

P S A R E P O R T

**PRELIMINARY SITE ASSESSMENT
PARCEL #160
BETTY C. PERRY PROPERTY
3822 US 401 S
YOUNGSVILLE, FRANKLIN COUNTY, NC
STATE PROJECT R-2814C
WBS ELEMENT 34506.1.4**

Prepared for

North Carolina Department of Transportation
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23 March 2015



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URS Job No. 3182 9895

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Certification

This Report was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my thorough inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.



Michael J. Murphy, L.G.
Project Manager
URS Corporation – North Carolina

2333
NC License No.

3/23/15
Date

1.1 INTRODUCTION

This report documents a Preliminary Site Assessment (PSA) conducted by URS Corporation – North Carolina (URS) on behalf of the North Carolina Department of Transportation (NCDOT). This PSA was conducted at 3822 US 401 South, Louisburg, Wake County, North Carolina (**Figure 1**), owned by JVC Homes, Inc. (the Site). The assessment area is located on the north quadrant of the US 401 (Louisburg Road) and SR 1103 (Flat Rock Church Road) intersection. The PSA was performed within the proposed right-of-way and/or easement for this parcel. This PSA was performed in general accordance with:

- NCDOT’s 1 December 2014 Request for Technical and Cost Proposal (RFP) for the Site. The RFP established the following scope of work (SOW) for the project:
 - Locate USTs and estimate approximate size and contents (if any).
 - Evaluate whether contaminated soils are present with emphasis along planned drainage lines and ditches.
 - If contamination is evident, estimate the quantity of impacted soils and indicate the approximate area of soil contamination on a Site map.
 - Prepare a report including field activities, findings, and recommendations for each Site and submit to this office in triplicate and one electronic copy.
- URS’s 17 December 2014 Technical and Cost Proposal for the Site.
- NCDOT’s 10 January 2015 Notice to Proceed for the Site.

The scope of work included a geophysical survey, soil sampling using a direct push technology (DPT) rig, and onsite soil testing services for Total Petroleum Hydrocarbons (TPH) using Ultra Violet Florescence Spectroscopy (UVF) technology. URS conducted the geophysical survey first in order to identify potential UST and/or anomaly locations within the Site. Based on the results of the geophysical survey and anecdotal evidence, boring locations were identified and completed by a drilling subcontractor (Regional Probing Services of Wake Forest, North Carolina) under the supervision of a URS geologist. Soil borings were located in areas that were cleared of underground utilities by NC One-Call. Onsite analysis of soil samples was performed by QROS of Wilmington, NC.

1.2 BACKGROUND

The objective for this PSA is to assess the Site for USTs, impacted soil, and to delineate potential impacts found in soils. A discrepancy was noted by URS in the property description (Parcel 161, owned by JVC Homes, Inc.) provided in the NCDOT PSA RFP. Upon review of the Franklin County Register of Deeds, the parcel information was determined to be Parcel 160, owned by Betty C. Perry. The property is currently occupied by the Triple G gas station and convenience store.

The major Site features and the surrounding area are shown on **Figures 1** and **2**. The parcel is bounded by Louisburg Road to the east, Flat Rock Church Road to the south, and residential properties to the west and north.

According to information supplied by NCDOT, there are two (2) tanks currently on the Site. Monitoring wells are located on the Site, however no groundwater incident reference was found in the NCDENR database.

2.1 GEOPHYSICAL SURVEY

The primary objective of the geophysical survey was to locate potential USTs or anomalies within the property, and a secondary objective was to identify the general locations of underground utilities at the property in advance of the planned subsurface investigation. The geophysical survey for the property was conducted by URS during the week of January 5, 2015. Ground surface conditions consisted primarily of concrete and asphalt.

The geophysical investigation was conducted using the electromagnetic (EM) method augmented by ground-penetrating radar (GPR). The EM survey was completed using a Geonics, Ltd. EM-61 MK2A (EM-61). The GPR survey was completed using a Sensors & Software, Inc. Noggin PLUS Smart Cart System with a 250 MHz scanning antenna.

EM-61 data were collected along parallel profiles with a nominal spacing of 5 feet where accessible. EM-61 data were recorded at a rate of 8 readings per second, which equates to an along-profile data point spacing of less than 1 foot. In areas inaccessible to the EM-61 (e.g. between trees, man-made obstructions, etc.), data were interpolated to provide a continuous electromagnetic surface.

A Hemisphere A100 global positioning system (GPS) was used to record positional data coincident with the EM-61 data. The A100 system provided real-time differential corrections via an Omnistar subscription service. The horizontal accuracy of the differential GPS (DGPS) data is generally 3 feet or less. URS also used the GPS system to record the locations of relevant site features within the survey area (e.g. utility poles, parked cars, etc.).

URS performed in-field analysis of the EM-61 data to identify anomalies indicative of potential USTs. Preliminary interpretations were based on an evaluation of the magnitude of the EM response as well as the dimensions of the anomaly in plan view.

In areas where the EM-61 encountered heavy surficial interference or where EM anomalies could not be readily attributed to site features, GPR was used to conduct a search for potential USTs. GPR surveying consisted of in-field analysis of real-time data. As a result, no post-processing of the GPR data was completed. Relevant GPR profiles were saved to a data file. GPR was selected to augment the EM-61 data due to its effectiveness at characterizing large subsurface metallic objects such as USTs.

The EM-61 data were pre-processed utilizing the accompanying software package, DAT61 MK2 (Geonics, Ltd), which is required before the data can be contoured and graphically displayed via Surfer (Golden Software, Inc.). The presented contoured data represent the Channel 3 response. The Channel 3 response represents the amplitude recorded at the third time interval along the EM-61 response decay curve. These data are applicable to detection of subsurface objects including USTs and other underground obstructions while simultaneously reducing the near-surface component. Common USTs are of sufficient size to resonate the induced magnetic field for long enough to be recorded in this time gate.

2.2 SOIL BORING INSTALLATION AND MEDIA SAMPLING

Thirteen direct-push soil borings, P160-SB1 through P160-SB13, were completed on January 21, 2015, to assess the Site for impacted soil, as shown on **Figure 2**. Soil samples were collected and logged continuously at each soil boring location. Soil sample aliquots were field screened for organic vapors with a MiniRae[®] brand photo-ionization detection (PID) instrument calibrated daily with 100 parts per million (ppm) isobutylene.

Based on field screening results or other evidence of contamination (e.g., visual, olfactory, etc.), soil samples from select intervals were collected from each boring for on-site soil analysis of TPH using UVF technology.

2.3 QUALITY CONTROL/QUALITY ASSURANCE PROCEDURES

While in the field, pertinent observations were recorded in a logbook maintained by the URS field representative. This included pertinent field data collection activities and other observations, as appropriate. Each sample collected was assigned a unique sample identification number and placed in a discrete container for UVF analyses.

Quality Assurance/Quality Control (QA/QC) of field analyzed data was done by and in accordance with QROS Basic QED QA/QC Components. The QA/QC process includes a five point standard PAH curve, initial calibration, and final calibration after the analyses of each 10 sample set. If any QA/QC measures failed, the QED did not produce data.

