Phase II Environmental Site Assessment
Roadway Improvement Project

Route 1 Widening Project
Daniel's Auto Care
17711 Jefferson Davis Highway
Dumfries, Virginia 22172
Prince William County

Contract ID: 44115
VDOT Project: 001-212-249
VDOT UPC: 90339 Act: 689
VDOT Task Number: E-FR024.04

Prepared for
Mr. Brutus Cooper
Regional VDOT HAZMAT Manager
Virginia Department of Transportation
NOVA District Office
4975 Alliance Drive
Fairfax, VA 22030

Prepared by
EEE Consulting, Inc.
201 Church Street
Blacksburg, Virginia 24060

February 2019

Prepared by: **Joshua P. Hepler, PG, Project Scientist**

Reviewed by: **Christopher J. Lalli, Vice President**

3e EEE Consulting, Inc.
Environmental, Engineering and Educational Solutions

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Acronyms

AST	Above Ground Storage Tank
BGS	Below Ground Surface
C	Celsius
COC	Chain of Custody
CL	Center Line
DEQ	Department of Environmental Quality
EPA	Environmental Protection Agency – United States
FT	Feet
LT	Left
mg/kg	Milligrams per Kilogram
MW	Monitoring Well
OWS	Oil Water Separator
PG	Professional Geologist
PID	Photoionization Detector
PPM	Parts Per Million
REC	Recognized Environmental Condition
RL	Reporting Limit
Rt	Route
RT	Right
R/W	Right-of-Way
STA	Station
TPH-DRO	Total Petroleum Hydrocarbons - Diesel Range Organics
TPH-GRO	Total Petroleum Hydrocarbons – Gasoline Range Organics
UST	Underground Storage Tank
VDOT	Virginia Department of Transportation
VOC	Volatile Organic Compounds
VSWMR	Virginia Solid Waste Management Regulations
3e	EEE Consulting, Inc.

1.0 INTRODUCTION AND BACKGROUND

The Virginia Department of Transportation (VDOT) is administering proposed improvements and realignment of 2.3-miles of Route 1 (Fraley Boulevard) between the intersection with Quantico Gateway Drive and the intersection with Drumfires Road (State Route 234) in Dumfries, Prince William County, Virginia. The general project location and topographic setting are shown on **Figures 1** and **2**, respectively. An aerial photograph of the project area is also presented as **Figure 3**.

The roadway and drainage improvements will occur in existing roadway right-of-way (R/W), proposed R/W, permanent easements (slope & drainage), temporary construction easements (i.e. erosion & sediment control measures) and proposed limited access lines. A Phase I Environmental Site Assessment (ESA) was prepared by EEE Consulting, Inc (**3e**) for the Study Area in August 2018, which identified Recognized Environmental Conditions (REC) throughout the corridor, including the subject property as follows:

- **Daniel's Auto Care** (Parcel 040) located at 17711 Jefferson Davis Highway, Dumfries, VA 22172 (VDOT Plan Sheet Nos. 12, 12A, 13 and 13A), which is an active automotive repair shop that has floor drains that discharge to an on-site Oil Water Separator (OWS). Multiple 55-gallon drums of used petroleum and antifreeze with poor housekeeping are also located outside.

According to Plan Sheet Nos. 12 and 13, the property is a potential full take because of the proposed R/W and permanent slope easement limits that intersect one story masonry building on-site. Improvements proposed to date at Parcel 040 include Drainage Structures 12-4, 13-15 and the associated 24-inch diameter connection pipe, sidewalk, and roadway realignment improvements (see **Figure 4**).

The RECs identified at Parcel 040 have the potential to pose adverse impacts to subsurface media that will likely be disturbed during the installation of the noted drainage improvements. The constituents of concern are petroleum-based, which are based on the RECs identified above and detailed in the Phase I ESA Corridor Study Report (**3e**, August 2018). Based on this information, the VDOT – NOVA District Hazardous Materials Manager requested the collection of representative samples to confirm the presence/absence of petroleum impacts to soil and groundwater, if encountered, in and proximate to the proposed disturbance areas. On December 6th, 2018, **3e** completed a Phase II ESA at Parcel 040 to confirm the presence/absence of impacts to subsurface media that will likely be disturbed in response to the proposed drainage improvements.

