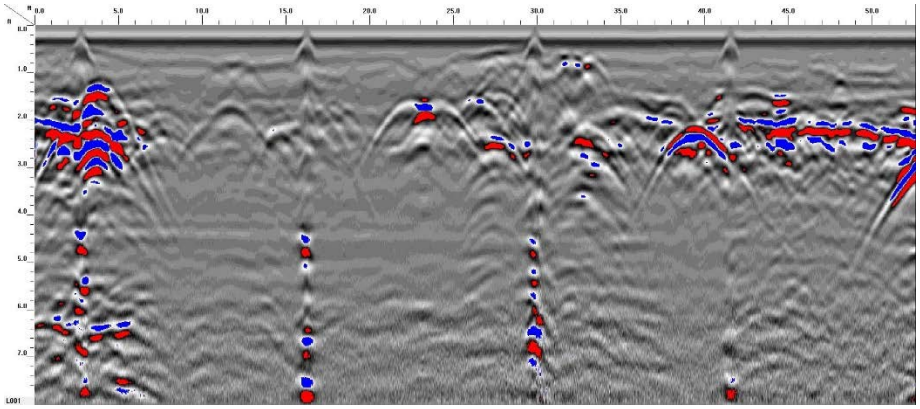
GPR TRANSECT 6



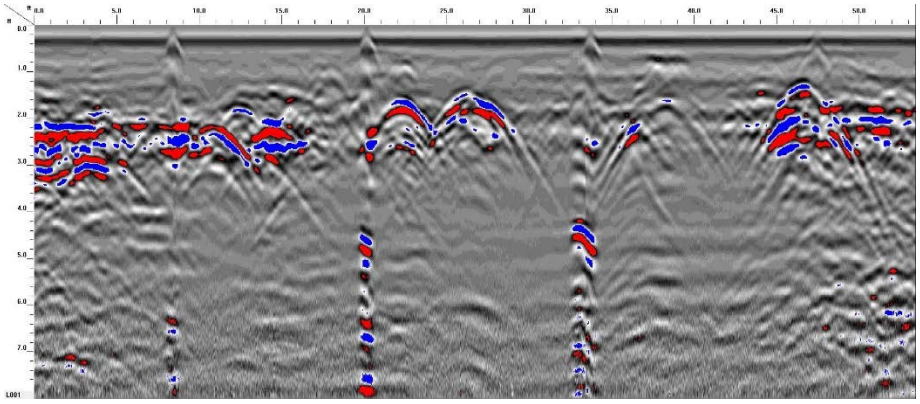
GPR TRANSECT 7



GPR TRANSECT 8



GPR TRANSECT 9



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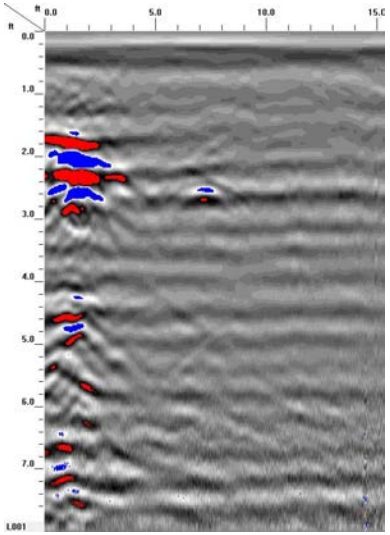
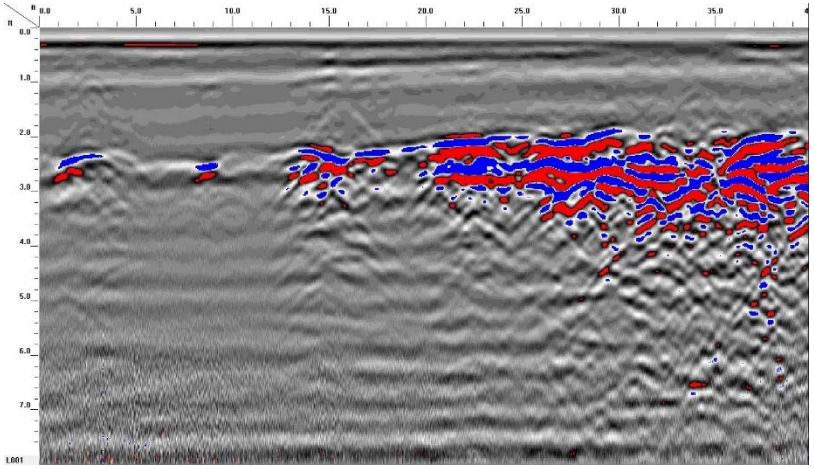
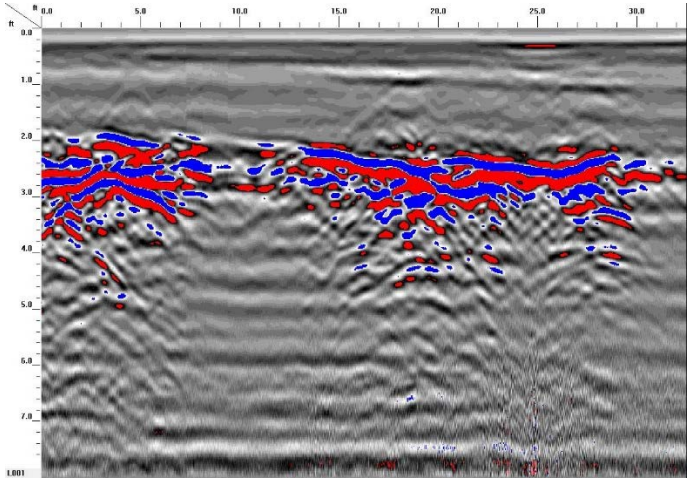


GPR TRANSECT 11



GPR TRANSECT 13



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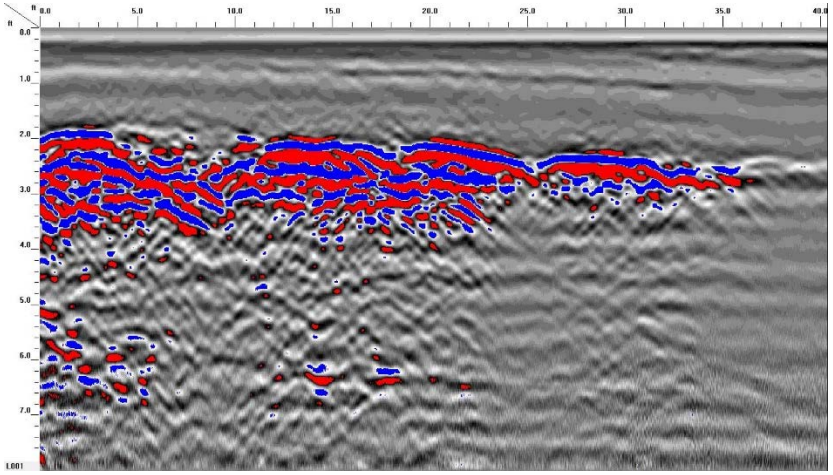