3.1 GEOPHYSICAL SURVEY RESULTS

The results of the geophysical survey are presented in accordance with the NCDOT guidelines, dated May 19, 2009, for identifying and ranking potential USTs on NCDOT projects.

The EM-61 Channel 3 response results are provided as a plan view, color-enhanced contour map in **Figure 3**. The results presented in **Figure 3** are superimposed on the parcel base drawing provided by NCDOT. The interpreted background response is represented by the light blue to light green contours and generally corresponds to the range of -40 to 40 milliVolts (mV).

The Channel 3 results indicate an excited response (red) where known surface or near-surface metallic features exist. Observable surface features at the site include utility poles, signs, a traffic box, active USTs, and fuel dispensers. These features are responsible for higher than background near surface response over the site, as evident in **Figure 3**.

One area without obvious surface features creating elevated EM responses was noted along the east of the on-site structure. A GPR sweep was performed across this area. Results from the GPR did not indicate any anomalies representative of a UST, therefore, the GPR data were not saved to disk. The EM anomaly may be an artifact of a former dispenser island. EM response elsewhere across the site was attributable to observable surface features, including active USTs. The active USTs at the site are within the requested survey bounds and evident by fill ports, caps, etc.

3.2 SOIL SAMPLING RESULTS

A total of thirteen soil borings were advanced to 5-8 feet below ground surface (ft bgs) or to refusal during the PSA investigation at the Site. Boring locations are shown in **Figure 2** and analytical results are summarized in **Appendix B**. Encountered soils consisted predominantly of brown silty clays and yellowish-orange sandy silts. The boring logs are included as **Appendix A**.

As shown in **Appendix A**, soil headspace screening in the field detected minor levels of organic vapors ranging from 0.1 to 2.4 parts per million (ppm). The hydrocarbon analyses results for the twenty-eight (28) samples submitted to QROS are summarized in **Appendix B**. Results indicate no detections of gasoline range organics (GRO), however seventeen (17) of the samples analyzed onsite TPH exceeded the NCDENR TPH Action Level of 10 milligrams per kilogram (mg/kg) for diesel range organics (DRO). DRO exceedances ranged from 13.57 mg/kg in P160 SB-11-6 to 315.3 mg/kg in P160 SB-12-6. QROS noted the existence of degraded fuel in many of the samples.

The approximate extent of potential soil impacts are depicted on **Figure 2** as a conservative approach. The first area shown is west of the active UST system, and is approximately 400 square feet, and surrounds borings P160-SB2 and P160-SB7 based on DRO exceedances of the NCDENR TPH Action Level. Using a uniform depth of 8 feet (from 0 to 8 ft bgs), the estimated volume of impacted soil that may be encountered in the upper 8 ft. is approximately 120 cubic yards.

The second area is along the US 401 frontage and is approximately 5,500 square feet and surrounds borings P160-SB4, P160-SB9, P160-SB10, P160-SB11, P160-SB12, and P160-SB13. Using a uniform depth of 8 feet (from 0 to 8 ft bgs), the estimated volume of impacted soil that may be encountered within the upper 8 ft. is approximately 1,700 cubic yards.

3.3 SUMMARY

The following summarizes the findings of NCDOT Parcel 160, located at 3822 US 401 South:

- The geophysical survey did not detect the presence of subsurface anomalies indicative of USTs on the parcel within the proposed easement. An area of subsurface metal was detected on the property; however, the GPR data did not confidently characterize the anomaly as a possible UST.
- An active UST system exists within the right-of-way south of the existing convenience store. The system is comprised of two USTs and is evident at the surface by tank caps and fill ports.
- Field screening detected the presence of low levels of organic vapors at very low levels in all thirteen soil borings at the Site; however, the distribution of borings within the proposed right-of-way and on-site TPH results provided by QROS, deemed no further delineation was warranted due to the presence of the impacted soil within the majority of the investigation boundaries.
- Seventeen of the samples submitted for TPH analysis exceeded the NCDENR TPH Action Level of 10 mg/kg for DRO. The existence of degraded fuel was observed in many of the samples.
- Based on QROS results, approximately 1,820 cubic yards of impacted soil may be encountered in the upper 8 ft. in the areas noted. Because of the active systems and other obstructions preventing additional borings, additional areas of impact may occur at this site.

Based on the Site investigation, future Site workers are likely to encounter impacted soil. If encountered, all impacted soil should be properly handled and disposed of in accordance with NCDENR regulations.

Opinions relating to environmental, geologic, and geotechnical conditions at this parcel are based on limited data, and actual conditions may vary from those encountered at the times and locations where the data was obtained, despite the use of due professional care. The geophysical investigation was conducted in accordance with reasonable and accepted engineering geophysics practices, and the interpretations and conclusions are rendered in a manner consistent with other consultants in our profession. All geophysical techniques have some level of uncertainty and limitations. No other representations of the reported information is expressed or implied, and no warranty or guarantee is included or intended. The results of the geophysical survey are presented in accordance with the NCDOT guidelines, dated May 19, 2009, for identifying and ranking potential USTs on NCDOT projects.

North Carolina Department of Transportation, Request for Technical and Cost Proposal, Preliminary Site Assessment, R-2814C, December 1, 2014.

North Carolina Department of Transportation, Notice to Proceed - Preliminary Site Assessment, R-2814C, January 10, 2015.

URS Corporation, Technical and Cost Proposal, Preliminary Site Assessment, R-2814, December 17, 2014.

Figures

P:\Jobs4\Projects\NCDOT\31829895 R-2814C Wake PSA\6.0 Graphics\6.5 - Autocad\Figure 1 - 151-160.dwg January 20, 2015 - 1:31 PM