Subsurface boring advancements, sampling methods, corresponding analytical results, and conclusions/recommendations pertaining to the proposed construction activities at Parcel 040 are summarized in the following sections of this report.

2.0 PUBLIC/PRIVATE UTILITY CLEARINGS AND MARK OUTS

Prior to implementing the direct push boring installations, the approximate locations of subsurface public utilities were identified and marked by Miss Utility of Virginia. A utility locate request form was also completed with VDOT to identify utilities owned and operated by VDOT. Copies of the Miss Utility and VDOT Tickets are included in **Appendix A**. In addition to public utility identification, private subsurface utilities were also identified and marked in each investigative area prior to commencing drilling activities.

3.0 SOIL SAMPLING METHODS

3.1. Soil Sampling Methods

On December 5th, 2018, a direct push drill rig was utilized to advance three (3) soil borings at the following locations:

- B1 – Installed proximate to STA No. 320+30; 65-ft RT of CL to a depth of 9-ft BGS upon refusal on consolidated material.
- B2 – Installed proximate to STA No. 321+05; 65-ft RT of CL to a depth of 8.5-ft BGS upon refusal on consolidated material.
- B3 – Installed proximate to STA No. 321+80; 70-ft RT of CL to a depth of 8.5-ft BGS upon refusal on consolidated material.

The roadway improvements proposed to date, RECs, and boring locations are depicted on **Figure 4**.

Each soil boring was advanced using a Geoprobe® direct push rig. The direct-push rig utilizes a hollow-stem spoon that produced a continuous soil core in five (5)-ft intervals along the vertical depth of each boring. Each boring was advanced to refusal at depths that ranged from 8.5-9-ft BGS. Subsurface conditions (i.e. wet soils) indicative of groundwater were not observed in B1 through B3. The detailed boring logs are presented in **Appendix B**.

Composite soil samples were collected to assess soil that will likely be disturbed during construction. The representative composite soil samples were obtained from the borings by collecting aliquots from the following depth intervals:

- B1: 0-5 and 5-9-ft BGS.
- B2 and B3: 0-5- and 5-8.5-ft BGS.

Each soil sample was placed into two (2) pre-cleaned 4-ounce glass jars. The sample jars were appropriately labeled and placed on ice in a cooler to maintain an appropriate temperature (≤ 4°C) while in transit to the certified environmental laboratory. Chain of Custody (COC) documentation was completed for all samples submitted for laboratory analysis.

All composite soil samples obtained from the three (3) direct push borings were submitted for laboratory analysis of TPH-GRO, TPH-DRO and TPH-ORO by EPA Method 8015C. The COC documentation and laboratory analytical data are provided in **Appendix C**. A detailed discussion of the composite soil sample analytical results is presented in **Section 5.0** of this report.

4.0 PID SCREENING RESULTS

Photoionization Detector (PID) results for the screened direct push soil cores are presented below in **Table 1**. Measurement units are in parts per million (ppm).

Table 1 - PID Soil Screening Data: Route 1 – Daniel's Auto Care

	PID (ppm)	PID (ppm)
Depth (ft BGS)	0-5	5-9
B1	0.2	0.0
B2	2.9	0.2
B3	0.0	0.0

Notes:
ppm = Parts per Million
BGS – Below Ground Surface
Depth Unit – foot BGS

A review of **Table 1** indicates that the measurable PID readings in the screened soil cores were less than 3.0-parts-per-million (ppm). The soil sample collected from B-3 at 0-5-ft BGS contained a low TPH-DRO concentration. This concentration detection did not register an elevated PID reading or odors that were noticeable to olfactory senses, which is consistent for a low concentration detection in the semi-volatile, hydrocarbon chain ranges (i.e. hydrocarbon chains from C10 – C38).

5.0 COMPOSITE SOIL SAMPLE ANALYTICAL RESULTS

The analytical results obtained from the soil samples are summarized in **Table 2** on the following page. All results are listed in units of milligrams-per-kilogram (mg/kg). A detailed laboratory analytical report is provided in **Appendix C**.

