Prepared for:

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

Preliminary Site Assessment Report

Waccamaw Development Corporation Property
Parcel # 21
215-315 South J.K. Powell Blvd.
Whiteville, Columbus County, North Carolina
US 701 Bypass (Madison St-Powell Blvd) from SR 1437 (Virgil Ave) to US 74/76
TIP Number: R-5020B
WBS Element: 41499.1.3

Apex Companies, LLC
(dba Apex Engineering, PC)
10610 Metromont Parkway, Suite 206
Charlotte, North Carolina 28269

Prepared by:

DocuSigned by:
Troy Holzschuh
2D73445FBBB9455...
Troy L. Holzschuh
Assistant Project Manager

Reviewed by:

DocuSigned by:
E J Wysong
3CB3ABA2358C407...
Eric Wysong, L.G.
Project Manager
NC Geologist License No. 2581

NORTH CAROLINA LICENSED SEAL 2581 GEOLOGIST ERIC J. WYSONG

November 21, 2018 *not considered final unless all signatures are completed*

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Site History 1
1.2 Site Description 2
2.0 GEOLOGY 2
2.1 Regional Geology 2
2.2 Site Geology 2
3.0 FIELD ACTIVITIES 3
3.1 Preliminary Activities 3
3.2 Site Reconnaissance 3
3.3 Geophysics Survey Results 3
3.4 Well Survey 4
3.5 Soil Sampling 4
3.6 Groundwater Sampling 4
4.0 SAMPLING RESULTS 4
4.1 Soil Sampling Results 4
5.0 CONCLUSIONS 5
6.0 RECOMMENDATIONS 6

TABLES

Table 1 UVF Onsite Hydrocarbon Analytical Soil Data

FIGURES

Figure 1 Site Location Map
Figure 2 Site Map with Soil Boring Locations
Figure 3 Onsite UVF Hydrocarbon Analysis Results - Soil

APPENDICES

Appendix A Photograph Log
Appendix B Boring Logs
Appendix C Geophysical Report
Appendix D UVF Hydrocarbon Analysis Results

1.0 INTRODUCTION

This report presents the results of a Preliminary Site Assessment (PSA) for the North Carolina Department of Transportation (NCDOT) Parcel 21 performed by Apex Companies, LLC (dba Apex Engineering, PC; Apex) on behalf of the NCDOT. The subject site of this PSA report will be affected by the widening of J.K. Powell Blvd. (US 701 Bypass) from Virgil Ave. to US 74/76. The Site is comprised of one parcel and is located at 215-315 South J.K. Powell Boulevard and is identified as Parcel 21, Waccamaw Development Corporation Property, within the NCDOT R-5020B design project. The property begins at the southeast corner of the intersection of South J.K. Powell Boulevard and Phillip Street and ends at the northeast corner of the intersection of South J.K. Boulevard and West Columbus Street in Whiteville, Columbus County, North Carolina, as shown in the attached Site Location Map (**Figure 1**). The site investigation was conducted in accordance with Apex's Technical and Cost proposal dated May 15, 2018.

NCDOT contracted Apex to perform the PSA within the proposed right-of-way (ROW) and/or easement of the Parcel 21 Property due to the potential presence of contamination at the site and the possibility that excavation and grading may occur within the area. The PSA was performed to evaluate if soils have been impacted as a result of past and present uses of the property within the proposed investigation area, if buried underground storage tanks (USTs) are present in the area of investigation, and if groundwater is impacted.

The following report presents the results of an electromagnetic (EM) and ground penetrating radar (GPR) geophysical survey to identify potential USTs in the investigation area and it describes the subsurface field investigation at the site. The report includes the evaluation of field screening, as well as field analyses with regards to the presence or absence of soil and groundwater contamination within the area of investigation across Parcel 21. **Appendix A** includes a Photograph log for the site.

1.1 Site History

Parcel 21 has been identified with the address of 215-315 South J.K. Powell Boulevard. Based on a search of the North Carolina Department of Environmental Quality (NCDEQ) UST database registry, no registered tanks were identified for the 215-315 South J.K. Powell Boulevard site. Additionally, the geophysical survey did not show evidence of USTs on site. The property currently houses three buildings. One brick building that is a vacant bowling alley is located at the northeastern portion of the parcel. An ice dispenser (Twice the Ice) is located on the north-central portion of the parcel, and The Treasure Chest, which is an occupied brick building, is located on the southeastern portion of the parcel. Apex also reviewed the NCDEQ Incident Management Database and determined that no groundwater regulatory incidents are associated with this parcel.

1.2 Site Description

The site is located in a mixed commercial and residential area of Whiteville, Columbus County, North Carolina. The property currently contains three buildings. Twice the Ice self-serve ice dispenser is located on the north-central portion of the site. A vacant bowling alley is located in the northeastern portion of the site and The Treasure Chest, a home goods store, is located on the southeastern portion of the site. The rest of the parcel is covered with paved asphalt and grass. The asphalt paved area of the site is used for a local flea market. West Columbus Street borders the parcel to the south with a vacant building, the Columbus Flower Shop, and Friendship Baptist Church located just beyond. The property is bordered by J.K. Powell Boulevard to the west followed by residences and Smith Funeral Home. Soccer fields and the US Social Security Administration border the property to the east, and Phillip Street borders the property to the north with Unique Cuts and residences just beyond. The geophysical surveyor, Pyramid Environmental & Engineering, PC, (Pyramid) did not identify EM or GPR anomalies characteristic of USTs in the investigation area.

2.0 GEOLOGY

2.1 Regional Geology

Parcel 21, Waccamaw Development Corporation property, is located within the Coastal Plain Physiographic Province. The Coastal Plain is the largest physiographic province in the state, covering about 45% of the land area. According to the US Geological Survey Hydrogeological framework of the North Carolina coastal plain, the geology consists of eastward-dipping and eastward-thickening series of sedimentary strata which range in age from Holocene to Cretaceous. The most common sediment types are sand and clay, although a significant amount of limestone occurs in the southern part of the Coastal Plain. The Site overlies surficial sediments (to approximately 30 to 40 feet below land surface), the PeeDee Confining unit (approximately 10 feet thick in this area), and the Late Cretaceous age PeeDee Formation. The PeeDee Formation is named for exposures along the great PeeDee River, and it preserves belemnites and foraminifera fossils dating from the Late Cretaceous. It generally consists of marine sand, clayey sand, and clay (M.D. Winner Jr. and R.W. Coble, 1996, *Hydrogeologic Framework of the North Carolina Coastal Plain, Regional Aquifer-System Analysis – Northern Atlantic Coastal Plain*, USGS Professional Paper 1404-1).

2.2 Site Geology

Site geology was observed through the drilling and sampling of seven direct push technology (DPT) soil borings (P21-SB1 through P21-SB7) onsite. **Figure 2** presents the boring locations and site layout. Borings did not exceed a total depth of ten feet below ground surface (bgs) since that depth was the maximum excavation depth for proposed drainage features. Soil

consisting predominantly of tan to gray clayey sand to tan to gray clay was observed across the parcel. Borings on the site intercepted groundwater at depths of approximately four to five feet bgs. According to the topographical maps found on the Columbus County Geographic Information System (GIS) site, the parcel slopes from north to south. The closest surface water bodies are Mollie Branch to the west and Soules Swamp to the south of the site. Based on the surface topography and locations of nearby streams, the general direction of shallow groundwater flow at the site is expected to be south towards Soules Swamp. Boring logs are presented in **Appendix B**.

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 prepared to include the site-specific health and safety information necessary for the field activities. North Carolina-One Call was contacted on May 25, 2018 to report the proposed drilling activities and notify affected utilities. Apex subcontracted Pyramid to locate subsurface utilities and other subsurface drilling hazards as well as to perform a geophysical survey. Carolina Soil Investigations, LLC (CSI) of Olin, North Carolina was retained by Apex to perform the direct push sampling for soil borings. REDLAB, LLC (REDLAB) provided an ultraviolet fluorescence (UVF) Hydrocarbon Analyzer and Eastern Solutions provided a calibrated Flame Ionization/Photoionization Detector (FID/PID). Boring locations were strategically placed in a pattern within the area of investigation to maximize the opportunity to encounter potentially contaminated soil.

3.2 Site Reconnaissance

Apex personnel performed a site reconnaissance on June 5, 2018. During the site reconnaissance, the area was visually examined for the presence of potential USTs or areas/obstructions that could potentially affect the subsurface investigation. The proposed boring locations were marked based on the site inspection and geophysical survey results. Apex personnel also used the site visit as an opportunity to contact the property manager/owner to inform them of upcoming field activities.