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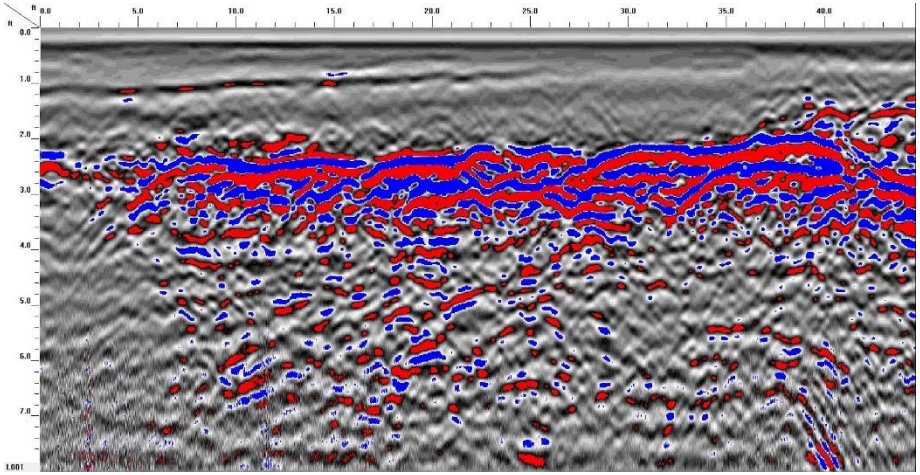
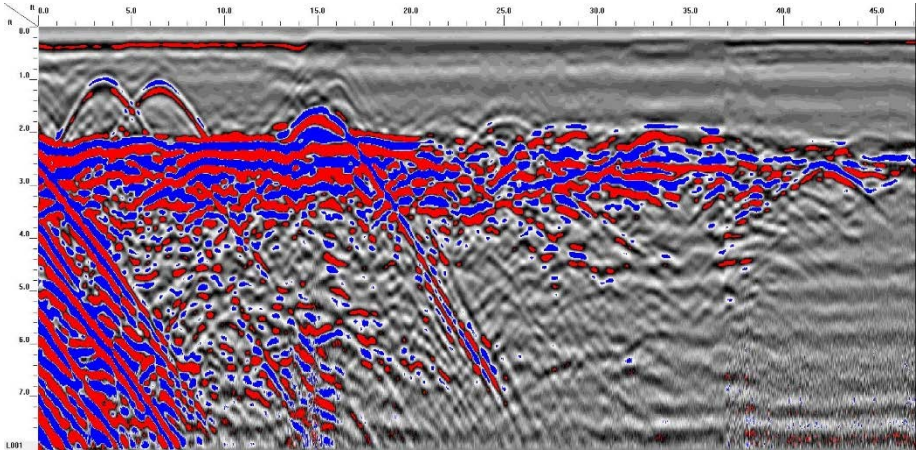
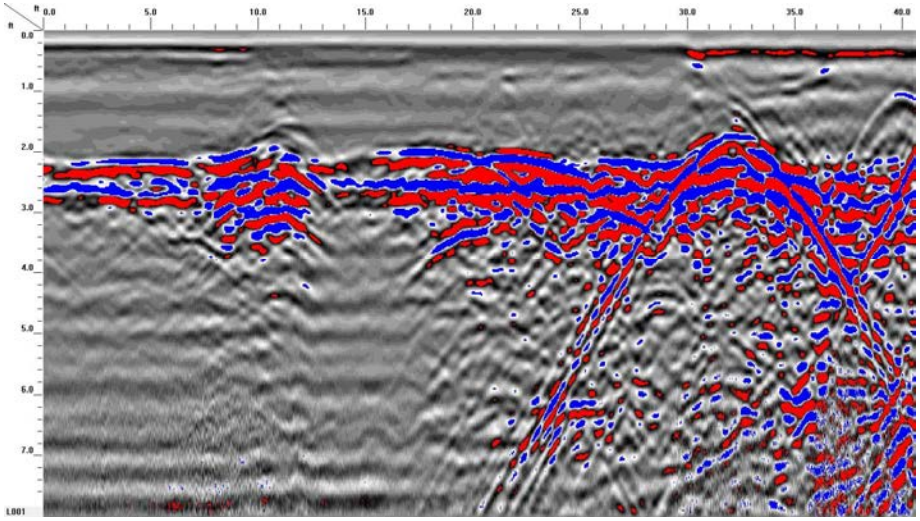


GPR TRANSECT 15



GPR TRANSECT 16



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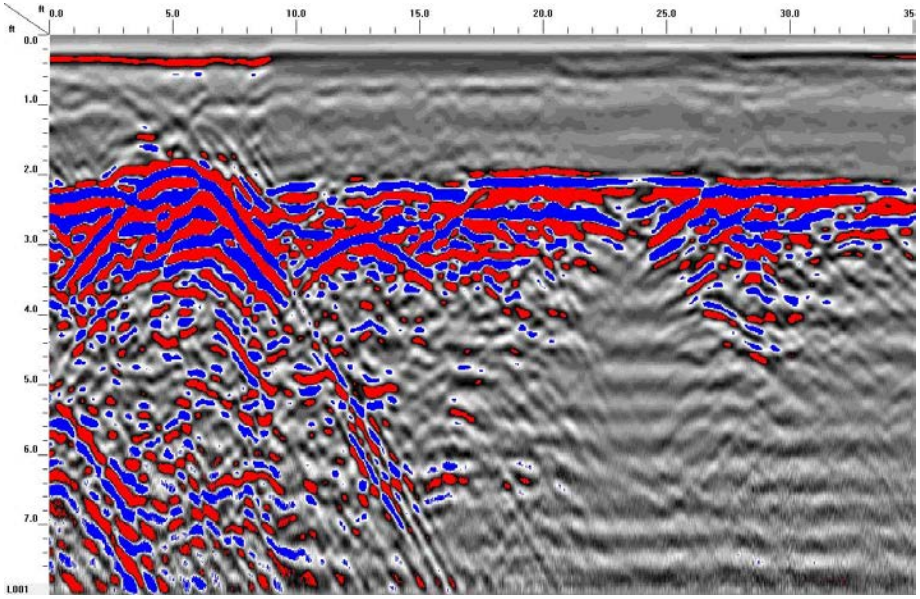
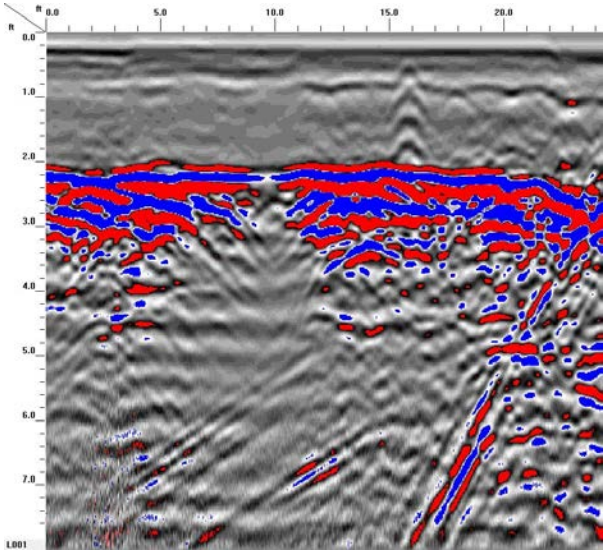
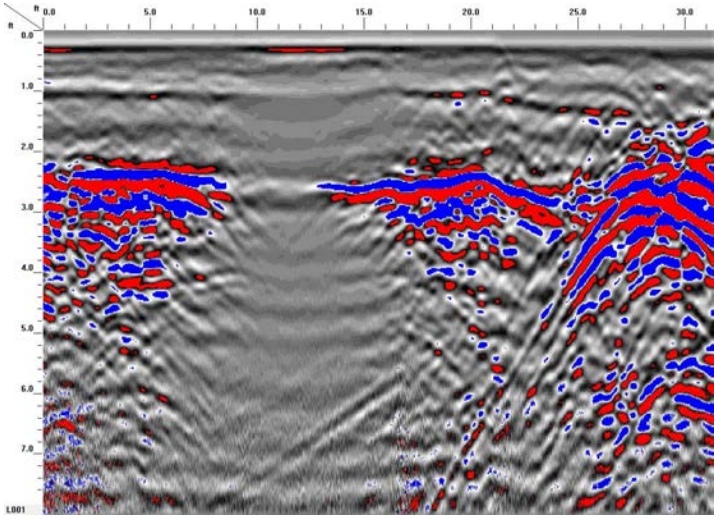