Table 2: Soil Sample Analytical Data
Daniel's Auto Care
Route 1 Widening, Dumfries VA
Units = Milligrams per Kilogram (mg/kg)

Location	B1 0-5		B1 5-10		B2 0-5		B2 5-9		B3 0-5		B3 5-8.5	
Laboratory I.D.	18L0344-01		18L0344-02		18L0344-03		18L0344-04		18L0344-05		18L0344-06	
Depth Below Grade	0-5 feet		5-10 feet		0-5 feet		5-9 feet		0-5 feet		5-8.5 feet	
Sample Time	12:55		13:00		13:20		13:30		13:40		13:45	
	Result	*RL*	Result	*RL*	Result	*RL*	Result	*RL*	Result	*RL*	Result	*RL*
TPH-GRO	ND	*0.10*	ND	*0.10*	ND	*0.10*	ND	*0.10*	ND	*0.10*	ND	*0.10*
TPH-DRO	ND	*10.0*	ND	*10.0*	ND	*10.0*	ND	*10.0*	**14.9**	*10.0*	ND	*10.0*
TPH-ORO	ND	*10.0*	ND	*10.0*	ND	*10.0*	ND	*10.0*	ND	*10.0*	ND	*10.0*

Notes:
Bold / Underlined text = Concentration reported above RL
RL = Reporting Limit
ND -Below Laboratory Reporting Limit

A review of **Table 2** indicates that the residual-phase TPH-DRO concentration detected in B3 at 0-5 BGS **did not exceed** the Virginia Solid Waste Management Regulation (VSWMR) TPH limit of 50-mg/kg for fill material (***9VAC20-81-660D.2.d***).

Please note that per the request of **3e**, the contract laboratory [Air Water & Soil Laboratories (AWS) of Richmond, VA] reviewed the chromatograms to ensure that the detected TPH-DRO concentration was not the result of interferences from non-petroleum based organic compounds in the corresponding sample. The AWS lab manager's review of the chromatograms indicates that the detected concentration is associated with some type of oil that elutes peaks in the latter third of the TPH-DRO range with spill over into the range (i.e. C24 to C38) that is associated with heavier-end hydrocarbon chains. A copy of the correspondence that summarizes AWS's interpretation of the detected TPH concentration and associated chromatograms is provided as **Appendix D**.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Three (3) direct push borings were installed to determine if the RECs identified at Parcel 040 resulted in adverse impacts to subsurface media in the proposed R/W, slope easement and/or disturbance areas. The residual-phase TPH-DRO concentration detected in B3 at 0-5 BGS **did not exceed** the VSWMR TPH limit of 50-mg/kg. The estimated volumes of petroleum impacted soil that will likely be excavated in the response to select drainage improvements at Parcel 040, and the corresponding soil management options that apply are detailed in the following sections of this report.

6.1. Petroleum Impacted Soil Volume Estimates

Review of Plan Sheet Nos. 12 and 13 indicates that the following drainage improvements will require excavation in portions of Parcel 040 that are impacted by low residual-phase petroleum concentrations:

- Drainage Structure No. 13-15 and a portion of the associated 24-inch diameter connection pipe from approximately STA Nos 321+60 to 322+10, 70-ft RT of CL.

Please note that drainage descriptions and associated invert elevations were not available for specific structures as of the date of this report. However, preliminary information provided via e-mail by a VDOT Hydraulics/Drainage Engineer indicates that the subject drainage improvements will likely require excavation to depths of approximately 6.5-ft BGS. Based on this preliminary information, **Table 3** below presents the estimated volumes of impacted soil that will likely require Special Management Provisions to the construction contract.

Table 3: Daniels Auto Care
Petroleum-Impacted Soil Volume Estimates
Select Drainage Improvements & Pipe Connections

Boring ID	Impacted Soil Depths	Drainage Structure ID	Impacted Excavation Footprint Location	Impacted Soil Excavation Dimensions	Volume Estimate**	Volume Estimate**	Volume Estimate**
Unit	BGS		STA No.	LxWxH	Cubic Feet (ft^3)	Cubic Yards (yd^3)	Tons*
B3 0-5	0-5-ft	13-15	STA No. 321+80; 70-ft RT of CL	5-ft x 5-ft x 6-ft	150	6	8
B3 0-5	0-5-ft	Associated 24-in pipe	STA No. 321+60 to 322+10; 70-ft RT of CL	50-ft x 4-ft x 6-ft	1200	44	67

Notes:
***Tons calculated with conversion of $1yd^3$ = 1.5 tons**
****Soil volume estimates are approximate and based on preliminary information available as of the date of this report.**

A full-sized copy of **Table 3** is also included as **Appendix E**.