3.3 Geophysics Survey Results

The geophysical survey of the site was conducted from May 30, 2018 to June 5, 2018. Pyramid performed an EM induction metal survey followed by a GPR survey. A copy of the Geophysical Report is presented in **Appendix C**. Two areas contained EM anomalies that were associated

with unknown features and were investigated further with the GPR method. Results of GPR scans indicated no evidence of possible USTs.

3.4 Well Survey

No water supply or groundwater monitoring wells were observed on Parcel 21.

3.5 Soil Sampling

Apex conducted drilling activities at the site on June 6, 2018. The purpose of soil sampling was to determine if a release of petroleum or other volatile organic chemicals had occurred within the investigation area, and if so, to estimate the volume of impacted soil that might require special handling during construction activities. Apex drilling subcontractor, CSI, advanced seven DPT soil borings within the proposed investigation area. These seven borings were placed in a linear pattern along the western parcel boundary that maximized the likelihood of intercepting potential soil contamination that might exist in the area of future construction activities. **Figure 2** presents the Site Map with boring locations and site structures.

Soil sampling was performed utilizing hand auger and direct push methods accompanied by field screening of volatile organic vapors with the FID/PID unit and onsite quantitative analyses with the UVF Hydrocarbon Analyzer. One to two intervals of the soil boring exhibiting the most elevated FID/PID readings were selected for onsite quantitative analysis of total petroleum hydrocarbons (TPH) in soil using the REDLAB UVF Hydrocarbon Analyzer. The analysis was performed onsite by Troy Holzschuh, a certified REDLAB UVF technician with Apex. The UVF results were generated concurrent with soil boring activities so that rapid assessment could be utilized for strategic boring placement.

3.6 Groundwater Sampling

Groundwater was encountered on site at depths ranging from four to five feet bgs. However, contamination was not evident in saturated soils collected several feet below the water table (i.e., the presumed smear zone) based on FID/PID field screening or UVF hydrocarbon analysis of deeper soils in contact with groundwater. Therefore, temporary monitoring wells were not installed.

4.0 SAMPLING RESULTS

4.1 Soil Sampling Results

Based on FID/PID field screening and onsite UVF hydrocarbon analysis from the June 2018 soil sampling there is no evidence of significant petroleum hydrocarbon contamination within the area of investigation on Parcel 21.

Elevated PID readings were observed above ten parts per million (ppm). PID readings ranged from non-detectable to 26 ppm in soils screened above the water table. Elevated FID readings, above ppm, were not observed in the soil borings conducted at the site. The FID readings ranged from non-detectable to 2 ppm. The FID/PID field screening results are provided on the boring logs in **Appendix B**.

Soil samples which exhibited the highest PID and/or FID concentrations were field-analyzed using the UVF instrument for the presence of TPH gasoline range organics (GRO) and diesel range organics (DRO). The UVF analytical results for TPH-GRO and TPH-DRO are presented in **Table 1**. The UVF instrument generated tables and chromatographs are found in **Appendix D**. **Figure 3** presents the TPH-GRO and TPH-DRO results at each soil boring.

Based on the UVF analyses, TPH-GRO was not identified above the instrument detection limits on Parcel 21. Detectable low levels of TPH-DRO were identified in eight soil samples collected on Parcel 21. TPH-DRO concentrations ranged from below detectable levels to 0.81 mg/kg (P21-SB4) for soils sampled above the water table and TPH-DRO concentrations ranged from below detectable levels to 1.2 mg/kg (P21-SB2) for saturated soils sampled below the water table. TPH-GRO concentrations did not exceed the regulatory action level of 50 mg/kg and TPH-DRO concentrations did not exceed the regulatory action level of 100 mg/kg.

5.0 CONCLUSIONS

Based on site observations, field screening of organic vapors in soil, and onsite UVF analysis, petroleum-impacted soil contamination was not identified in the area investigated. None of the soil samples analyzed for TPH by the UVF instrument exceeded the NCDEQ Action level of 50 mg/kg for TPH-GRO or the action level of 100 mg/kg for TPH-DRO.

The following summary is based upon Apex's evaluation of field observations, field screening, and onsite quantitative analyses of samples collected from the Site on June 6, 2018.

- Results of the geophysical survey did not produce anomalies characteristic of USTs in the area investigated.

- Seven soil borings were advanced onsite. Soil samples collected from each boring were screened with an FID/PID unit and were analyzed in the field using a REDLAB UVF Hydrocarbon Analyzer.

- PID soil readings ranged from non-detectable to 26 ppm. FID readings ranged from non-detectable to 2 ppm.

- Soil samples analyzed using the UVF did not contain TPH-GRO concentrations above its NCDEQ Action level of 50 mg/kg.
- Soil samples analyzed using the UVF did not contain TPH-DRO concentrations above its NCDEQ Action level of 100 mg/kg.
- Groundwater was encountered on site at depths ranging from four to five feet bgs. However, contamination was not evident in saturated soils collected below the water table based on FID/PID field screening or UVF hydrocarbon analysis.

6.0 RECOMMENDATIONS

Based on these PSA results, Apex does not recommend further assessment or soil sampling in the area of investigation.

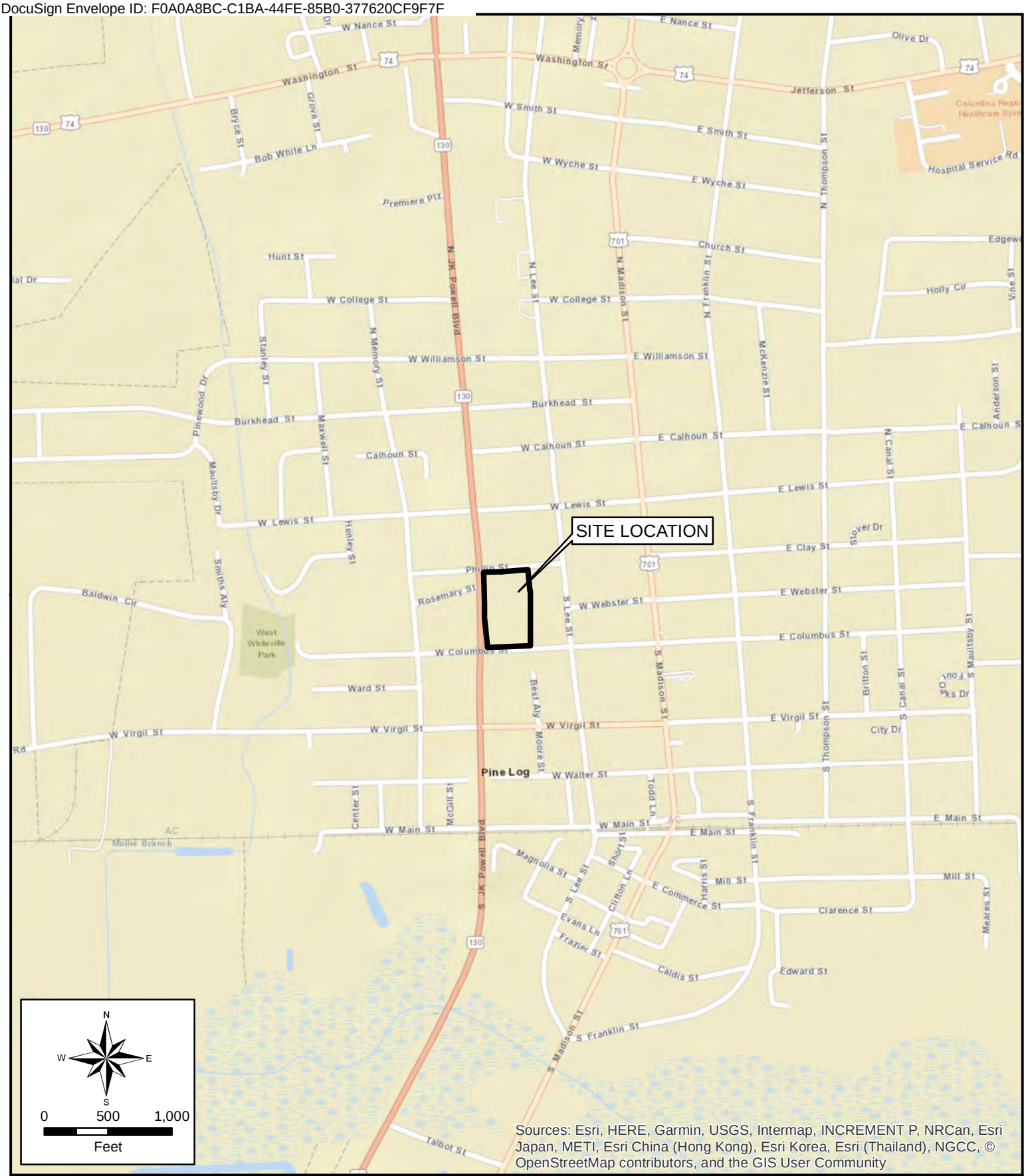
TABLES

Table 1
UVF Onsite Hydrocarbon Analytical Soil Data from June 2018
R-5020B, Parcel 21, Waccamaw Development Corp. Property
Whiteville, Columbus County, North Carolina