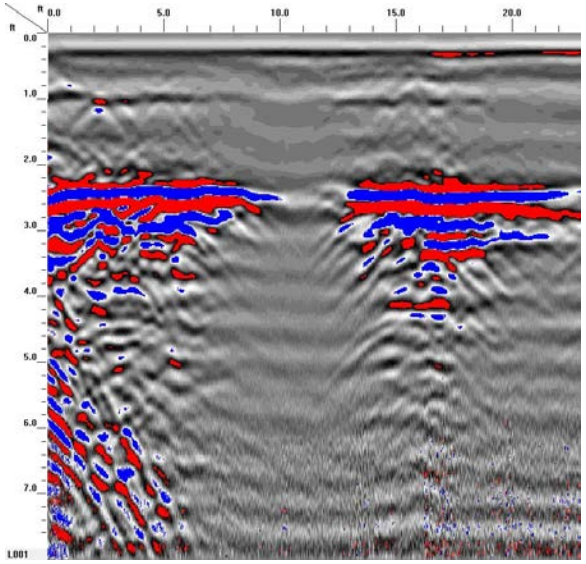
GPR TRANSECT 18



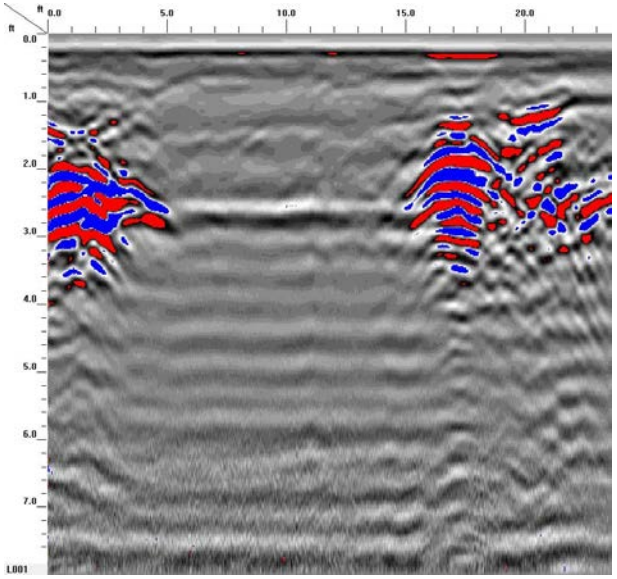
GPR TRANSECT 19



GPR TRANSECT 21



GPR TRANSECT 20



GPR TRANSECT 22

APPENDIX D

UVF HYDROCARBON ANALYTICAL RESULTS

Hydrocarbon Analysis Results

Client: Wood
Address: 2801 Yorkmont Rd
Charlotte, NC 28208

Contact: Helen Corley

Project: P229

Samples taken Monday, August 30, 2021
Samples extracted Monday, August 30, 2021
Samples analysed Monday, August 30, 2021

Operator DRH

H09382

Matrix	Sample ID	Dilution used	BTEX C6-C9	GRO C5-C10	DRO C10-C35	TPH C5-C35	Total Aromatics C10-C35	16 EPA PAHs	BaP	% Ratios			HC Fingerprint Match
										C5:10	C10:C 18	C18+	
Soil	P229-B1-6-8	7.0	<0.17	<0.17	<0.07	<0.17	<0.004	<0.004	<0.002	0	0	0	PHC ND,(FCM)
Soil	P229-B2-4-6	6.0	<0.15	<0.15	0.1	0.1	0.05	0.002	<0.001	0	67.3	32.7	V.Deg.PHC 71.6%,(FCM)
Soil	P229-B2-8-10	6.0	<0.15	<0.15	<0.06	<0.15	<0.003	<0.003	<0.002	0	0	0	PHC ND,(FCM)
Soil	P229-B3-2-4	7.0	<0.17	<0.17	<0.07	<0.17	<0.004	<0.004	<0.002	0	0	0	PHC ND,(FCM)
Soil	P229-B3-6-8	6.0	<0.15	<0.15	<0.06	<0.15	<0.003	<0.003	<0.002	0	0	0	PHC ND,(FCM)
Soil	P229-B4-2-4	7.0	<0.17	<0.17	<0.07	0.008	0.008	0.001	<0.002	0	46.9	53.1	Residual HC
Soil	P229-B4-6-8	6.0	<0.15	<0.15	<0.06	<0.15	<0.003	<0.003	<0.002	0	0	0	PHC ND,(FCM)

Initial Calibrator QC check OK

Final FCM QC Check OK 100.3%

Analysis by QED HC-1 Analyser

Concentration values in mg/kg for soil 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 for hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

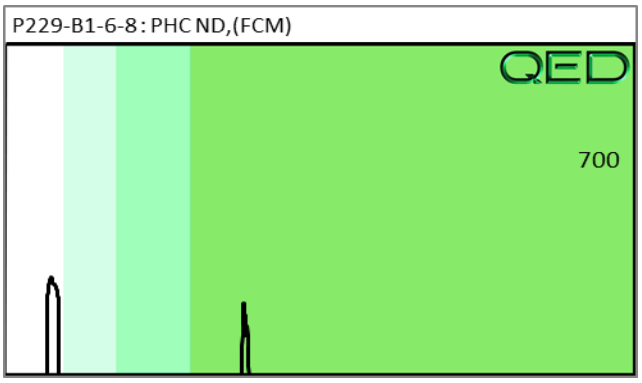
HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only : % Ratios estimated carbon number proportions : (OCR)/(Q) = Outside cal range, values and HC match estimates : ND = Not Detected