6.2. Petroleum Impacted Soil Management Options

The following management options apply to excavated soil that contains low petroleum constituent concentrations (i.e. TPH concentrations < 50-mg/kg):

1. Exempt Materials and Use (i.e. ***9VAC20-81-95C.7.d***):
   - Nonhazardous, contaminated soil excavated in response to the proposed drainage improvements can be used to backfill the same excavation or excavations containing similar petroleum concentrations on-site. Excess contaminated soil that cannot be used

to backfill the same or similar excavations on-site must be managed in accordance with the applicable requirements of the VSWMR.

2. Manage as petroleum-impacted fill material in accordance with the location restrictions of the VSWMR (***9VAC20-81-660D.2.d***).
   - May not be disposed of within 100-ft of a regularly flowing surface water.
   - 500-ft of any spring, or groundwater source of drinking water.
   - 200-ft from a residence, school, hospital, nursing home, or recreational park.
   - If utilized as fill on an off-site property, then the owner must be notified that it is contaminated and what it is contaminated with (i.e. petroleum).

7.0 LIMITATIONS

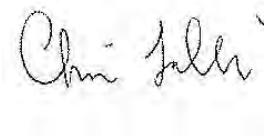
It is impossible to know with certainty the entirety of a site is free of hazardous substances or conditions even with extensive subsurface testing. The conclusions of this investigation are based solely on the scope-of-work and on the sources of information reviewed during this investigation. This report was prepared for the exclusive use of VDOT, and their expressly-designated affiliates. **3e** accepts no responsibility for damages or claims resulting from past or future environmental degradation related to the subject property.

8.0 ACKNOWLEDGEMENT

3e appreciates the opportunity to provide environmental services to VDOT regarding the Daniel's Auto Care - Route 1 roadway improvement project located in Dumfries, VA under the Professional Services HAZMAT Contract. If we may be of further assistance, or you have any questions or comments regarding the project, please contact our office at (540) 953-0170.