Sample ID Number	Sample Date	Sample Depth (ft bgs)	GRO (mg/kg) (C5-C10)	DRO (mg/kg) (C10-C35)
SOIL				
NCDEQ Action Level in mg/kg			**50**	**100**
P21-SB1	6/6/2018	3 - 4	<0.69	<0.69
P21-SB2	6/6/2018	3 - 4	<0.68	0.68
P21-SB2	6/6/2018	9 - 10	<0.65	1.2
P21-SB3	6/6/2018	4 - 6	<0.76	0.76
P21-SB3*	6/6/2018	9 - 10	<0.61	0.61
P21-SB4	6/6/2018	5 - 6	<0.64	0.81
P21-SB4	6/6/2018	9 - 10	<0.69	<0.69
P21-SB5	6/6/2018	4 -5	<0.76	<0.76
P21-SB5	6/6/2018	7 - 8	<0.71	<0.71
P21-SB6	6/6/2018	4 - 5	<0.59	<0.59
P21-SB6	6/6/2018	9 - 10	<0.76	0.76
P21-SB7	6/6/2018	4 - 5	<0.68	<0.68
P21-SB7	6/6/2018	7 - 8	<0.71	0.71
P21-DUP-1	6/6/2018	---	<0.61	1.1

NOTES:
(mg/kg) = Milligrams per kilogram
* = Duplicate sample was collected
GRO = Gasoline Range Organics
DRO = Diesel Range Organics
ft bgs = feet below ground surface
TPH - GRO values in exceedance of NCDEQ Action Level of 50 mg/kg are shown in Bold
TPH - DRO values in exceedance of NCDEQ Action Level of 100 mg/kg are shown in Bold

FIGURES



CHECK BY: TH	SITE LOCATION MAP	APEX	FIGURE
DRAWN BY: SP			1
DATE: 7/6/2018	PARCEL #21		
SCALE: AS SHOWN	315-215 S. JK POWELL BOULEVARD		
CAD NO:. NCDOT-001	WHITEVILLE, NORTH CAROLINA		
PRJ NO.: NCDOT-001			

APEX COMPANIES, LLC
10610 METROMONT PARKWAY
SUITE 206
CHARLOTTE, NC 28117
PHONE: (704) 799-6390

FIGURE 2
PARCEL 021
315-215 S. JK. POWELL BLVD.
SITE MAP WITH SOIL BORING LOCATIONS

Date: 7/3/18	R-5020B US 701 BYPASS COLUMBUS COUNTY
Proj. # NCDOT-001	
CAD File: pc_021_fig 2.dgn	Project Title:
Approx. Scale: 1" = 50'	Drawn by: MJO
	Client: NC DOT

Sample Identification	P21-SB1
Sample Depth (Feet bgs)	3-4
TPH GRO (mg/kg)	<0.69
THP DRO (mg/kg)	<0.69

Sample Identification	P21-SB7
Sample Depth (Feet bgs)	4-5
TPH GRO (mg/kg)	<0.68
THP DRO (mg/kg)	<0.68
Sample Depth (Feet bgs)	7-8
TPH GRO (mg/kg)	<0.71
THP DRO (mg/kg)	0.71

Sample Identification	P21-SB2
Sample Depth (Feet bgs)	3-4
TPH GRO (mg/kg)	<0.68
THP DRO (mg/kg)	0.68
Sample Depth (Feet bgs)	9-10
TPH GRO (mg/kg)	<0.65
THP DRO (mg/kg)	1.2

Sample Identification	P21-SB6
Sample Depth (Feet bgs)	4-5
TPH GRO (mg/kg)	<0.59
THP DRO (mg/kg)	<0.59
Sample Depth (Feet bgs)	9-10
TPH GRO (mg/kg)	<0.76
THP DRO (mg/kg)	0.76

Sample Identification	P21-SB3
Sample Depth (Feet bgs)	4-6
TPH GRO (mg/kg)	<0.76
THP DRO (mg/kg)	0.76
Sample Depth (Feet bgs)	9-10
TPH GRO (mg/kg)	<0.61
THP DRO (mg/kg)	0.61

Sample Identification	P21-SB5
Sample Depth (Feet bgs)	4-5
TPH GRO (mg/kg)	<0.76
THP DRO (mg/kg)	<0.76
Sample Depth (Feet bgs)	7-8
TPH GRO (mg/kg)	<0.71
THP DRO (mg/kg)	<0.71

Sample Identification	P21-SB4
Sample Depth (Feet bgs)	5-6
TPH GRO (mg/kg)	<0.64
THP DRO (mg/kg)	0.81
Sample Depth (Feet bgs)	9-10
TPH GRO (mg/kg)	<0.69
THP DRO (mg/kg)	<0.69

US 701 BYP NC 130 JK POWELL BLVD

N 0° 52' 07.0" E

WACCAMAW DEVELOPMENT CORP
DB 508 PG 899

21

BEARING BK = N 89° 04' 42.5" E

LEGEND

- SOIL BORING LOCATION
- PROPOSED SLOPE STAKES FILL
- PROPOSED SLOPE STAKES CUT
- EXISTING PROPERTY LINE

SCALE IN FEET

APEX COMPANIES, LLC
10610 METROMONT PARKWAY
SUITE 206
CHARLOTTE, NC 28117
PHONE: (704) 799-6390

FIGURE 3
PARCEL 21
315-215 S. JK. POWELL BLVD.
ONSITE UVF HYDROCARBON ANALYSIS RESULTS - SOIL
JUNE 6, 2018

Date: 7/3/18		R-5020B US 701 BYPASS COLUMBUS COUNTY
Proj. # NCDOT-001		
CAD File: pc_021_fig 3.dgn		Project Title:
Approx. Scale: 1" = 50'	Drawn by: MJO	Client: NC DOT

APPENDIX A

PHOTOGRAPH LOG

Photo 1

Overview of the site, looking north, prior to preliminary site assessment activities.

Photo 2

Overview of the site, looking southeast, prior to preliminary site assessment activities.

10610 Metromont Pkwy
Suite 206
Charlotte, NC 28269

APEX

WBS	41499.1.3
PROCESSED	TLH
DATE	June 2018

PHOTOGRAPHIC LOG
PSA Field Activities
Parcel 21
Waccamaw Development Corp. Property
Whiteville, NC

Photo 5

Photo of mobile lab set up prior to running UVF samples.

Photo 6

Photo shows CSI operating direct push drill rig.

APPENDIX B

BORING LOGS

Apex Companies, LLC

Boring Log

Boring/Well No.: P21-SB1	**Site Name: Parcel 21**
Date: 6/6/18	**Location: Whiteville, Columbus County, NC**
Job No.: NCDOT-001	**Sample Method: Hand Auger and Direct Push**
Apex Rep: Thomas Fisher	**Drilling Method: Hand Auger and Direct Push**
Drilling Company: Carolina Soil Investigations	**Driller Name/Cert #: Danny Summers/2579**
Remarks:	

Depth (ft BLS)	FID Reading (ppm)	PID Reading (ppm)	Lab Sample ID	Soil/Lithologic Description
1	2	5		0-2.5' Grass-Dark gray silty **SAND**, loose.
2				
3	2	16		2.5'-4' Tan clayey **SAND**, slightly plastic, slightly stiff.
4	2	20		
5	1	21		4'-4.5' Gray, orange, and brown **CLAY,** very stiff, very plastic at 4.5'-6' Gray clayey **SAND.**
6				
7				6'-9.5' Gray and tan **CLAY**, very stiff, very plastic.
8				
9				
10				9.5'-10' Gray **CLAY**, very stiff, very plastic.
11				Boring terminated at 10 feet.
12				
13				
14				

WELL CONSTRUCTION DETAILS (If Applicable)	
Well Type/Diameter:	Outer Casing Interval:
Total Depth:	Outer Casing Diameter:
Screen Interval:	Bentonite Interval:
Sand Interval:	Slot Size:
Grout Interval:	Static Water Level:

Apex Companies, LLC

Boring Log

Boring/Well No.: P21-SB2	**Site Name: Parcel 21**
Date: 6/6/18	**Location: Whiteville, Columbus County, NC**
Job No.: NCDOT-001	**Sample Method: Hand Auger and Direct Push**
Apex Rep: Thomas Fisher	**Drilling Method: Hand Auger and Direct Push**
Drilling Company: Carolina Soil Investigations	**Driller Name/Cert #: Danny Summers/2579**
Remarks:	

Depth (ft BLS)	FID Reading (ppm)	PID Reading (ppm)	Lab Sample ID	Soil/Lithologic Description
	1	17		0-2.5' Grass-Dark gray silty **SAND**, loose.
1				
2				
	2	17		2.5'-4' Tan clayey **SAND**, slightly plastic, slightly stiff.
3				
	2	26		
4				
	2	25		4'-4.5' Gray, orange, and brown **CLAY,** very stiff, very plastic at
5				4.5'-6' Gray clayey **SAND.**
	1	16		
6				
				6'-9.5' Gray and tan **CLAY**, very stiff, very plastic.
7				
	2	23		
8				
9				
	1	19		
10				9.5'-10' Gray **CLAY**, very stiff, very plastic.
				Boring terminated at 10 feet.
11				
12				
13				
14				

WELL CONSTRUCTION DETAILS (If Applicable)

Well Type/Diameter:	Outer Casing Interval:
Total Depth:	Outer Casing Diameter:
Screen Interval:	Bentonite Interval:
Sand Interval:	Slot Size:
Grout Interval:	Static Water Level:

Apex Companies, LLC

Boring Log

Boring/Well No.: P21-SB3	**Site Name: Parcel 21**
Date: 6/6/18	**Location: Whiteville, Columbus County, NC**
Job No.: NCDOT-001	**Sample Method: Hand Auger and Direct Push**
Apex Rep: Thomas Fisher	**Drilling Method: Hand Auger and Direct Push**
Drilling Company: Carolina Soil Investigations	**Driller Name/Cert #: Danny Summers/2579**
Remarks:	

Depth (ft BLS)	FID Reading (ppm)	PID Reading (ppm)	Lab Sample ID	Soil/Lithologic Description
1	1	8		0-2.5' Grass-Dark gray silty **SAND**, loose.
2				
3	1	14		2.5'-4' Tan clayey **SAND**, slightly plastic, slightly stiff.
4				
5	1	15		4'-4.5' Gray, orange, and brown **CLAY,** very stiff, very plastic at 4.5'-6' Gray clayey **SAND.**
6				
7	1	14		6'-9.5' Gray and tan **CLAY**, very stiff, very plastic.
8				
9	1	15		
10				9.5'-10' Gray **CLAY**, very stiff, very plastic.
11				Boring terminated at 10 feet.
12				
13				
14				

WELL CONSTRUCTION DETAILS (If Applicable)	
Well Type/Diameter:	Outer Casing Interval:
Total Depth:	Outer Casing Diameter:
Screen Interval:	Bentonite Interval:
Sand Interval:	Slot Size:
Grout Interval:	Static Water Level:

Apex Companies, LLC

Boring Log

Boring/Well No.: P21-SB4	**Site Name: Parcel 21**
Date: 6/6/18	**Location: Whiteville, Columbus County, NC**
Job No.: NCDOT-001	**Sample Method: Hand Auger and Direct Push**
Apex Rep: Thomas Fisher	**Drilling Method: Hand Auger and Direct Push**
Drilling Company: Carolina Soil Investigations	**Driller Name/Cert #: Danny Summers/2579**
Remarks:	

Depth (ft BLS)	FID Reading (ppm)	PID Reading (ppm)	Lab Sample ID	Soil/Lithologic Description
1	1	10		0-2.5' Grass-Dark gray silty **SAND**, loose.
2				
3	1	14		2.5'-4' Tan clayey **SAND**, slightly plastic, slightly stiff.
4				
5	1	15		4'-4.5' Gray, orange, and brown **CLAY,** very stiff, very plastic at 4.5'-6' Gray clayey **SAND.**
6				
7	1	8		6'-9.5' Gray and tan **CLAY**, very stiff, very plastic.
8				
9	1	13		
10				9.5'-10' Gray **CLAY**, very stiff, very plastic.
11				Boring terminated at 10 feet.
12				
13				
14				

WELL CONSTRUCTION DETAILS (If Applicable)

Well Type/Diameter:	Outer Casing Interval:
Total Depth:	Outer Casing Diameter:
Screen Interval:	Bentonite Interval:
Sand Interval:	Slot Size:
Grout Interval:	Static Water Level:

Apex Companies, LLC

Boring Log

Boring/Well No.: P21-SB5	**Site Name: Parcel 21**
Date: 6/6/18	**Location: Whiteville, Columbus County, NC**
Job No.: NCDOT-001	**Sample Method: Hand Auger and Direct Push**
Apex Rep: Thomas Fisher	**Drilling Method: Hand Auger and Direct Push**
Drilling Company: Carolina Soil Investigations	**Driller Name/Cert #: Danny Summers/2579**
Remarks:	

Depth (ft BLS)	FID Reading (ppm)	PID Reading (ppm)	Lab Sample ID	Soil/Lithologic Description
1	1	6		0-2.5' Grass-Dark gray silty **SAND**, loose.
2				
3	1	7		2.5'-4' Tan clayey **SAND**, slightly plastic, slightly stiff.
4				
5	1	8		4'-4.5' Gray, orange, and brown **CLAY,** very stiff, very plastic at 4.5'-6' Gray clayey **SAND.**
6				
7	1	7		6'-9.5' Gray and tan **CLAY**, very stiff, very plastic.
8				
9	1	6		
10				9.5'-10' Gray **CLAY**, very stiff, very plastic.
11				Boring terminated at 10 feet.
12				
13				
14				

WELL CONSTRUCTION DETAILS (If Applicable)

Well Type/Diameter:	Outer Casing Interval:
Total Depth:	Outer Casing Diameter:
Screen Interval:	Bentonite Interval:
Sand Interval:	Slot Size:
Grout Interval:	Static Water Level:

Apex Companies, LLC

Boring Log

Boring/Well No.: P21-SB6	**Site Name: Parcel 21**
Date: 6/6/18	**Location: Whiteville, Columbus County, NC**
Job No.: NCDOT-001	**Sample Method: Hand Auger and Direct Push**
Apex Rep: Thomas Fisher	**Drilling Method: Hand Auger and Direct Push**
Drilling Company: Carolina Soil Investigations	**Driller Name/Cert #: Danny Summers/2579**
Remarks:	

Depth (ft BLS)	FID Reading (ppm)	PID Reading (ppm)	Lab Sample ID	Soil/Lithologic Description
1	--	--		0-2.5' Grass-Dark gray silty **SAND**, loose.
2				
3	--	--		2.5'-4' Tan clayey **SAND**, slightly plastic, slightly stiff.
4				
5	--	--		4'-4.5' Gray, orange, and brown **CLAY,** very stiff, very plastic at 4.5'-6' Gray clayey **SAND.**
6				
7	1	4		6'-9.5' Gray and tan **CLAY**, very stiff, very plastic.
8				
9	1	5		
10				9.5'-10' Gray **CLAY**, very stiff, very plastic.
				Boring terminated at 10 feet.
11				
12				
13				
14				

WELL CONSTRUCTION DETAILS (If Applicable)	
Well Type/Diameter:	Outer Casing Interval:
Total Depth:	Outer Casing Diameter:
Screen Interval:	Bentonite Interval:
Sand Interval:	Slot Size:
Grout Interval:	Static Water Level:

Apex Companies, LLC

Boring Log

Boring/Well No.: P21-SB7	**Site Name: Parcel 21**
Date: 6/6/18	**Location: Whiteville, Columbus County, NC**
Job No.: NCDOT-001	**Sample Method: Hand Auger and Direct Push**
Apex Rep: Thomas Fisher	**Drilling Method: Hand Auger and Direct Push**
Drilling Company: Carolina Soil Investigations	**Driller Name/Cert #: Danny Summers/2579**
Remarks:	

Depth (ft BLS)	FID Reading (ppm)	PID Reading (ppm)	Lab Sample ID	Soil/Lithologic Description
1	1	5		0-2.5' Grass-Dark gray silty **SAND**, loose.
2				
3	1	5		2.5'-4' Tan clayey **SAND**, slightly plastic, slightly stiff.
4				
5	2	6		4'-4.5' Gray, orange, and brown **CLAY,** very stiff, very plastic at 4.5' grading more gray.
				4.5'-6' Gray clayey **SAND.**
6				
7	2	7		6'-9.5' Gray and tan **CLAY**, very stiff, very plastic.
8				
9	2	6		
10				9.5'-10' Gray **CLAY**, very stiff, very plastic.
11				Boring terminated at 10 feet.
12				
13				
14				