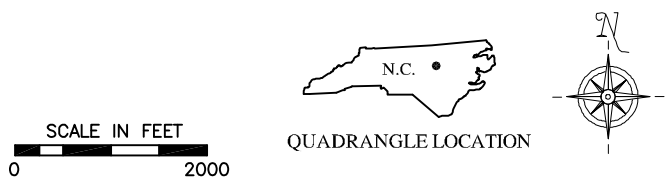
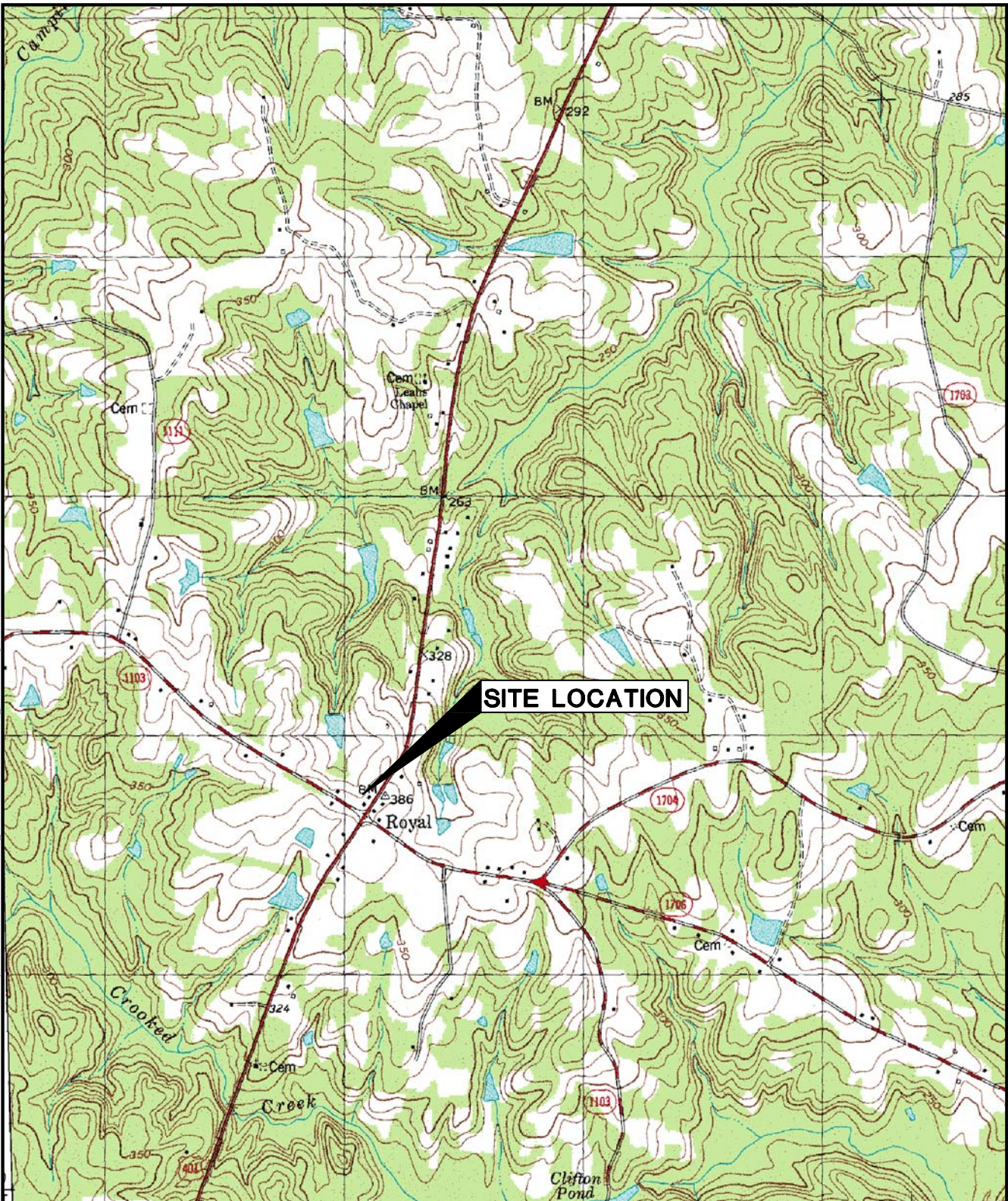

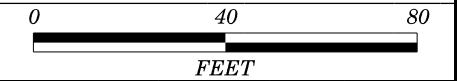


FIGURE 1. LOCATION MAP
PARCEL 160, 3822 US 401 S
STATE PROJECT R-2814
LOUISBURG, NC

Prepared for: NC DOT		 <small>RDU, NORTH CAROLINA 27560</small>	Fig. 1
DRAWN BY:	TSH		
DATE:	1/19/15		
PROJECT NO.	31829895		

SOURCE: USGS 7.5' TOPOGRAPHIC QUADRANGLE
 LOUISBURG, NC - DATED 1978, PHOTOREVISED 1984

GeoEnvironmental



LEGEND

- P2-SB6 SOIL BORING LOCATION
 - PROPOSED RIGHT-OF-WAY
 - PROPOSED EASEMENT
 - PROPOSED DRAINAGE STRUCTURE
 - KNOWN SOIL CONTAMINATION
 - EXISTING MONITORING WELL
 - UNDERGROUND STORAGE TANK
- P2-SBI-10 ID - DEPTH

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Hydrocarbon Analysis Results		
Sample ID	GRO (C5 - C10)	DRO (C10 - C35)
P160 SB-4-6	<1.3	89.87
P160 SB-4-8	<0.9	81.46
P160 SB-6-6	<1.2	61.55
P160 SB-7-6	<1.1	37.4
P160 SB-9-6	<0.6	18.62
P160 SB-10-6	<0.8	40.06
P160 SB-10-8	<1.2	141.3
P160 SB-11-6	<0.8	13.57
P160 SB-11-8	<1	48.85
P160 SB-12-2	<1.1	34.76
P160 SB-12-4	<1.1	45.01
P160 SB-12-6	<11.9	315.3
P160 SB-12-8	<1.1	114.5
P160 SB-13-6	<0.8	20.5
P160 SB-13-8	<0.9	80.59

Results generated by a QED HC-1 analyzer.
Concentration values in mg/kg for soil samples.
For clarity purposes, only those wells with exceedances are presented in the above table.
Bold data above the NCDENR Action Level
GRO = gasoline range organics
DRO = diesel range organics

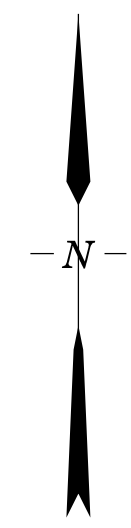
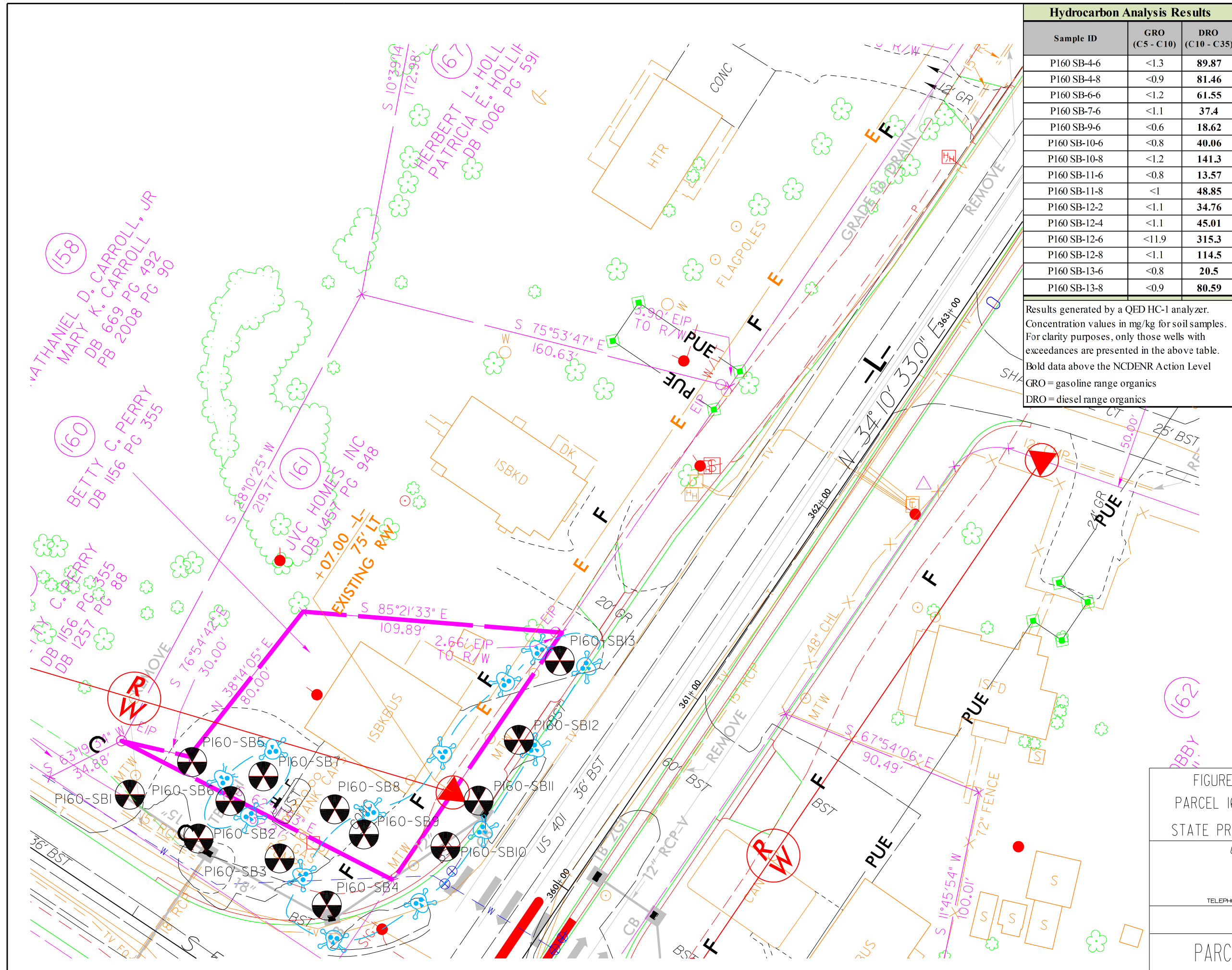