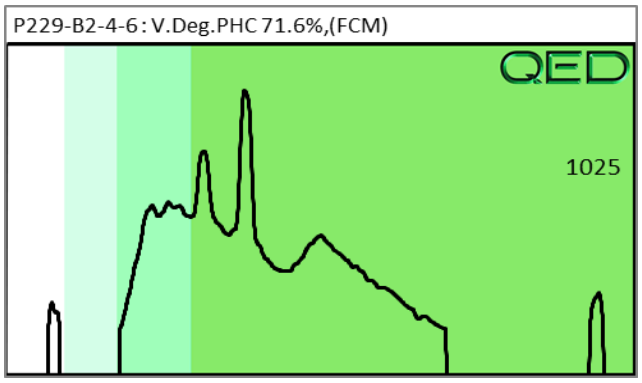
(B) = Blank Drift : (M) = Adjusted value : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : SB = sample selected as site background

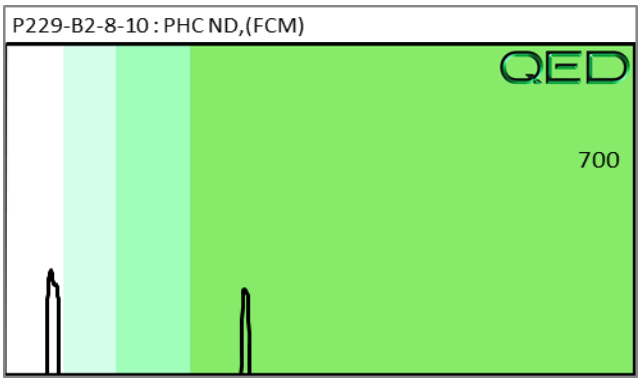
(TD) = Calibration outside limit

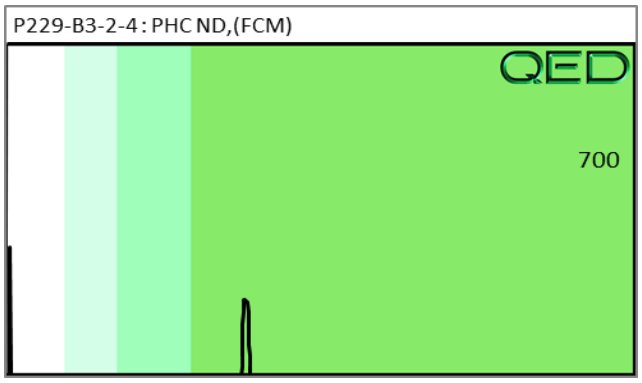
QED Hydrocarbon Fingerprints

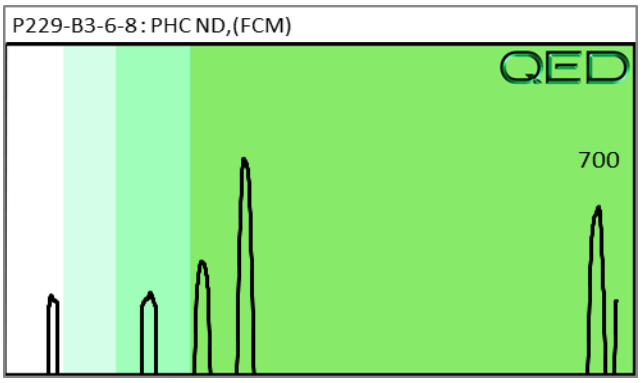
Project: P229

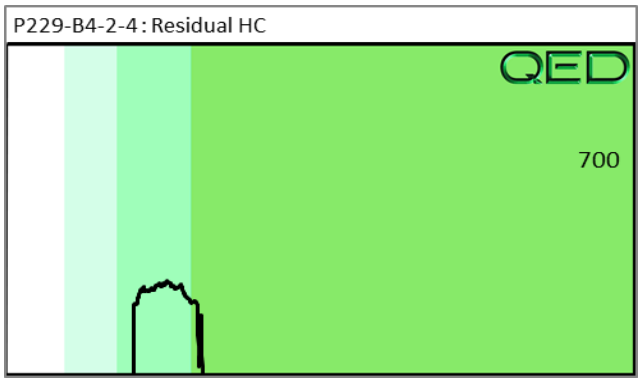


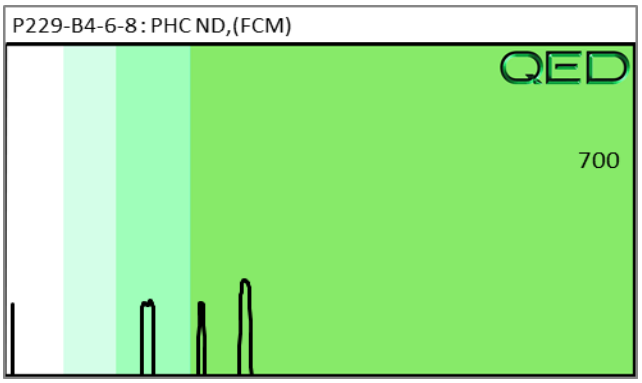












Hydrocarbon Analysis Results

Client: Wood
Address 2801 Yorkmont Rd
Charlotte, NC 28208

Contact: Helen Corley

Project: P229

Samples taken Monday, August 30, 2021
Samples extracted Monday, August 30, 2021
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Operator DRH

H09382

Matrix	Sample ID	Dilution used	BTEX C6-C9	GRO C5-C10	DRO C10-C35	TPH C5-C35	Total Aromatics C10-C35	16 EPA PAHs	BaP	% Ratios C5:10	% Ratios C10:C18	% Ratios C18+	HC Fingerprint Match
Soil	P229-B5-2-4	8.0	<0.2	<0.2	0.05	0.05	0.05	0.003	<0.002	0	29	71	PHC ND,(FCM)
Soil	P229-B5-6-8	5.0	<0.12	<0.12	4.4	4.4	0.029	0.002	<0.002	0	99.2	0.8	Deg Fuel 93.2%,(FCM)
Soil	P229-B6-2-4	6.0	<0.15	<0.15	0.9	0.9	0.4	0.016	<0.001	0	87.2	12.8	V.Deg.PHC 98.7%,(FCM)
Soil	P229-B6-8-10	5.0	<0.12	<0.12	<0.05	<0.12	<0.003	<0.003	<0.002	0	100	0	Residual HC
Soil	P229-B7-0-2	6.0	<0.15	<0.15	0.4	0.4	0.21	0.01	<0.001	0	75	25	V.Deg.PHC 82.2%,(FCM)
Soil	P229-B7-6-8	5.0	<0.12	<0.12	<0.05	<0.12	<0.003	<0.003	<0.002	0	0	0	PHC ND,(FCM)
Soil	P229-B8-2-4	5.0	<0.12	<0.12	0.1	0.1	0.05	0.003	<0.001	0	69.8	30.2	V.Deg.PHC 50.3%,(FCM)
Soil	P229-B8-8-10	5.0	<0.12	<0.12	<0.05	<0.12	<0.003	<0.003	<0.002	0	0	0	PHC ND,(FCM)

Initial Calibrator QC check OK

Final FCM QC Check OK 103.1%

Analysis by QED HC-1 Analyser

Concentration values in mg/kg for soil 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 for hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only : % Ratios estimated carbon number proportions : (OCR)/(Q) = Outside cal range, values and HC match estimates : ND = Not Detected