WELL CONSTRUCTION DETAILS (If Applicable)

Well Type/Diameter:	Outer Casing Interval:
Total Depth:	Outer Casing Diameter:
Screen Interval:	Bentonite Interval:
Sand Interval:	Slot Size:
Grout Interval:	Static Water Level:

APPENDIX C

GEOPHYSICAL REPORT

PYRAMID GEOPHYSICS

PYRAMID GEOPHYSICAL SERVICES
(PROJECT 2018-139)

GEOPHYSICAL SURVEY

METALLIC UST INVESTIGATION:
PARCEL 21
NCDOT PROJECT R-5020B (41499.1.3)

315-215 S. JK POWELL BLVD., WHITEVILLE, NC

JUNE 20, 2018

Report prepared for: Katie Lippard
Apex Companies, LLC
1071 Pemberton Hill Rd., Suite 203
Apex, NC 27502

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

Reviewed by: _____
Douglas A. Canavello, P.G.
NC License #1066

503 INDUSTRIAL AVENUE, GREENSBORO, NC 27406
P: 336.335.3174 F: 336.691.0648
C257: GEOLOGY C1251: ENGINEERING

GEOPHYSICAL INVESTIGATION REPORT
Parcel 21 – 315-215 S. JK Powell Blvd.
Whiteville, Columbus County, North Carolina

Table of Contents

Executive Summary 1
Introduction 2
Field Methodology 2
Discussion of Results 3
Discussion of EM Results 3
Discussion of GPR Results 4
Summary & Conclusions 5
Limitations 5

Figures

Figure 1 – Parcel 21 Geophysical Survey Boundaries and Site Photographs
Figure 2 – Parcel 21 EM61 Results Contour Map
Figure 3 – Parcel 21 GPR Transect Locations and Images
Figure 4 – Overlay of Geophysical Survey Boundaries on NCDOT Engineering Plans

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 conducted a geophysical investigation for Apex Companies, LLC at Parcel 21, located at 315-215 S. JK Powell Blvd., in Whiteville, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project R-5020B). The survey was designed to extend from the existing edge of pavement into the proposed ROW and/or easements, whichever distance was greater. Conducted from May 30 – June 5, 2018, 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 ten EM anomalies were identified. The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface. Two EM anomalies were associated with suspected buried metallic debris or surface metal/suspected utilities and were further investigated with GPR. GPR transects at EM Anomaly 4 recorded evidence of isolated high-amplitude reflectors and an increase in signal penetration that were suggestive of buried metallic debris. No evidence of a larger structure such as a UST was observed in this area. GPR provided evidence of utilities at EM Anomaly 9, but no evidence of larger structures such as USTs. Collectively, the geophysical data did not record any evidence of metallic USTs at Parcel 21.

INTRODUCTION

Pyramid Environmental conducted a geophysical investigation for Apex Companies, LLC at Parcel 21, located at 315-215 S. JK Powell Blvd., in Whiteville, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project R-5020B). The survey was designed to extend from the existing edge of pavement into the proposed ROW and/or easements, whichever distance was greater. Conducted from May 30 – June 5, 2018, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

The site included an asphalt parking lot associated with two commercial buildings, which were located to the east of the survey area. 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 metal detector integrated with a Trimble AG-114 GPS antenna. The integrated GPS system allows the location of the instrument to be recorded in real-time during data collection, resulting in an EM data set that is geo-referenced and can be overlain on aerial photographs and CADD drawings. A boundary grid was established around the perimeter of the site with marks every 10 feet to maintain orientation of the instrument throughout the survey and assure complete coverage of the area.

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

computer and reviewed in the field and office using the Geonics NAV61 and Surfer for Windows Version 15.0 software programs.

GPR data were acquired across select EM anomalies on June 5, 2018, using a Geophysical Survey Systems, Inc. (GSSI) UtilityScan DF unit equipped with a dual frequency 300/800 MHz 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 DF 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	Drop Inlet	
2	Metal Posts	
3	Water Meter	
4	Suspected Buried Metallic Debris	☑
5	Sign/Debris	
6	Drop Inlet	
7	Drop Inlet	
8	Debris	
9	Surface Metal	☑
10	Signs	

The majority of the EM anomalies were directly attributed to visible cultural features at the ground surface, including drop inlets, metal posts, a water meter, signs, debris, and surface metal. EM Anomaly 4 was associated with unknown buried metal and was investigated further by GPR. Additionally, GPR scans were performed across Anomaly 8 to confirm that no other metal structures were present beneath the area impacted by EM interference due to the surface 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 GPR transects were performed at the site. GPR Transects 1 and 2 were performed across EM Anomaly 4. These transects recorded evidence of isolated high-amplitude reflectors and an increase in signal penetration that were suggestive of buried metallic debris. No evidence of a larger structure such as a UST was observed in this area.

GPR Transects 3 and 4 were performed across Anomaly 9. These transects verified the presence of suspected utilities, but no evidence of larger structures such as USTs was observed.

Collectively, the geophysical data did not record any evidence of metallic USTs at Parcel 21. **Figure 4** provides an overlay of the geophysical survey onto the NCDOT MicroStation engineering plans for reference.

SUMMARY & CONCLUSIONS

Pyramid's evaluation of the EM61 and GPR data collected at Parcel 21 in Whiteville, 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.
- Two EM anomalies were associated with suspected buried metallic debris or surface metal/suspected utilities and were further investigated with GPR.
- GPR transects at EM Anomaly 4 recorded evidence of isolated high-amplitude reflectors and an increase in signal penetration that were suggestive of buried metallic debris. No evidence of a larger structure such as a UST was observed in this area.
- GPR provided evidence of utilities at EM Anomaly 9, but no evidence of larger structures such as USTs.
- Collectively, the geophysical data did not record any evidence of metallic USTs at Parcel 21.

LIMITATIONS

Geophysical surveys have been performed and this report was prepared for Apex Companies, LLC 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

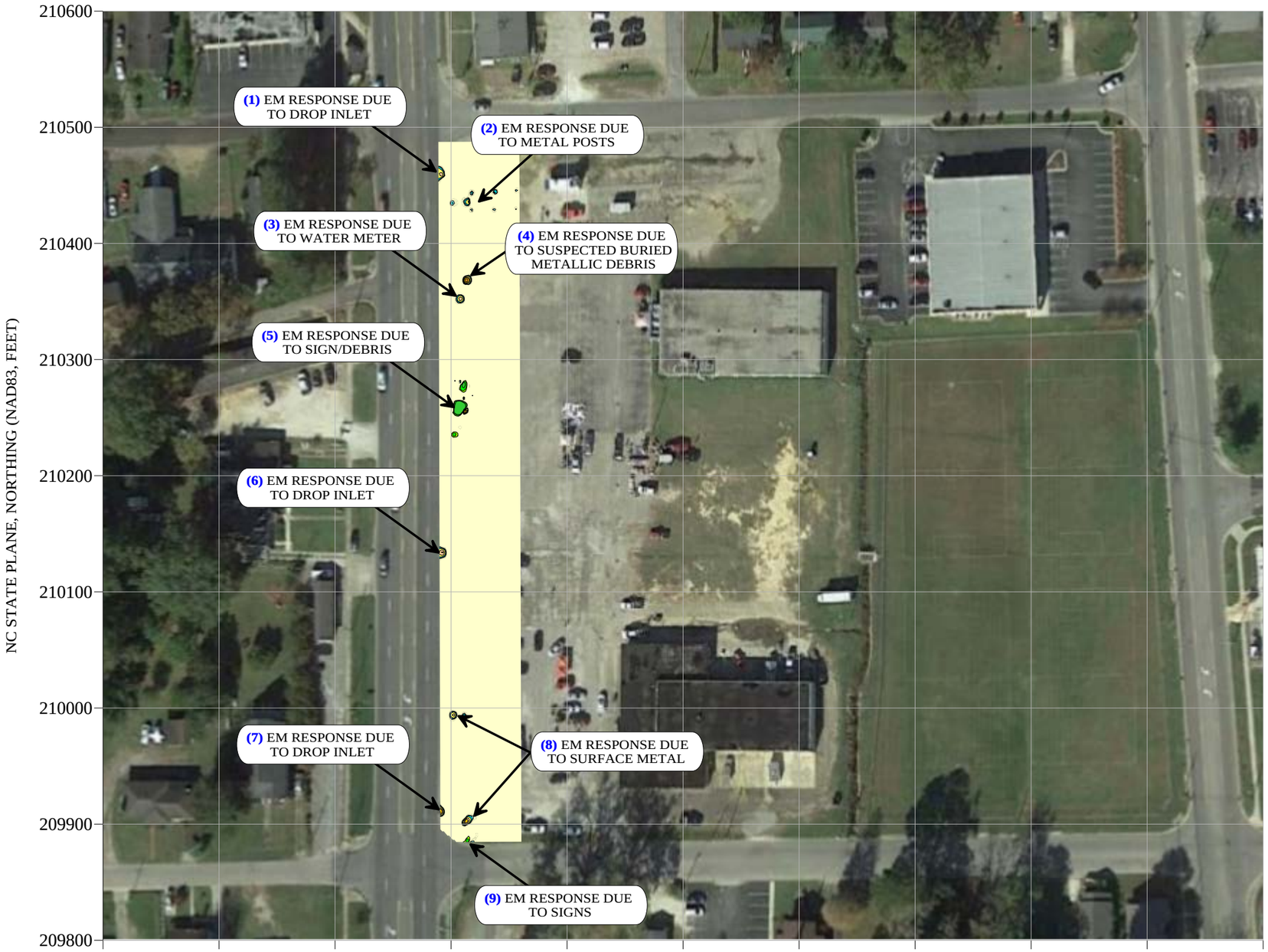
View of Survey Area
(Facing Approximately North)