FIGURE 2 SOIL SAMPLING LOCATIONS
PARCEL 160 - BETTY C. PERRY PROPERTY
STATE PROJECT R-2814C, WAKE COUNTY, NC

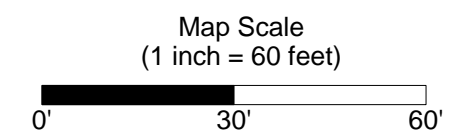
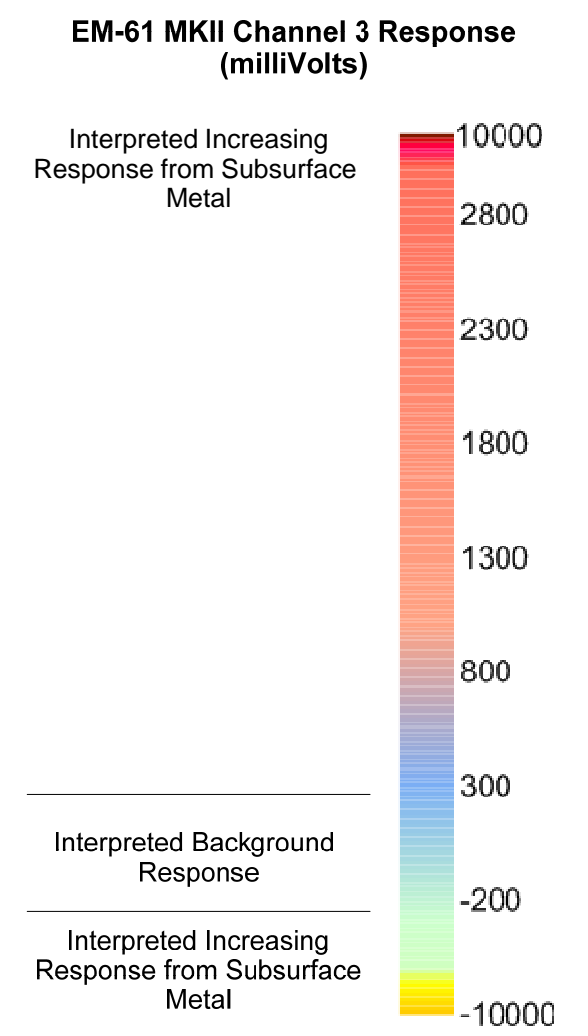
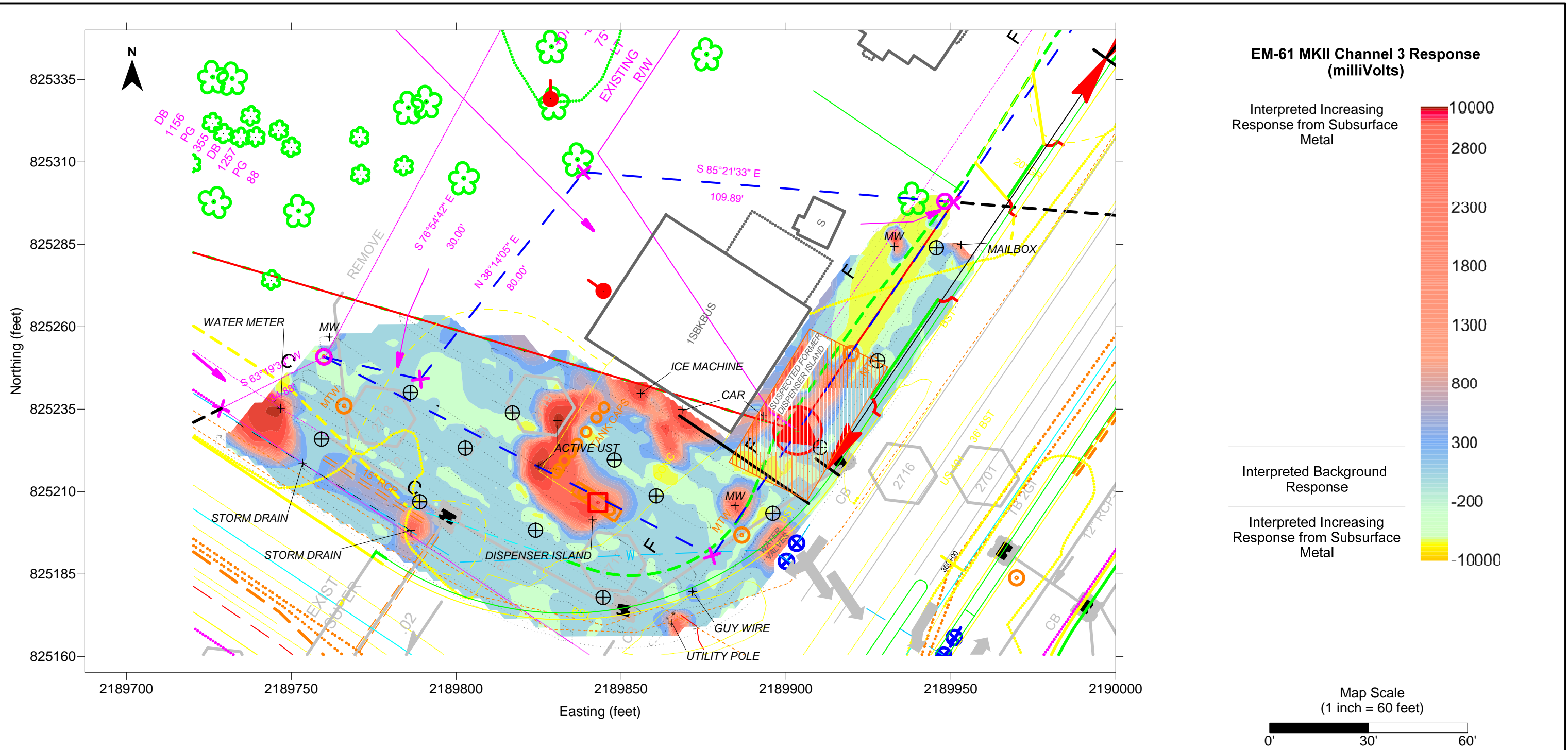
URS Corporation - North Carolina
1600 Perimeter Park Drive
Morrisville, North Carolina 27560
NC LIC # C-2243