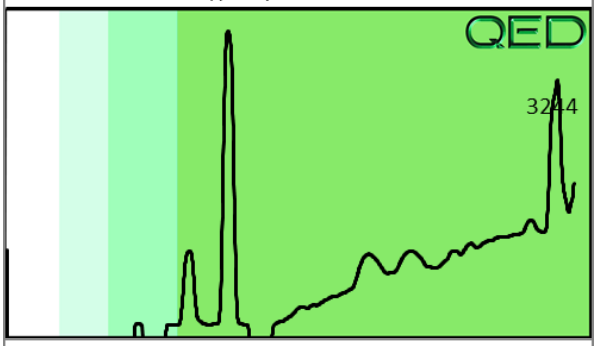
(B) = Blank Drift : (M) = Adjusted value : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : SB = sample selected as site background

(TD) = Calibration outside limit

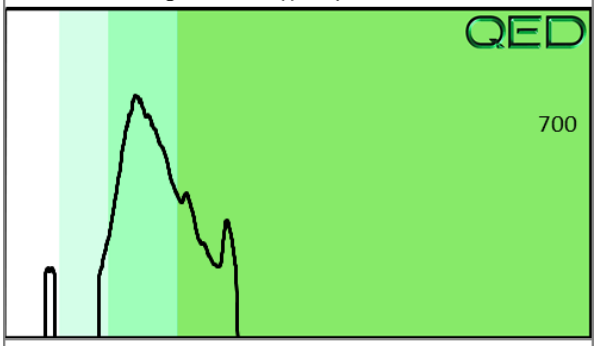
QED Hydrocarbon Fingerprints

Project: P229

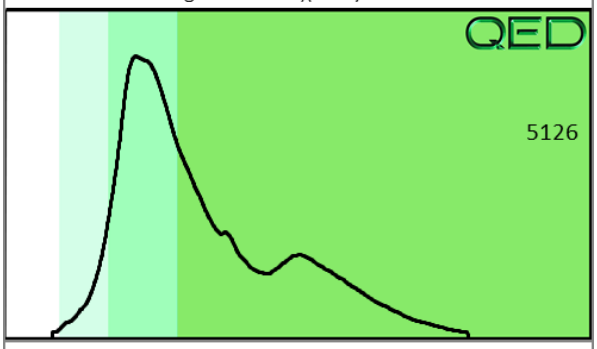
P229-B5-2-4 : PHC ND,(FCM)



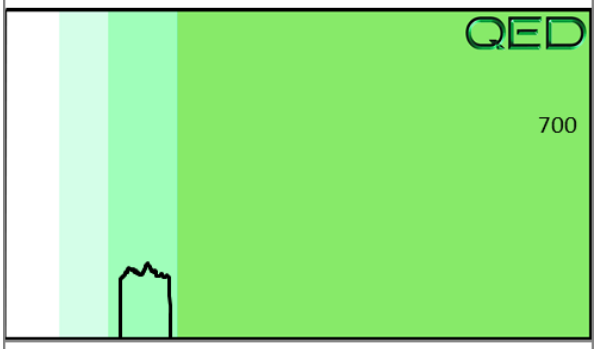
P229-B5-6-8 : Deg Fuel 93.2%,(FCM)



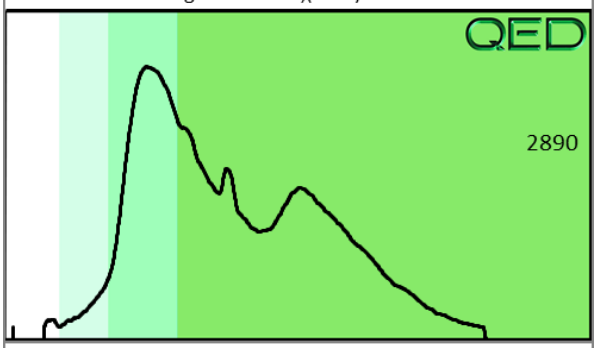
P229-B6-2-4 : V.Deg.PHC 98.7%,(FCM)



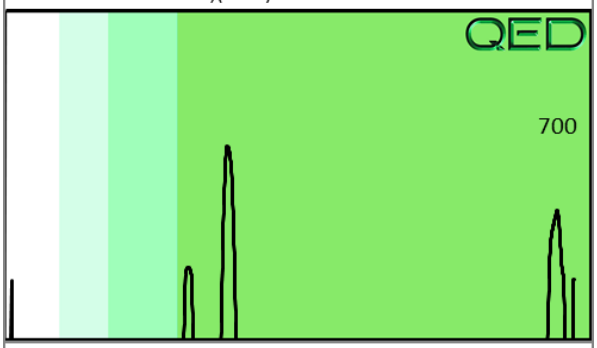
P229-B6-8-10 : Residual HC



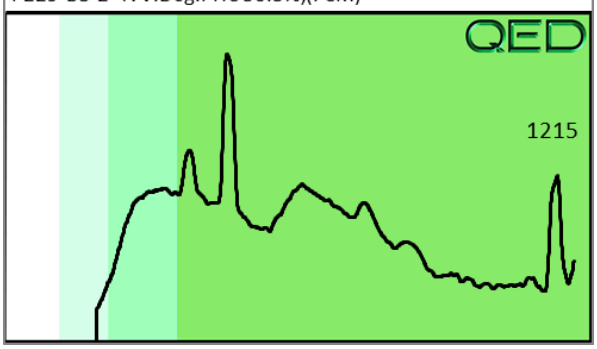
P229-B7-2-4 : V.Deg.PHC 82.2%,(FCM)



P229-B7-6-8 : PHC ND,(FCM)



P229-B8-2-4 : V.Deg.PHC 50.3%,(FCM)



P229-B8-8-10 : PHC ND,(FCM)

Hydrocarbon Analysis Results

Client: Wood
Address 2801 Yorkmont Rd
Charlotte, NC 28208

Contact: Helen Corley

Project: P229

Samples taken Monday, August 30, 2021
Samples extracted Monday, August 30, 2021
Samples analysed Monday, August 30, 2021

Operator DRH

H09382

Matrix	Sample ID	Dilution used	BTEX C6-C9	GRO C5-C10	DRO C10-C35	TPH C5-C35	Total Aromatics C10-C35	16 EPA PAHs	BaP	% Ratios			HC Fingerprint Match
										C5:10	C10:C 18	C18+	
Soil	P229-B9-0-2	24.0	<0.6	<0.6	24.1	24.1	15.5	0.4	0.004	0	92.5	7.5	V.Deg.PHC 90.6%,(FCM)
Soil	P229-B9-4-6	14.0	<0.3	<0.3	<0.14	<0.3	<0.007	<0.007	<0.004	0	0	0	PHC ND,(FCM)
Soil	P229-B10-2-4	15.0	<0.3	<0.3	<0.15	<0.3	<0.008	<0.008	<0.005	0	0	0	PHC ND,(FCM)
Soil	P229-B10-6-8	7.0	<0.17	<0.17	<0.07	<0.17	<0.004	<0.004	<0.002	0	0	0	PHC ND,(FCM)
Soil	P229-B11-2-4	7.0	<0.17	<0.17	<0.07	<0.17	<0.004	<0.004	<0.002	0	0	0	PHC ND,(FCM)
Soil	P229-B11-4-6	7.0	<0.17	<0.17	<0.07	<0.17	<0.004	<0.004	<0.002	0	0	0	PHC ND,(FCM)
Soil	P229-B12-2-4	9.0	<0.22	<0.22	<0.09	<0.22	<0.005	<0.005	<0.003	0	0	0	PHC ND,(FCM)
Soil	P229-B12-6-8	8.0	<0.2	<0.2	<0.08	<0.2	<0.004	<0.004	<0.002	0	0	0	PHC ND,(FCM)