View of Survey Area
(Facing Approximately South)

N

PYRAMID GEOPHYSICS 503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology	PROJECT PARCEL 21 WHITEVILLE, NORTH CAROLINA NCDOT PROJECT R-5020B	TITLE PARCEL 21 - GEOPHYSICAL SURVEY BOUNDARIES AND SITE PHOTOGRAPHS	DATE 5/30/2018 PYRAMID PROJECT #: 2018-139	CLIENT Apex Companies, LLC **FIGURE 1**

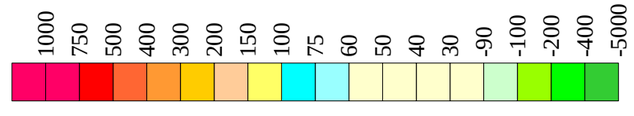
EM61 METAL DETECTION RESULTS



NO EVIDENCE OF UNKNOWN METALLIC USTs OBSERVED.

The contour plot shows the differential results of the EM61 instrument in millivolts (mV). The differential results focus on larger metallic objects such as USTs and drums. The EM61 data were collected on May 30, 2018, using a Geonics EM61 instrument. Verification GPR data were collected using a GSSI UtilityScan DF instrument with a dual frequency 300/800 MHz antenna on June 5, 2018.

EM61 Metal Detection Response (millivolts)

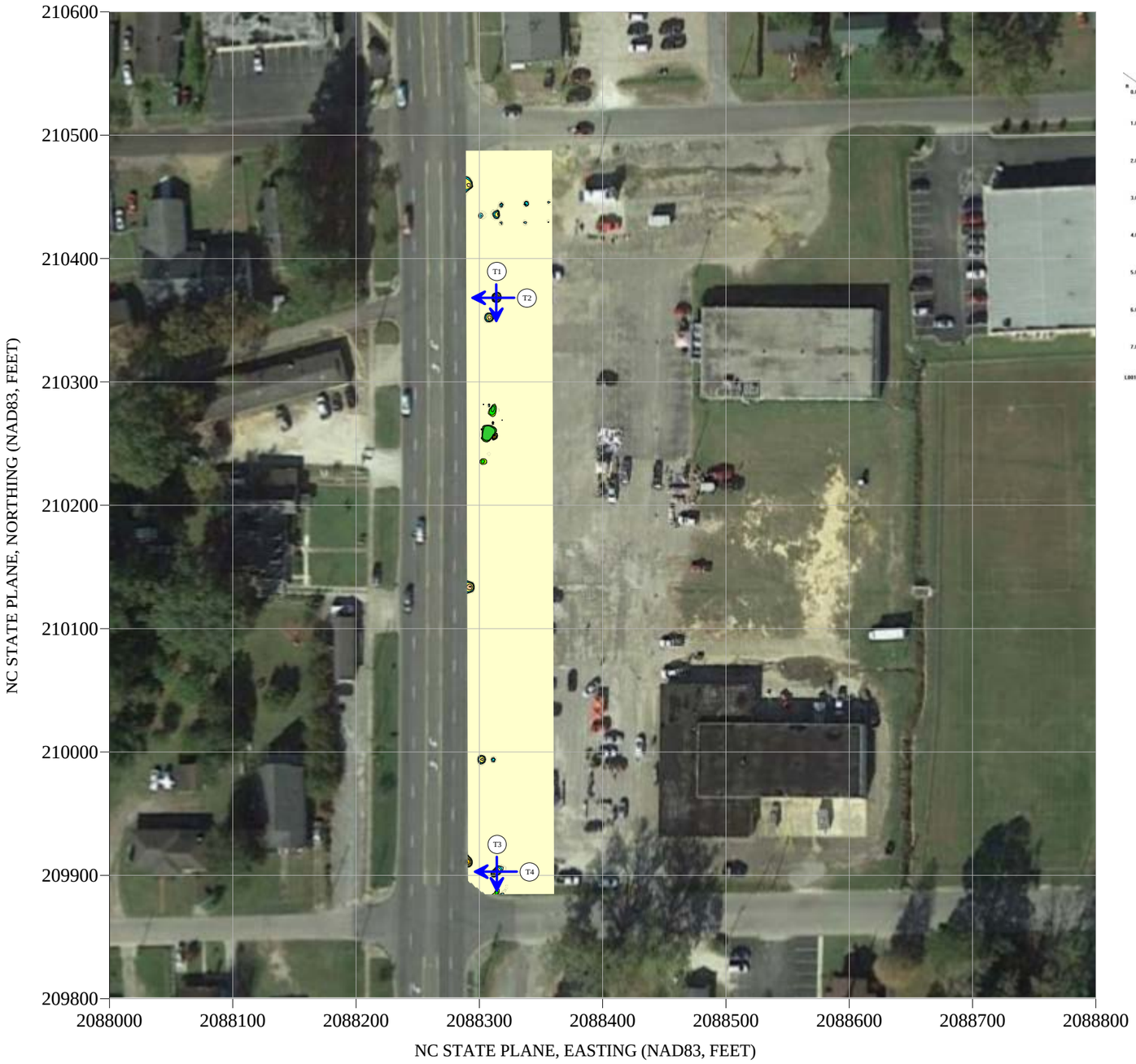


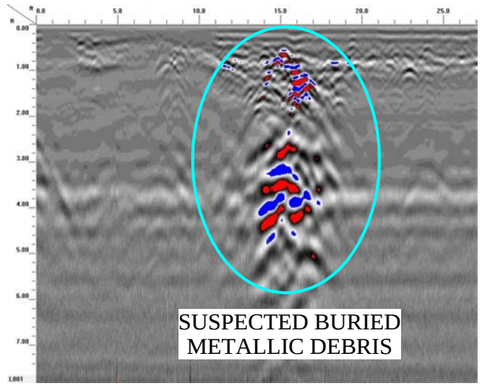
N

PYRAMID GEOPHYSICS
503 INDUSTRIAL AVENUE
GREENSBORO, NC 27460
(336) 335-3174 (p) (336) 691-0648 (f)
License # C1251 Eng. / License # C257 Geology

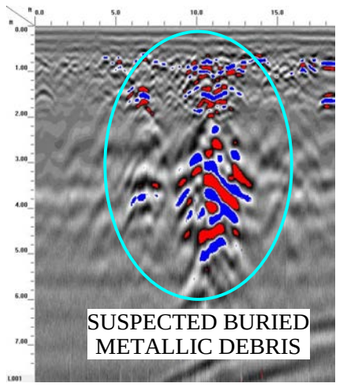
PROJECT	PARCEL 21 WHITEVILLE, NORTH CAROLINA NCDOT PROJECT R-5020B	TITLE	PARCEL 21 - EM61 METAL DETECTION CONTOUR MAP	DATE 5/30/2018 PYRAMID PROJECT #: 2018-139
CLIENT	Apex Companies, LLC			**FIGURE 2**