TELEPHONE (919) 461-1100 FAX (919) 461-1415

DRN BY: LHM	DATE: 12-11-14	STATE PROJECT: R-2814C
CHECKED BY: VK	DATE: 12-12-14	

PARCEL LOCATION MAP

FIGURE 2



Notes:

1. Coordinates in NC State Plane NAD 83 (US Feet).
2. Data from Geonics, Ltd. EM-61 MKII instrument.
3. Base drawing after file "Parcel 160.dxf" provided by NCDOT.
4. Location control from DGPS survey by URS.
5. No EM anomalies selected for GPR survey.

Legend

- ⊕ Soil Boring Location
- Interpreted Subsurface Utility Center Line
- ? Utility Termination Point not Known
- Property Boundary
- ▨ Inaccessible Area
- ▤ EM Anomalies selected for GPR survey
- ◁ Proposed Right-of-Way

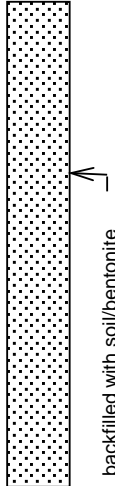
1600 Perimeter Park Drive, Suite 400 Raleigh, NC 27560 Geophysical Services (919) 461-1387			
EM-61 MKII Channel 3 Response Contours Betty C. Perry Property (Parcel #160; Tax PIN: 1882-95-8265)			
NCDOT WBS 34506.1.4, Wake-Franklin County			
Louisburg, Franklin County, North Carolina			
DESIGNED BY	DRAWN BY	CHECKED BY	JOB NUMBER
MJM	02/05/15	CMS	02/05/15
			31829895
			Figure 3

Appendix A
Boring Logs



BORING LOG: P160-SB1

Permit #	Drill Date 01/21/15	Site Parcel #160
Client NCDOT	Use	URS Corporation
Address 3822 US 401 S, Louisburg, NC 27549		Total Depth (ft) 8'
Drilling Method Geoprobe Direct Push	Boring Depth (ft) 8'	Boring Diam. (in) 1.5
Backfill Material Soil/Bentonite		Static Water Level unknown
Remarks:	TOC Elevation NA	Sample Method Acetate Liner (4 ft)

Depth (ft.)	Sample ID	Sample Depth (ft)	Blows/ 6"	OVA (ppm)	Geologic Description	Typical Diagram
0						 <p style="margin-top: 10px;">Not to Scale</p>
1	P160-SB1-2	0-2'		0.9	Yellowish-orange to light brown sandy SILT	
2						
3	P160-SB1-4	2-4'		0.5		
4						
5	P160-SB1-6	4-6'		0.3	Stiff, yellowish-orange to light brown sandy CLAY (WEATHERED GRANITE)	
6						
7	P160-SB1-8	6-8'		NA	Stiff, light brown sandy CLAY	
8					Boring Terminated at 8' bgs	
9						
10						

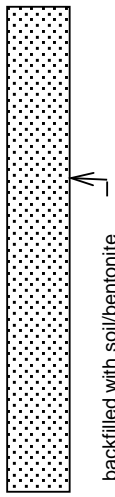
Notes: P160-SB1-6 and P160-SB1-8 submitted to QROS for analysis

Geologist: **Joseph Kiker** Driller: **RPS**



BORING LOG: P160-SB2

Permit #	Drill Date 01/21/15	Site Parcel #160
Client NCDOT	Use	URS Corporation
Address 3822 US 401 S, Louisburg, NC 27549		Total Depth (ft) 5'
Drilling Method Geoprobe Direct Push	Boring Depth (ft) 5'	Boring Diam. (in) 1.5
Backfill Material Soil/Bentonite		Static Water Level unknown
Remarks:	TOC Elevation NA	Sample Method Acetate Liner (4 ft)

Depth (ft.)	Sample ID	Sample Depth (ft)	Blows/ 6"	OVA (ppm)	Geologic Description	Typical Diagram
0						 <p style="text-align: center;">Not to Scale</p>
1	P160-SB2-2	0-2'		0.1	Olive gray sandy SILT	
2	P160-SB2-4	2-4'		0.8	Moist, yellowish-orange sandy SILT	
3	P160-SB2-5	4-5'		0.9	Stiff, light brown to yellowish-orange sandy CLAY	
4					WEATHERED GRANITE	
5					Boring Terminated at 5' bgs	
6						
7						
8						
9						
10						

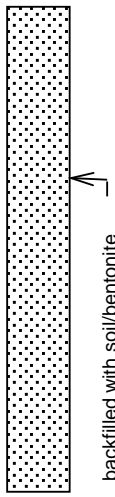
Notes: P160-SB2-4 and P160-SB2-5 submitted to QROS for analysis; refusal at 5' bgs

Geologist: **Joseph Kiker** Driller: **RPS**



BORING LOG: P160-SB3

Permit #	Drill Date 01/21/15	Site Parcel #160
Client NCDOT	Use	URS Corporation
Address 3822 US 401 S, Louisburg, NC 27549		Total Depth (ft) 8'
Drilling Method Geoprobe Direct Push	Boring Depth (ft) 8'	Boring Diam. (in) 1.5
Backfill Material Soil/Bentonite		Static Water Level unknown
Remarks:	TOC Elevation NA	Sample Method Acetate Liner (4 ft)

Depth (ft.)	Sample ID	Sample Depth (ft)	Blows/ 6"	OVA (ppm)	Geologic Description	Typical Diagram
0					Med. Stiff, yellowish-orange sandy silty CLAY	 <p style="margin-top: 10px;">Not to Scale</p>
2	P160-SB3-2	0-2'	0.7		Olive gray to yellowish-orange sandy SILT with 4" layer of GRAVEL at base	
4	P160-SB3-4	2-4'	0.4			
6	P160-SB3-6	4-6'	0.6		Stiff, light brown to yellowish-orange sandy CLAY	
8	P160-SB3-8	6-8'	1.1			
10					Boring Terminated at 8' bgs	