9.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS

Joshua P. Hepler, PG
Project Environmental Scientist
Preparer



Chris Lalli
Vice President/Associate
Reviewer

Figures

3e EEE Consulting, Inc.
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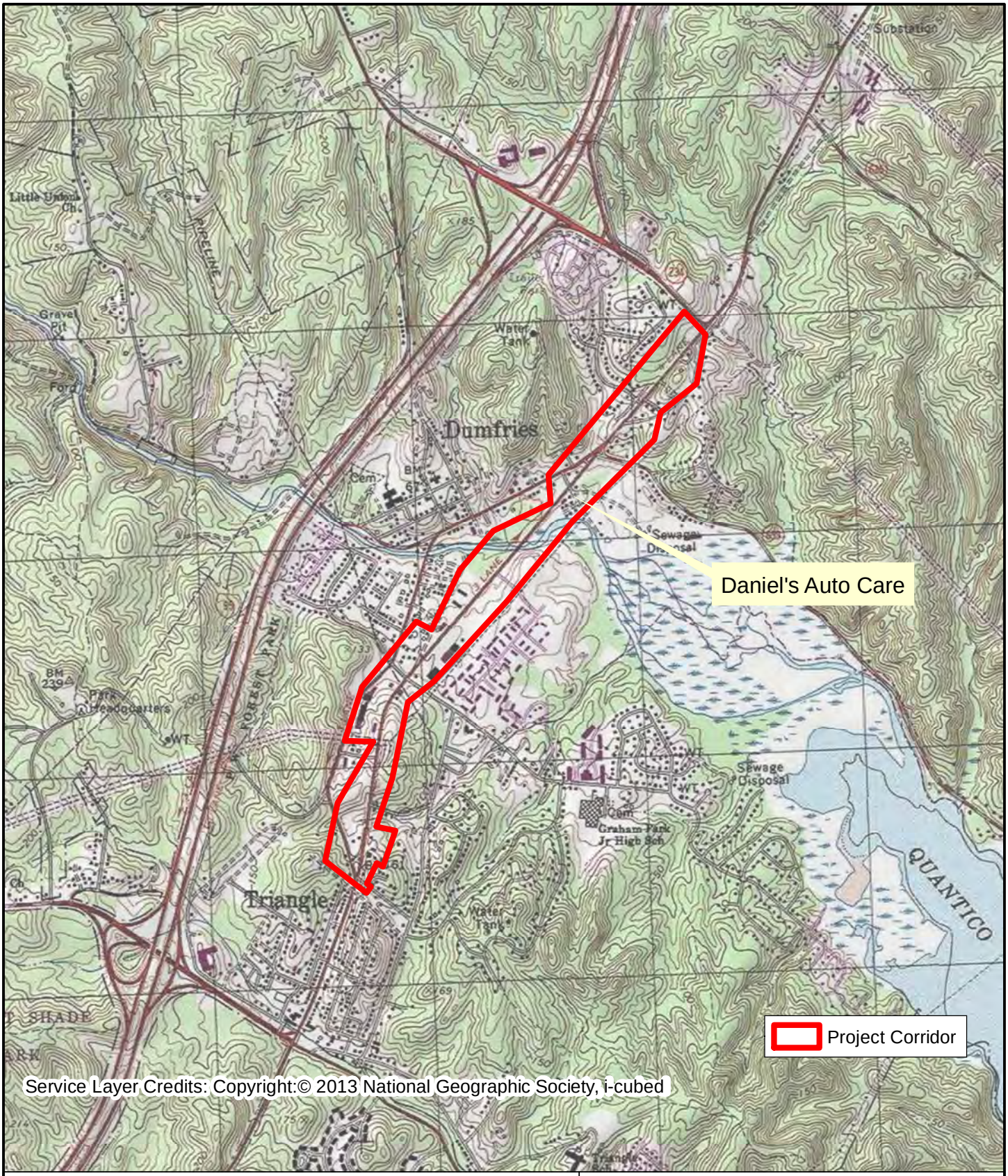
N

Prepared by Leah Potts, 01/24/2019
Projection: NAD 1983 2011 StatePlane Virginia North FIPS 4501 Ft US

FIGURE 1
PROJECT CORRIDOR AERIAL
DANIEL'S AUTO CARE

0 0.5 1
Miles

Dumfries, VA



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Prepared by Leah Potts, 01/24/2019
Projection: NAD 1983 2011 StatePlane Virginia North FIPS 4501 Ft US