Initial Calibrator QC check OK

Final FCM QC Check OK 97.8%

Analysis by QED HC-1 Analyser

Concentration values in mg/kg for soil 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 for hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

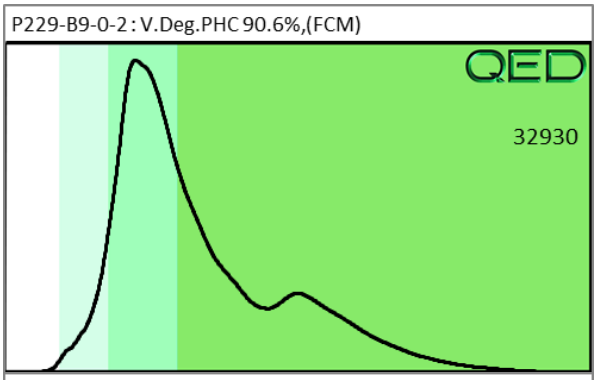
HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only : % Ratios estimated carbon number proportions : (OCR)/(Q) = Outside cal range, values and HC match estimates : ND = Not Detected

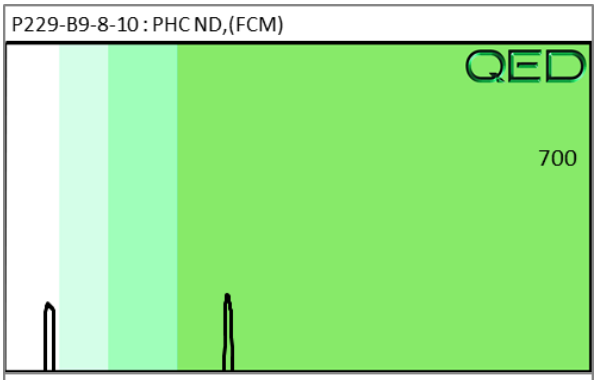
(B) = Blank Drift : (M) = Adjusted value : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : SB = sample selected as site background

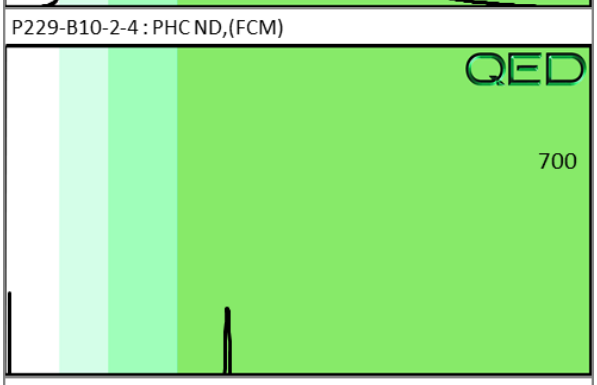
(TD) = Calibration outside limit

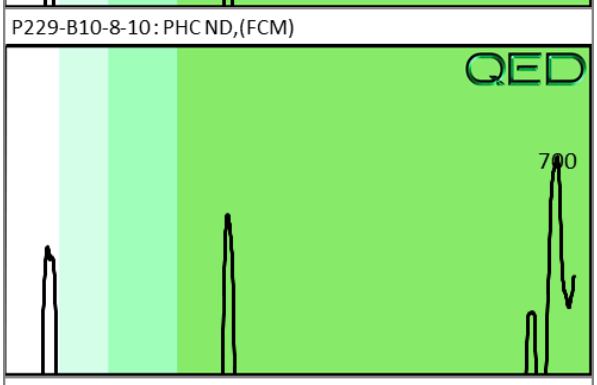
QED Hydrocarbon Fingerprints

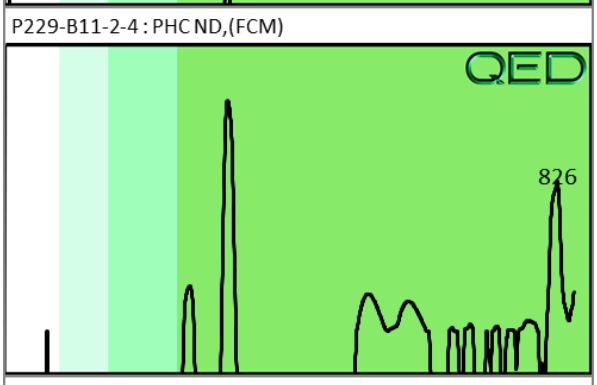
Project: P229

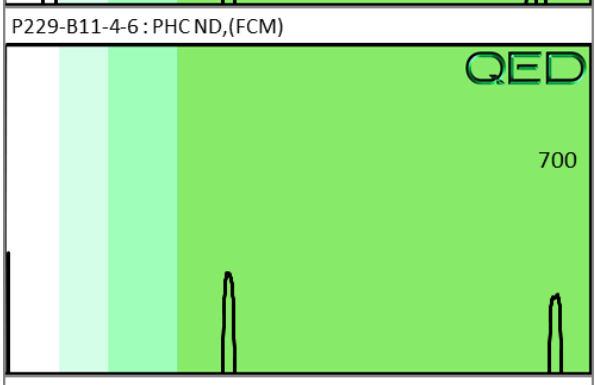


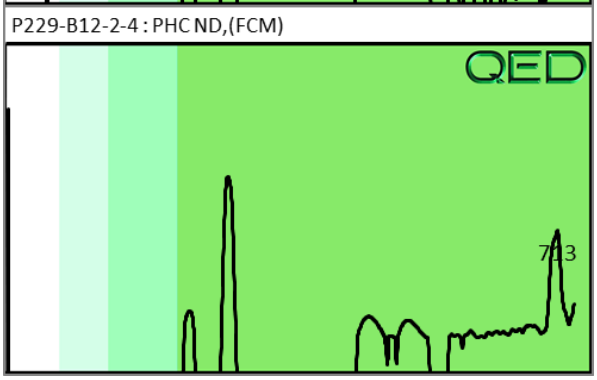


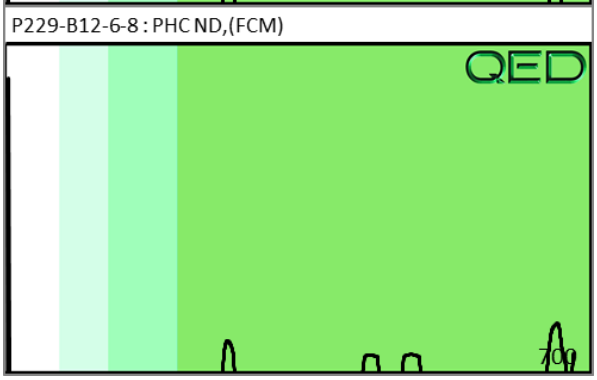












Hydrocarbon Analysis Results

Client: Wood
Address: 2801 Yorkmont Rd
Charlotte, NC 28208

Contact: Helen Corley

Project: P229

Samples taken Monday, August 30, 2021
Samples extracted Monday, August 30, 2021
Samples analysed Monday, August 30, 2021