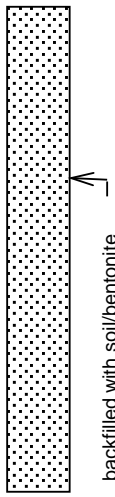
Notes: P160-SB3-6 and P160-SB3-8 submitted to QROS for analysis

Geologist: **Joseph Kiker** Driller: **RPS**



BORING LOG: P160-SB4

Permit #	Drill Date 01/21/15	Site Parcel #160
Client NCDOT	Use	URS Corporation
Address 3822 US 401 S, Louisburg, NC 27549		Total Depth (ft) 8'
Drilling Method Geoprobe Direct Push	Boring Depth (ft) 8'	Boring Diam. (in) 1.5
Backfill Material Soil/Bentonite		Static Water Level unknown
Remarks:	TOC Elevation NA	Sample Method Acetate Liner (4 ft)

Depth (ft.)	Sample ID	Sample Depth (ft)	Blows/ 6"	OVA (ppm)	Geologic Description	Typical Diagram
0					ASPHALT and FILL	 <p style="margin-top: 10px;">Not to Scale</p>
2	P160-SB4-2	0-2'		0.6	Olive gray to yellowish-orange clayey sandy SILT	
4	P160-SB4-4	2-4'		0.4	Stiff, yellowish-orange sandy CLAY	
6	P160-SB4-6	4-6'		0.5	WEATHERED GRANITE	
8	P160-SB4-8	6-8'		0.6	Boring Terminated at 8' bgs	
10						

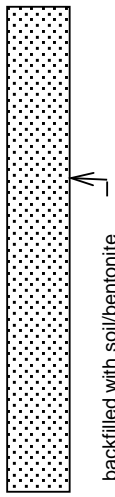
Notes: P160-SB4-6 and P160-SB4-8 submitted to QROS for analysis

Geologist: **Joseph Kiker** Driller: **RPS**



BORING LOG: P160-SB5

Permit #	Drill Date 01/21/15	Site Parcel #160
Client NCDOT	Use	URS Corporation
Address 3822 US 401 S, Louisburg, NC 27549		Total Depth (ft) 7'
Drilling Method Geoprobe Direct Push	Boring Depth (ft) 7'	Boring Diam. (in) 1.5
Backfill Material Soil/Bentonite		Static Water Level unknown
Remarks:	TOC Elevation NA	Sample Method Acetate Liner (4 ft)

Depth (ft.)	Sample ID	Sample Depth (ft)	Blows/ 6"	OVA (ppm)	Geologic Description	Typical Diagram
0					GRAVEL	 <p style="margin-top: 10px;">Not to Scale</p>
1	P160-SB5-2	0-2'		0.6	Olive gray to yellowish-orange clayey sandy SILT	
2						
3	P160-SB5-4	2-4'		0.6		
4					Stiff, light brown to yellowish orange sandy CLAY	
5	P160-SB5-6	4-6'		0.5		
6					Light brown to yellowish-orange silty SAND (WEATHERED GRANITE)	
7	P160-SB5-8	6-8'		0.7	Stiff, yellowish-orange sandy CLAY (WEATHERED GRANITE)	
8					Boring Terminated at 7' bgs	
9						
10						

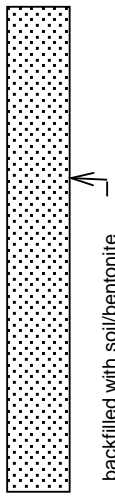
Notes: P160-SB5-6 and P160-SB5-8 submitted to QROS for analysis; refusal at 7' bgs

Geologist: **Joseph Kiker** Driller: **RPS**



BORING LOG: P160-SB6

Permit #	Drill Date 01/21/15	Site Parcel #160
Client NCDOT	Use	URS Corporation
Address 3822 US 401 S, Louisburg, NC 27549		Total Depth (ft) 8'
Drilling Method Geoprobe Direct Push	Boring Depth (ft) 8'	Boring Diam. (in) 1.5
Backfill Material Soil/Bentonite		Static Water Level unknown
Remarks:	TOC Elevation NA	Sample Method Acetate Liner (4 ft)

Depth (ft.)	Sample ID	Sample Depth (ft)	Blows/ 6"	OVA (ppm)	Geologic Description	Typical Diagram
0					GRAVEL	 <p style="margin-top: 10px;">Not to Scale</p>
1	P160-SB6-2	0-2'		1.2	Olive gray to yellowish-orange clayey sandy SILT	
2						
3	P160-SB6-4	2-4'		0.7		
4						
5	P160-SB6-6	4-6'		1.2	Stiff, yellowish-orange sandy CLAY	
6						
7	P160-SB6-8	6-8'		0.6		
8					WEATHERED GRANITE	
9					Boring Terminated at 8' bgs	
10						

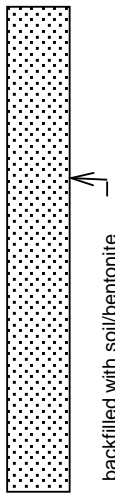
Notes: P160-SB6-6 and P160-SB6-8 submitted to QROS for analysis

Geologist: **Joseph Kiker** Driller: **RPS**



BORING LOG: P160-SB7

Permit #	Drill Date 01/21/15	Site Parcel #160
Client NCDOT	Use	URS Corporation
Address 3822 US 401 S, Louisburg, NC 27549		Total Depth (ft) 8'
Drilling Method Geoprobe Direct Push	Boring Depth (ft) 8'	Boring Diam. (in) 1.5
Backfill Material Soil/Bentonite		Static Water Level unknown
Remarks:	TOC Elevation NA	Sample Method Acetate Liner (4 ft)

Depth (ft.)	Sample ID	Sample Depth (ft)	Blows/ 6"	OVA (ppm)	Geologic Description	Typical Diagram
0					GRAVEL with brick (FILL)	 <p style="margin-top: 10px;">Not to Scale</p>
1	P160-SB7-2	0-2'		1.2	Olive gray to yellowish-orange clayey sandy SILT	
2					Stiff, yellowish-orange sandy CLAY	
3	P160-SB7-4	2-4'		1.3		
4					WEATHERED GRANITE	
5	P160-SB7-6	4-6'		0.7		
6					WEATHERED GRANITE	
7	P160-SB7-8	6-8'		1.0		
8					Boring Terminated at 8' bgs	
9						
10						

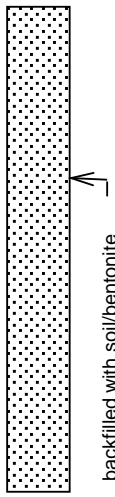
Notes: P160-SB7-6 and P160-SB7-8 submitted to QROS for analysis

Geologist: **Joseph Kiker** Driller: **RPS**



BORING LOG: P160-SB8

Permit #	Drill Date 01/21/15	Site Parcel #160
Client NCDOT	Use	URS Corporation
Address 3822 US 401 S, Louisburg, NC 27549		Total Depth (ft) 6'
Drilling Method Geoprobe Direct Push	Boring Depth (ft) 6'	Boring Diam. (in) 1.5
Backfill Material Soil/Bentonite		Static Water Level unknown
Remarks:	TOC Elevation NA	Sample Method Acetate Liner (4 ft)