FIGURE 2
PROJECT CORRIDOR TOPOGRAPHIC
DANIEL'S AUTO CARE

0 0.5 1
Miles

Dumfries, VA

1:24,000

3e EEE Consulting, Inc.
Environmental, Engineering and Educational Solutions

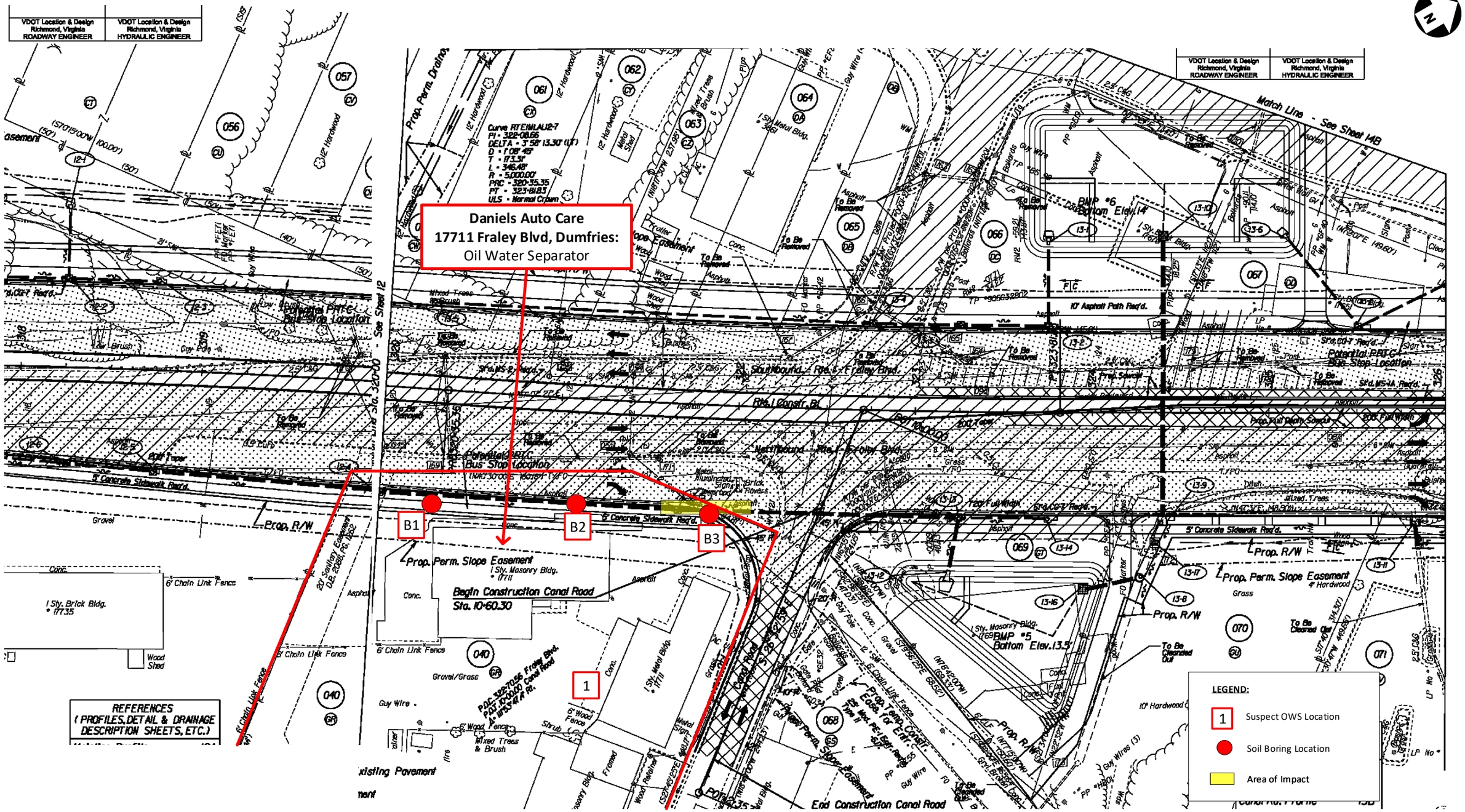
N

Prepared by Leah Potts, 01/24/2019
Sources: VGIN 2017
Projection: NAD 1983 2011 StatePlane Virginia North FIPS 4501 Ft US

FIGURE 3
AERIAL WITH PROPERTY BOUNDARIES
DANIEL'S AUTO CARE

0 200 400
Feet

Dumfries, VA



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VDOT Virginia Department of Transportation

Route 1 Widening Project
Dumfries, Virginia

Figure 4

Plan Sheet Nos. 12 and 13 Depicting Identified RECs and Soil Boring Locations at Daniels Auto Care.

E-FR024.04 January 2019

Appendix A: Miss Utility Ticket and VDOT Ticket

From: tickets@missutilityofvirginia.com
To: Josh Hepler
Subject: VUPS EMLCFM 2018/12/04 #02148 A833101272-01A RUSH RESP LREQ
Date: Tuesday, December 4, 2018 10:05:26 AM
Importance: High

EMLCFM 02148 VUPSa 12/04/18 10:05:17 A833101272-01A RESPONSE

Thank you for contacting VA811! This is an automatically generated response from the utilities who received your notice of excavation. If you have questions about the response, call the "field contact" for that utility. For your safety, please respect and protect the marks, excavate carefully around the marked utility lines and contact VA811 if you see clear evidence of unmarked utilities.

Remember, you can now reach VA811 by dialing 811.

Ticket : A833101272 Rev: 01A Taken: 12/03/18 11:51 AM

State: VA Cnty: PRINCE WILLIAM Place: DUMFRIES
Address : 17711 FRALEY BLVD
Responses due by: 12/03/18 02:52 PM Expires: 12/19/18 07:00 AM

When the member Marking Code is blue, click for additional information that may be provided by the Operator/Locator.