LOCATIONS OF GPR TRANSECTS

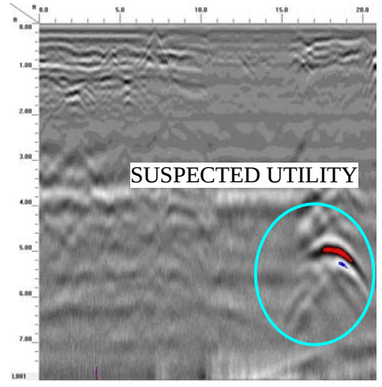




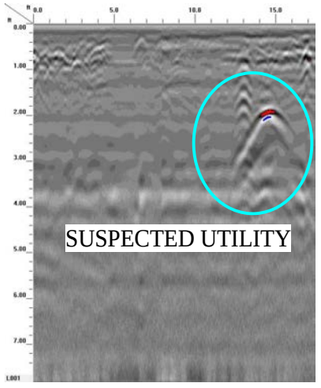
GPR TRANSECT 1 (T1)



GPR TRANSECT 2 (T2)



GPR TRANSECT 3 (T3)



GPR TRANSECT 4 (T4)

N

PYRAMID GEOPHYSICS

503 INDUSTRIAL AVENUE
GREENSBORO, NC 27460
(336) 335-3174 (p) (336) 691-0648 (f)
License # C1251 Eng. / License # C257 Geology

PROJECT: PARCEL 21
WHITEVILLE, NORTH CAROLINA
NCDOT PROJECT R-5020B

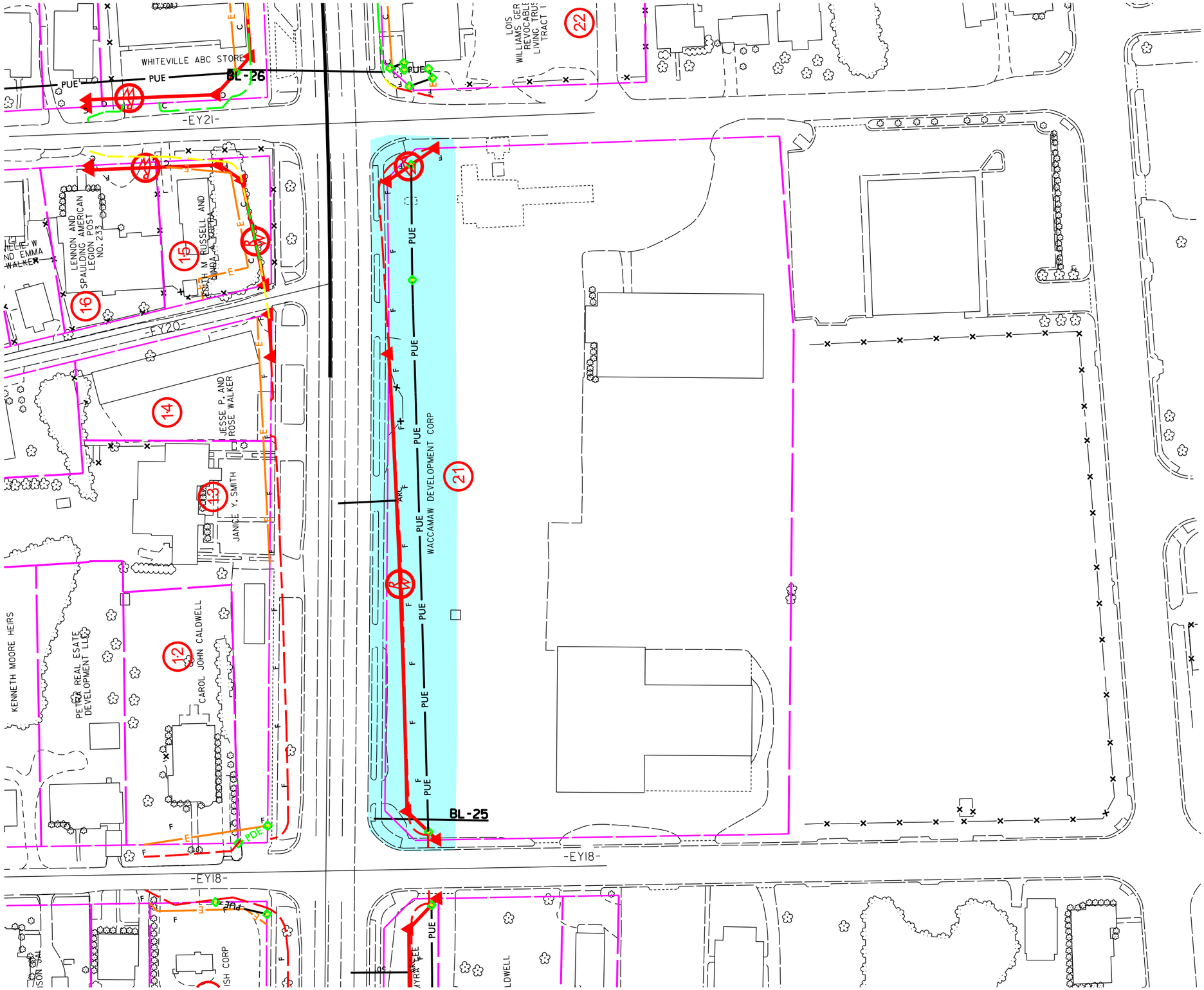
TITLE: PARCEL 21 - GPR TRANSECT LOCATIONS AND IMAGES

DATE: 6/5/2018

PYRAMID PROJECT #: 2018-139

CLIENT: Apex Companies, LLC

FIGURE 3



LEGEND

- EXISTING ROW
- EXISTING PROPERTY BOUNDARY
- PROPOSED ROW LINE
- E — TEMPORARY CONSTRUCTION EASEMENT
- PDE — PROPOSED PERMANENT DRAINAGE
- PUE — PROPOSED PERMANENT UTILITY
- PROPOSED SS CUT LINE
- PROPOSED SS FILL LINE
- GEOPHYSICAL SURVEY AREA

N

0 50 100
FEET

TITLE
OVERLAY OF GEOPHYSICAL SURVEY BOUNDARIES ON NCDOT ENGINEERING PLANS

PROJECT
PARCEL 21
WHITEVILLE, NORTH CAROLINA
NCDOT PROJECT W-5020B

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

DATE: 06-26-2018	REVISION NO. 0
PYRAMID PROJECT NO. 2018-139	FIGURE NO. 4

APPENDIX D

HYDROCARBON ANALYSIS RESULTS

QED REDLAB RAPID ENVIRONMENTAL DIAGNOSTICS AQROS

Hydrocarbon Analysis Results

Client: NCDOT
Address: Parcel 21

Samples taken Wednesday, June 6, 2018
Samples extracted Wednesday, June 6, 2018
Samples analysed Wednesday, June 6, 2018