Depth (ft.)	Sample ID	Sample Depth (ft)	Blows/ 6"	OVA (ppm)	Geologic Description	Typical Diagram
0						 <p style="margin-top: 10px;">Not to Scale</p>
2	P160-SB8-2	0-2'		1.5	Light brown to yellowish-orange clayey SILT	
4	P160-SB8-4	2-4'		1.6	Stiff, yellowish-orange sandy CLAY	
6	P160-SB8-6	4-6'		1.3	WEATHERED GRANITE	
8					Boring Terminated at 6' bgs	
10						

Notes: P160-SB8-4 and P160-SB8-6 submitted to QROS for analysis; hand auger to 4' bgs; refusal at 6' bgs

Geologist: **Joseph Kiker** Driller: **RPS**



BORING LOG: P160-SB9

Permit #	Drill Date 01/21/15	Site Parcel #160
Client NCDOT	Use	URS Corporation
Address 3822 US 401 S, Louisburg, NC 27549		Total Depth (ft) 6'
Drilling Method Geoprobe Direct Push	Boring Depth (ft) 6'	Boring Diam. (in) 1.5
Backfill Material Soil/Bentonite		Static Water Level unknown
Remarks:	TOC Elevation NA	Sample Method Acetate Liner (4 ft)

Depth (ft.)	Sample ID	Sample Depth (ft)	Blows/ 6"	OVA (ppm)	Geologic Description	Typical Diagram
0					GRAVEL (FILL)	<p style="text-align: center;">backfilled with soil/bentonite</p> <p style="text-align: center;">Not to Scale</p>
1.6	P160-SB9-2	0-2'		1.6	Olive gray to yellowish-orange clayey sandy SILT	
2	P160-SB9-4	2-4'		1.7	Stiff, yellowish-orange sandy CLAY	
4	P160-SB9-6	4-6'		2.0		
6					Boring Terminated at 6' bgs	
8						
10						

Notes: P160-SB9-4 and P160-SB9-6 submitted to QROS for analysis; refusal at 6'

Geologist: **Joseph Kiker** Driller: **RPS**



BORING LOG: P160-SB10

Permit #	Drill Date 01/21/15	Site Parcel #160
Client NCDOT	Use	URS Corporation
Address 3822 US 401 S, Louisburg, NC 27549		Total Depth (ft) 8'
Drilling Method Geoprobe Direct Push	Boring Depth (ft) 8'	Boring Diam. (in) 1.5
Backfill Material Soil/Bentonite		Static Water Level unknown
Remarks:	TOC Elevation NA	Sample Method Acetate Liner (4 ft)

Depth (ft.)	Sample ID	Sample Depth (ft)	Blows/ 6"	OVA (ppm)	Geologic Description	Typical Diagram
0					ASPHALT and GRAVEL	<p style="text-align: center;">Not to Scale</p>
1.4	P160-SB10-2	0-2'		1.4	Stiff, yellowish-orange sandy CLAY	
2.1					Yellowish-orange sandy clayey SILT	
2.4	P160-SB10-4	2-4'		1.9	Stiff, yellowish-orange sandy CLAY	
4.0	P160-SB10-6	4-6'		1.6	Stiff, yellowish-orange sandy CLAY	
6.8	P160-SB10-8	6-8'		1.9	WEATHERED GRANITE	
8.0					Boring Terminated at 8' bgs	
10.0						

Notes: P160-SB10-6 and P160-SB10-8 submitted to QROS for analysis

Geologist: **Joseph Kiker** Driller: **RPS**



BORING LOG: P160-SB11

Permit #	Drill Date 01/21/15	Site Parcel #160
Client NCDOT	Use	URS Corporation
Address 3822 US 401 S, Louisburg, NC 27549		Total Depth (ft) 8'
Drilling Method Geoprobe Direct Push	Boring Depth (ft) 8'	Boring Diam. (in) 1.5
Backfill Material Soil/Bentonite		Static Water Level unknown
Remarks:	TOC Elevation NA	Sample Method Acetate Liner (4 ft)

Depth (ft.)	Sample ID	Sample Depth (ft)	Blows/ 6"	OVA (ppm)	Geologic Description	Typical Diagram
0					ASPAHLT and GRAVEL	<p style="text-align: center;">Not to Scale</p>
1.7	P160-SB11-2	0-2'		1.7	Yellowish-orange SILT	
2						
4	P160-SB11-4	2-4'		1.5	Stiff, yellowish-orange sandy CLAY	
6	P160-SB11-6	4-6'		2.2		
8	P160-SB11-8	6-8'		2.3	WEATHERED GRANITE	
8					Boring Terminated at 8' bgs	
10						

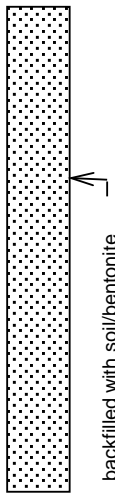
Notes: P160-SB11-6 and P160-SB11-8 submitted to QROS for analysis

Geologist: **Joseph Kiker** Driller: **RPS**



BORING LOG: P160-SB12

Permit #	Drill Date 01/21/15	Site Parcel #160
Client NCDOT	Use	URS Corporation
Address 3822 US 401 S, Louisburg, NC 27549		Total Depth (ft) 8'
Drilling Method Geoprobe Direct Push	Boring Depth (ft) 8'	Boring Diam. (in) 1.5
Backfill Material Soil/Bentonite		Static Water Level unknown
Remarks:	TOC Elevation NA	Sample Method Acetate Liner (4 ft)

Depth (ft.)	Sample ID	Sample Depth (ft)	Blows/ 6"	OVA (ppm)	Geologic Description	Typical Diagram
0					ASPHALT and GRAVEL	 <p style="margin-top: 10px;">Not to Scale</p>
2	P160-SB12-2	0-2'		1.0	Stiff, yellowish-orange sandy CLAY	
4	P160-SB12-4	2-4'		1.3		
6	P160-SB12-6	4-6'		1.4	WEATHERED GRANITE	
8	P160-SB12-8	6-8'		1.7	Boring Terminated at 8' bgs	
10						

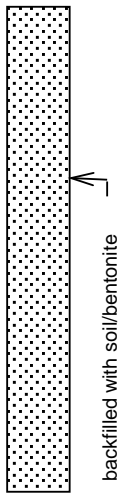
Notes: All samples submitted to QROS for analysis

Geologist: **Joseph Kiker** Driller: **RPS**



BORING LOG: P160-SB13

Permit #	Drill Date 01/21/15	Site Parcel #160
Client NCDOT	Use	URS Corporation
Address 3822 US 401 S, Louisburg, NC 27549		Total Depth (ft) 8'
Drilling Method Geoprobe Direct Push	Boring Depth (ft) 8'	Boring Diam. (in) 1.5
Backfill Material Soil/Bentonite		Static Water Level unknown
Remarks:	TOC Elevation NA	Sample Method Acetate Liner (4 ft)