Operator DRH

H09382

Matrix	Sample ID	Dilution used	BTEX C6-C9	GRO C5-C10	DRO C10-C35	TPH C5-C35	Total Aromatics C10-C35	16 EPA PAHs	BaP	% Ratios C5:10	% Ratios C10:C18	% Ratios C18+	HC Fingerprint Match
Soil	P229-B13-2-4	8.0	<0.2	<0.2	<0.08	<0.2	<0.004	<0.004	<0.002	0	0	0	PHC ND,(FCM)
Soil	P229-B13-6-8	9.0	<0.22	<0.22	<0.09	<0.22	<0.005	<0.005	<0.003	0	0	0	PHC ND,(FCM)
Soil	P229-B14-2-4	19.0	<0.4	<0.4	<0.19	<0.4	<0.01	<0.01	<0.006	0	0	0	PHC ND,(FCM)
Soil	P229-B14-6-8	5.0	<0.12	<0.12	<0.05	<0.12	<0.003	<0.003	<0.002	0	0	0	PHC ND,(FCM)
Soil	P229-B15-2-4	8.0	<0.2	<0.2	<0.08	<0.2	<0.004	<0.004	<0.002	0	0	0	PHC ND,(FCM)
Soil	P229-B15-6-8	8.0	<0.2	<0.2	<0.08	0.009	0.009	0.001	<0.002	0	54.5	45.5	Residual HC

Initial Calibrator QC check OK

Final FCM QC Check OK 97.0%

Analysis by QED HC-1 Analyser

Concentration values in mg/kg for soil 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 for hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

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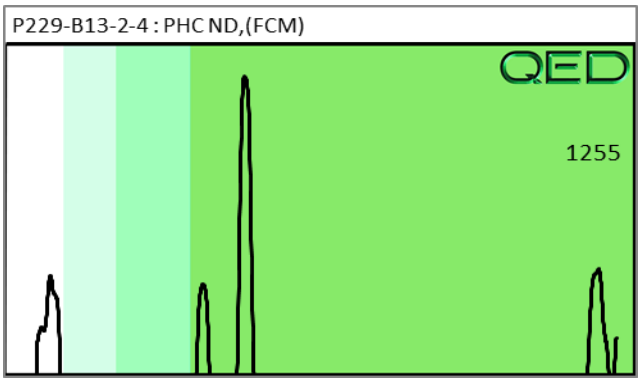
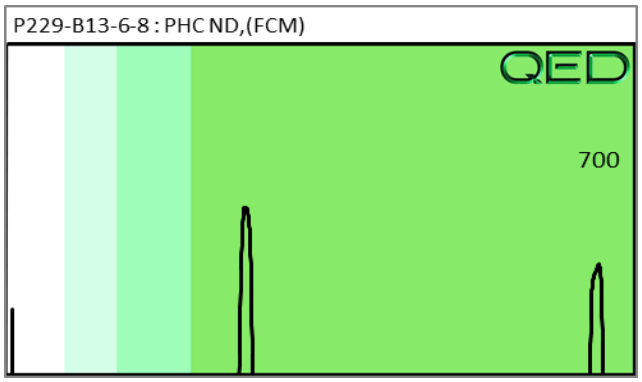
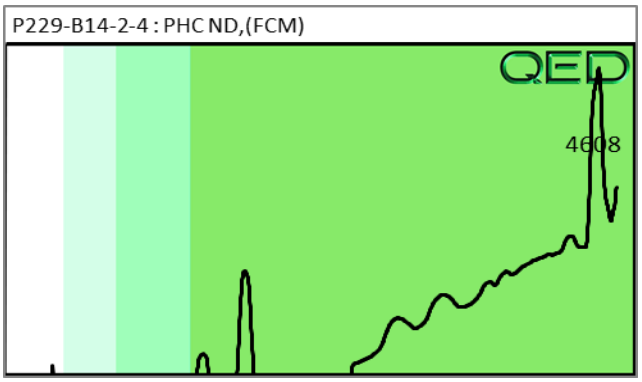
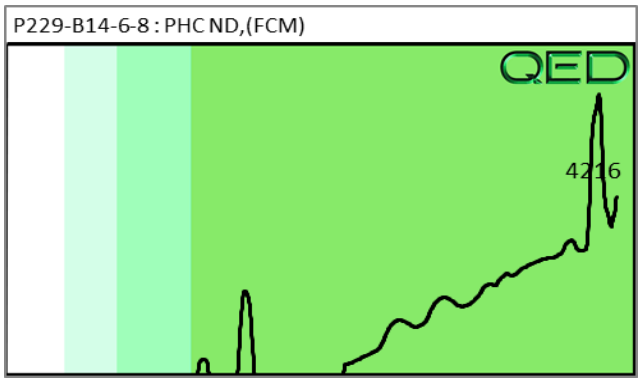
QED Hydrocarbon Fingerprints

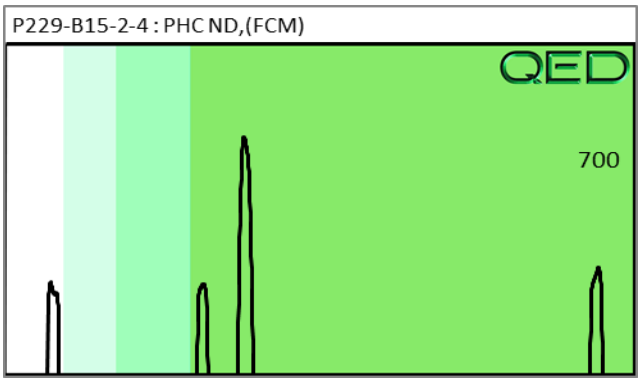
Project: P229

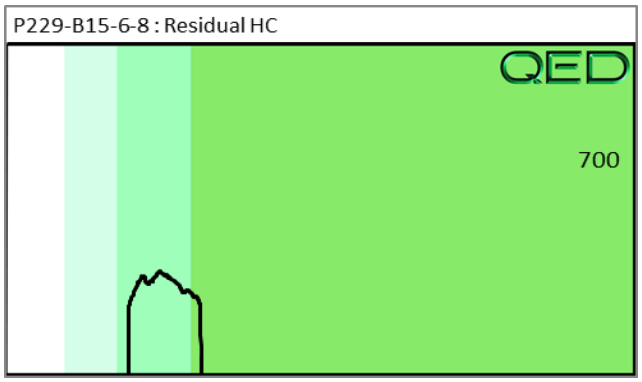












Hydrocarbon Analysis Results

Client: Wood
Address: 2801 Yorkmont Rd
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Contact: Helen Corley

Project: P229

Samples taken Monday, August 30, 2021
Samples extracted Monday, August 30, 2021
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Operator DRH