Contact: Craig Haden

Operator Troy Holzschuh

Project: R-5020B Whiteville

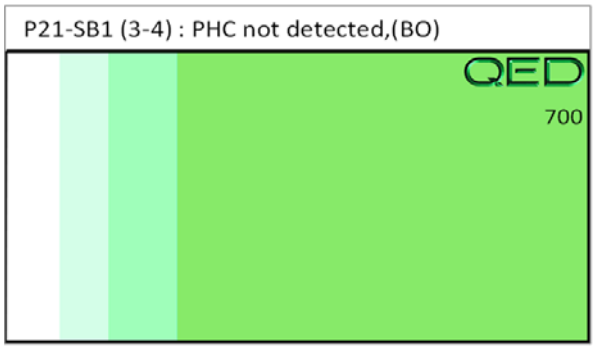
F03640

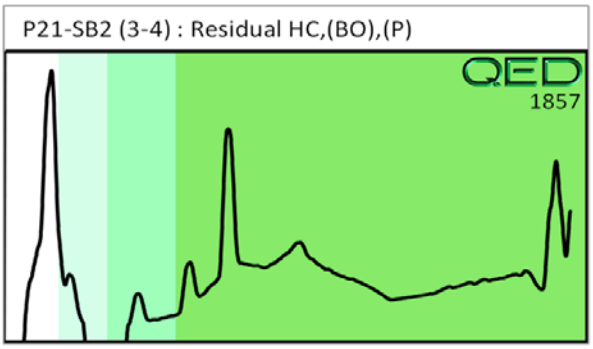
Matrix	Sample ID	Dilution used	BTEX (C6 - C9)	GRO (C5 - C10)	DRO (C10 - C35)	TPH (C5 - C35)	Total Aromatics (C10-C35)	16 EPA PAHs	BaP	Ratios			HC Fingerprint Match
										% light	% mid	% heavy	
s	P21-SB1 (3-4)	27.5	<0.69	<0.69	<0.69	<0.69	<0.14	<0.22	<0.028	0	0	0	PHC not detected,(BO)
s	P21-SB2 (3-4)	27.2	<0.68	<0.68	0.68	0.68	0.74	<0.22	<0.027	0	40	60	Residual HC,(BO),(P)
s	P21-SB2 (9-10)	26.0	<0.65	<0.65	1.2	1.2	1.2	<0.21	<0.026	0	61.5	38.5	V.Deg.PHC 59.4%,(FCM),(BO)
s	P21-SB3 (4-6)	30.6	<0.76	<0.76	0.76	0.76	0.4	<0.24	<0.031	0	53.1	46.9	Residual HC,(BO)
s	P21-SB3 (9-10)	24.5	<0.61	<0.61	0.61	0.61	0.39	<0.2	<0.025	0	76	24	Residual HC
s	P21-DUP-1	24.5	<0.61	<0.61	1.1	1.1	1.1	<0.2	<0.025	0	30.6	69.4	Residual HC,(BO)
s	P21-SB4 (5-6)	25.7	<0.64	<0.64	0.81	0.81	0.77	<0.21	<0.026	0	25.4	74.6	Residual HC,(BO)
s	P21-SB4 (9-10)	27.7	<0.69	<0.69	<0.69	<0.69	<0.14	<0.22	<0.028	0	0	100	PHC not detected,(BO)
s	P21-SB5 (4-5)	30.2	<0.76	<0.76	<0.76	<0.76	<0.15	<0.24	<0.03	0	0	0	PHC not detected,(BO)
s	P21-SB5 (7-8)	28.6	<0.71	<0.71	<0.71	<0.71	<0.14	<0.23	<0.029	0	0	0	PHC not detected

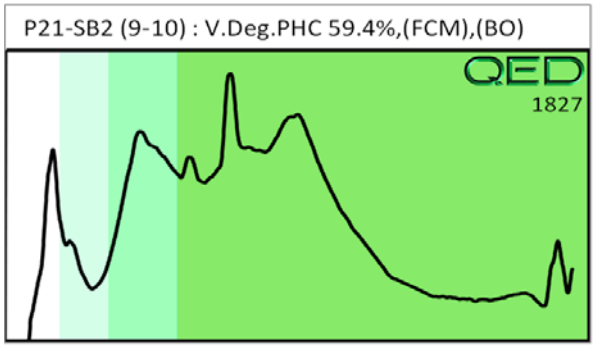
Initial Calibrator QC check OK Final FCM QC Check OK 92 %

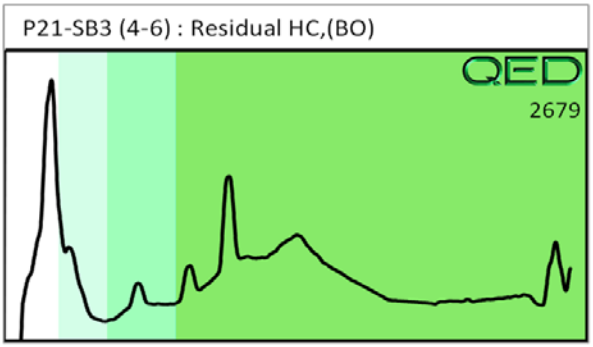
Results generated by a QED HC-1 analyser. Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values are not corrected for moisture or stone content

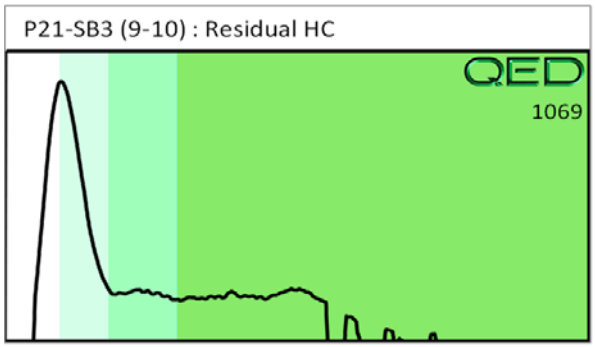
Fingerprints provide a tentative hydrocarbon identification. The abbreviations are:- FCM = Results calculated using Fundamental Calibration Mode : % = confidence for sample fingerprint match to library (SBS) or (LBS) = Site Specific or Library Background Subtraction applied to result : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate present

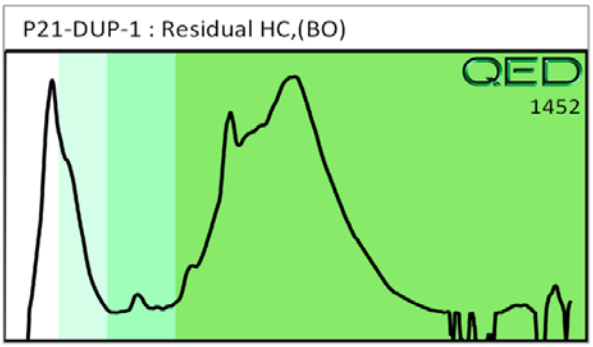

P21-SB1 (3-4) : PHC not detected,(BO)
QED
700

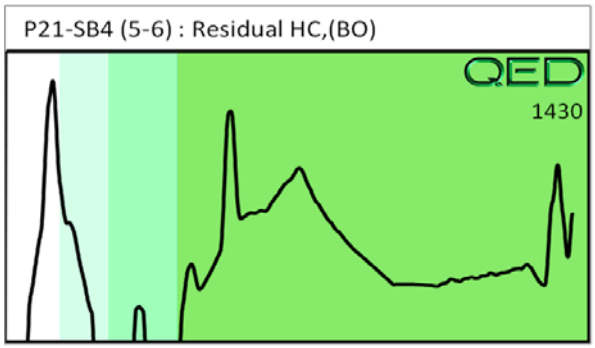

P21-SB2 (3-4) : Residual HC,(BO),(P)
QED
1857

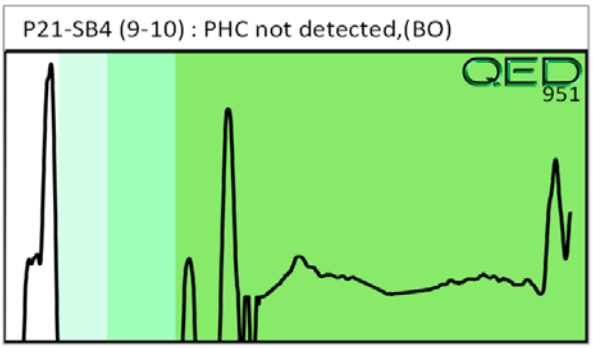

P21-SB2 (9-10) : V.Deg.PHC 59.4%,(FCM),(BO)
QED
1827

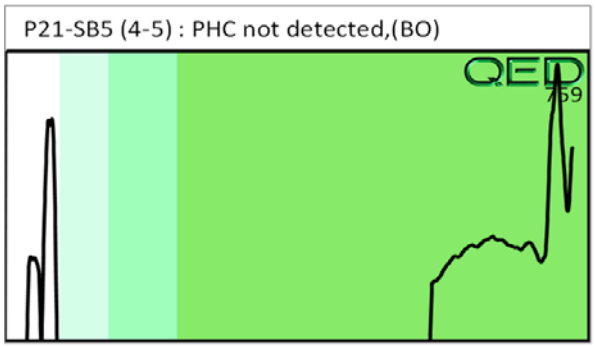

P21-SB3 (4-6) : Residual HC,(BO)
QED
2679

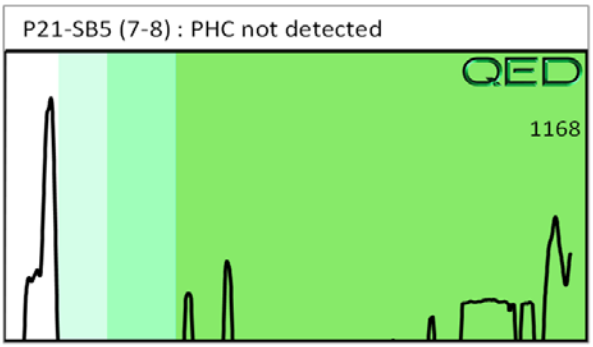

P21-SB3 (9-10) : Residual HC
QED
1069


P21-DUP-1 : Residual HC,(BO)
QED
1452


P21-SB4 (5-6) : Residual HC,(BO)
QED
1430


P21-SB4 (9-10) : PHC not detected,(BO)
QED
951


P21-SB5 (4-5) : PHC not detected,(BO)
QED
769


P21-SB5 (7-8) : PHC not detected
QED
1168