Depth (ft.)	Sample ID	Sample Depth (ft)	Blows/ 6"	OVA (ppm)	Geologic Description	Typical Diagram
0					ASPHALT and GRAVEL	 <p style="text-align: center;">Not to Scale</p>
2	P160-SB13-2	0-2'		1.8	Stiff, yellowish-orange sandy CLAY	
4	P160-SB13-4	2-4'		1.5		
6	P160-SB13-6	4-6'		2.4	WEATHERED GRANITE	
8	P160-SB13-8	6-8'		2.0		
10					Boring Terminated at 8' bgs	

Notes: P160-SB13-6 and P160-SB13-8 submitted to QROS for analysis

Geologist: **Joseph Kiker** Driller: **RPS**

Appendix B
QED Hydrocarbon Analysis Results



Hydrocarbon Analysis Results

Client: AECOM

Address:

Samples taken
Samples extracted
Samples analysed

Wednesday, January 21, 2015
 Wednesday, January 21, 2015
 Wednesday, January 21, 2015

Contact: MIKE MURPHY

Operator

RACHEL MENOHER

Project: P160

Hydrocarbon Analysis Results													
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	P160 SB-1-6	13.6	<0.7	<0.7	0.82	0.82	0.23	<0.01	<0.014	0	31	69	Deg Fuel (FCM) 82.7%
s	P160 SB-1-8	10.7	<0.5	<0.5	0.61	0.61	0.18	<0.01	<0.011	0	34.6	65.4	Deg Fuel (FCM) 98.7%
s	P160 SB-2-4	9.9	<0.5	<0.5	4.93	4.93	1.31	0.06	<0.01	55.6	26.2	18.2	Deg Fuel (FCM) 58.7%
s	P160 SB-2-5	10.2	<0.5	<0.5	2.05	2.05	0.64	0.03	<0.01	53.9	24.3	21.9	Deg Fuel (FCM) 65.4%
s	P160 SB-3-6	13.9	<0.7	<0.7	<0.14	<0.14	<0.14	<0.01	<0.014	0	4.5	95.5	Match not possible
s	P160 SB-3-8	9.5	<0.5	<0.5	<0.1	<0.1	<0.1	<0.01	<0.01	0	4	96	Match not possible
s	P160 SB-4-6	25.7	<1.3	<1.3	89.87	89.87	29.2	1.01	<0.026	51.2	43.5	5.2	Deg Fuel (FCM) 83%
s	P160 SB-4-8	17.3	<0.9	<0.9	81.46	81.46	27.05	0.95	<0.017	47.9	46.8	5.2	Deg Fuel (FCM) 86.4%
s	P160 SB-5-6	12.4	<0.6	<0.6	1.34	1.34	0.62	0.03	<0.012	58.8	24.4	16.8	Deg Fuel (FCM) 96.8%
s	P160 SB-5-8	7.2	<0.4	<0.4	0.34	0.34	0.11	<0.01	<0.007	0	22.2	77.8	Deg Fuel (FCM) 92.9%
Initial Calibrator QC check				OK		Final FCM QC Check				OK		103.4%	

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



Hydrocarbon Analysis Results

Client: AECOM

Address:

Samples taken
Samples extracted
Samples analysed

Wednesday, January 21, 2015
 Wednesday, January 21, 2015
 Wednesday, January 21, 2015

Contact: MIKE MURPHY

Operator

RACHEL MENOHER

Project: P160

Hydrocarbon Analysis Results													
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	P160 SB-6-6	23.2	<1.2	<1.2	61.55	61.55	20.71	0.73	<0.023	48.2	45.8	6	Deg Fuel (FCM) 86.9%
s	P160 SB-6-8	22.8	<1.1	<1.1	6.54	6.54	2.4	0.1	<0.023	55	33.6	11.4	Deg Fuel (FCM) 85.6%
s	P160 SB-7-6	22.4	<1.1	<1.1	37.4	37.4	13.18	0.49	<0.022	51	42.6	6.4	Deg Fuel (FCM) 98.5%
s	P160 SB-7-8	27.7	<1.4	<1.4	9.39	9.39	3.5	0.12	<0.028	56.5	34	9.5	Deg Fuel (FCM) 81.5%
s	P160 SB-8-4	12.0	<0.6	<0.6	<0.12	<0.12	<0.12	<0.01	<0.012	0	0	100	Pet.Hyd not Detected
s	P160 SB-8-6	8.5	<0.4	<0.4	<0.09	<0.09	<0.09	<0.01	<0.009	0	0	100	Pet.Hyd not Detected
s	P160 SB-9-4	12.1	<0.6	<0.6	<0.12	<0.12	<0.12	<0.01	<0.012	0	0	100	Pet.Hyd not Detected
s	P160 SB-9-6	11.2	<0.6	<0.6	18.62	18.62	6.38	0.22	<0.011	52.4	41.3	6.4	Deg Fuel (FCM) 84.7%
s	P160 SB-10-6	16.1	<0.8	<0.8	40.06	40.06	12.85	0.45	<0.016	51.6	42.9	5.5	Deg Fuel (FCM) 81.1%
s	P160 SB-10-8	24.3	<1.2	<1.2	141.3	141.3	43.01	1.52	<0.024	47.3	48.2	4.6	Deg Fuel (FCM) 80.6%
Initial Calibrator QC check				OK		Final FCM QC Check				OK		105.2%	

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



Hydrocarbon Analysis Results

Client: AECOM

Address:

Samples taken
Samples extracted
Samples analysed

Wednesday, January 21, 2015
 Wednesday, January 21, 2015
 Wednesday, January 21, 2015

Contact: MIKE MURPHY

Operator

RACHEL MENOHER

Project: P160

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	P160 SB-11-6	15.5	<0.8	<0.8	13.57	13.57	4.76	0.16	<0.015	56.5	36.4	7.2	Deg Fuel (FCM) 82.2%
s	P160 SB-11-8	20.2	<1	<1	48.85	48.85	16.38	0.56	<0.02	54	40.4	5.5	Deg Fuel (FCM) 83.4%
s	P160 SB-12-2	21.1	<1.1	<1.1	34.76	34.76	12.48	0.44	<0.021	54.3	38	7.7	Deg Fuel (FCM) 93.4%
s	P160 SB-12-4	21.1	<1.1	<1.1	45.01	45.01	16.03	0.56	<0.021	52.9	39.7	7.4	Deg Fuel (FCM) 93.6%
s	P160 SB-12-6	238.0	<11.9	<11.9	315.3	315.3	115	4.01	<0.238	54.1	37.9	8	Deg Fuel (FCM) 94.5%
s	P160 SB-12-8	21.5	<1.1	<1.1	114.5	114.5	40.4	1.46	<0.021	47.1	46.5	6.4	Deg Fuel (FCM) 95%
s	P160 SB-13-6	15.1	<0.8	<0.8	20.5	20.5	6.47	0.22	<0.015	55.4	38.7	5.9	Deg Fuel (FCM) 74.8%
s	P160 SB-13-8	17.6	<0.9	<0.9	80.59	80.59	25.7	0.91	<0.018	47	47.9	5.1	Deg Fuel (FCM) 83.8%
Initial Calibrator QC check			OK			Final FCM QC Check			OK			95.8%	

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

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

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