H09382

Matrix	Sample ID	Dilution used	BTEX C6-C9	GRO C5-C10	DRO C10-C35	TPH C5-C35	Total Aromatics C10-C35	16 EPA PAHs	BaP	% Ratios			HC Fingerprint Match
										C5:10	C10:C 18	C18+	
Soil	P229-B16-2-4	7.0	<0.17	<0.17	0.18	0.18	0.18	0.019	<0.002	0	93.2	6.8	Residual PHC
Soil	P229-B16-4-6	7.0	<0.17	<0.17	0.08	0.08	0.05	0.001	<0.002	0	78	22	Residual HC
Soil	P229-B17-2-4	9.0	<0.22	<0.22	<0.09	<0.22	<0.005	<0.005	<0.003	0	0	0	PHC ND,(FCM)
Soil	P229-B17-6-8	8.0	<0.2	<0.2	<0.08	<0.2	<0.004	<0.004	<0.002	0	0	0	PHC ND,(FCM)
Soil	P229-B18-0-2	7.0	<0.17	<0.17	0.5	0.5	0.29	0.015	0.001	0	73.8	26.2	V.Deg.PHC 76.7%,(FCM)
Soil	P229-B18-4-6	7.0	<0.17	<0.17	<0.07	<0.17	<0.004	<0.004	<0.002	0	0	0	PHC ND,(FCM)

Initial Calibrator QC check OK

Final FCM QC Check OK 101.3%

Analysis by QED HC-1 Analyser

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

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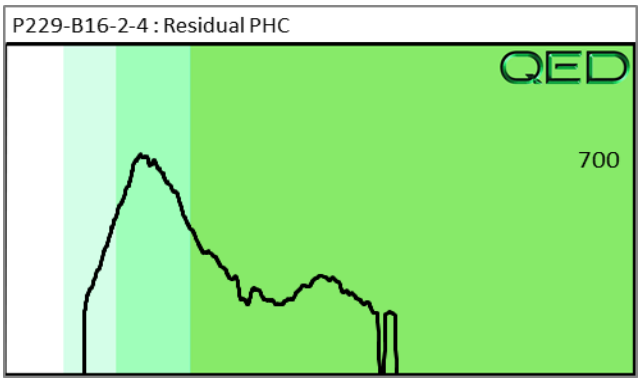
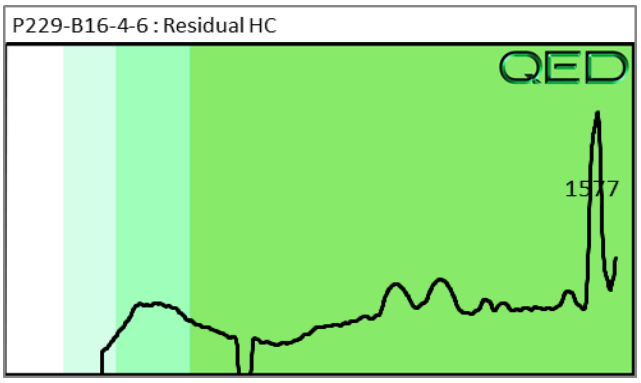
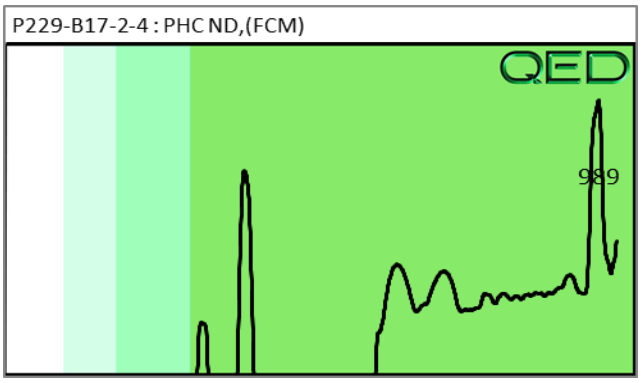
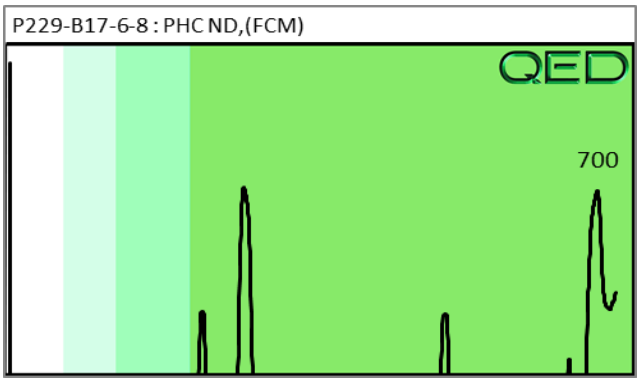
QED Hydrocarbon Fingerprints

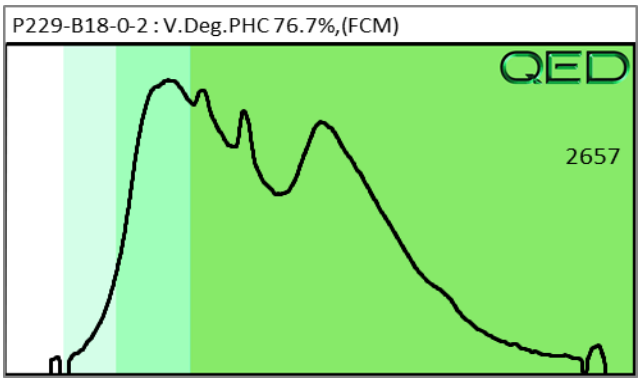
Project: P229

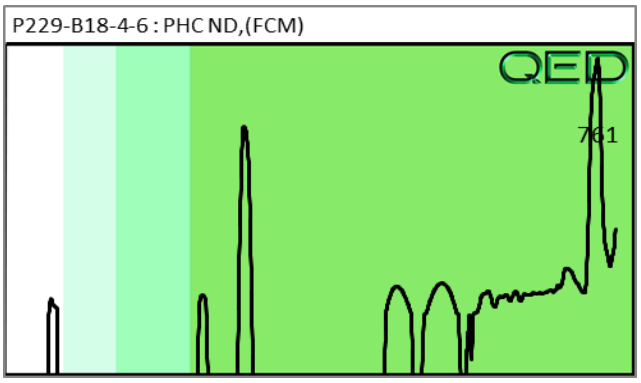












Hydrocarbon Analysis Results

Client: Wood
Address: 2801 Yorkmont Rd
Charlotte, NC 28208

Contact: Helen Corley,

Project: P229

Samples taken Monday, August 30, 2021
Samples extracted Monday, August 30, 2021
Samples analysed Monday, August 30, 2021

Operator DRH

H09382

Matrix	Sample ID	Dilution used	BTEX C6-C9	GRO C5-C10	DRO C10-C35	TPH C5-C35	Total Aromatics C10-C35	16 EPA PAHs	BaP	% Ratios			HC Fingerprint Match
										C5:10	C10:C 18	C18+	
Soil	P229-B1-2-4	8.0	<0.2	<0.2	<0.08	<0.2	<0.004	<0.004	<0.002	0	0	0	PHC ND,(FCM)

Initial Calibrator QC check OK

Final FCM QC Check OK 100.0%

Analysis by QED HC-1 Analyser

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

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QED Hydrocarbon Fingerprints

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