Marking Code	Description	Response	
CGV	COLUMBIA GAS (CGV930)	12/04/18 10:05 AM	10
	Marked Field Contact: UTILIQUEST (703)754-2116 In the event of damage to a facility call: (800)543-8911		
DOM	DOMINION ENERGY ELEC DIST (DOM400)	11/29/18 12:10 PM	30
	No Conflict; utility is outside of stated work area. Field Contact: UTILIQUEST (703)754-2116 In the event of damage to a facility call: (888)667-3000		
PWS	PRINCE WILLIAM - WATER (PWS902)	12/03/18 12:42 PM	12
	Marked up to privately owned utility; contact private utility owner for locate Field Contact: BUTCH ROGERS (703)609-8097 In the event of damage to a facility call: (703)335-7982		
PWS	PRINCE WILLIAM - SEWER (PWS903)	11/29/18 11:36 AM	12
	Marked up to privately owned utility; contact private utility owner for locate Field Contact: BUTCH ROGERS (703)609-8097 In the event of damage to a facility call: (703)335-7982		
VZN	VERIZON (VZN703)	12/04/18 10:01 AM	10
	Marked Field Contact: UTILIQUEST (703)754-2116 In the event of damage to a facility call: (888)483-1233		

LC1B

Locate Work Order Number:
N-04432

Project Location:
17711 Fraley Blvd

Utility Location Results Form

Utility Location Results *(completed by utility location service provider)*

Photos attached ☑ Yes ☐ No

Was the location that was requested completed? ☐ Yes ☑ No

Detection cable and/or location tape available ☐ Yes ☑ No
Accurate As-Built Documents available ☐ Yes ☑ No

If no, please check all applicable boxes:

Accurate As-Built Documents:
Requested? ☐ Yes ☑ No Provided? ☐ Yes ☐ No

VDOT on-site assistance:
Requested? ☐ Yes ☑ No Provided? ☐ Yes ☐ No

Does the in-field survey area extend 3 feet beyond the border of the intended excavation area? (Required) ☐ Yes ☑ No

Utility Location Method(s) used: _____

Comments:

☐ Serco/Elite has provided utility markings within the scope of this request for all VDOT owned fiber optic communications cable, and all power cabling from the ITS Device to the ITS Cabinet that was accurately shown on drawings if provided by VDOT, or actual location contained detection cable or tape, and/or VDOT provided on-site assistance.

☐ Where no detection cable/tape and or accurate as-built documents, and/or VDOT assistance was not provided, we have provided approximate markings or no markings have occurred and the 3rd Party Requestor is advised that hand digging with extreme caution is advised. Photos have been attached.

☑ Please be advised that in no case will Serco/Elite be held liable or responsible for any power or communication cabling that falls outside our scope and could not be located due to the lack of accurate documentation, detection cable or tape, and/or VDOT assistance

☑ Arrived onsite to verify no VDOT ITS assets in the area.Team then verified junction boxes in area do not house VDOT fiber.

Certification: The most appropriate equipment and technology to identify all VDOT underground utilities within the requested zone were used.

Utility Locator: (Print) Matt Robinson
(signature) _____
Company: Elite Contracting

Start time: 3:25 PM
End time: 3:28 PM
Date: 11-28-18

This information is valid for 15 days from signed date of marking. Any work performed after 15 days is not covered under this request and will need re-marked.

Appendix B: Boring Logs

Project Location:	**RT 1 Widening**
Site	**Daniel's Auto Care**
Location	**STA 320+30.00; 65-ft RT of CL**
Boring Location:	**B1**

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Date(s) Drilled: **12/5/18**	Logged By: **Josh Hepler/Carroll Ellis**	Well Information: **N/A**
Drill Rig Type: **Geo Probe**	Total Depth Drilled: **8'**	Screened Interval:
DTW Within Soil Boring: **N/A**		Cased Interval:
Static GW Level: **N/A**	Date GW Measured: **N/A**	

Depth (feet)	Sample Info			Material Description
	PID (ppm)	Sample Interval (ft)	Time	
1 2 3 4 5	0.2		12:55	60% recovery. 0-0.5' asphalt, gravel. 0.5-4' light brown clay. 4-5' grey/green sandy clay, low moisture, slight organic odor.
6 7 8 9 10	0.0		1:00	5-7' gravelly sand with clay, at 8' becomes moist fill (grey/brown and sandy). Refusal at 9', gray rock, silty, shale? Organic odor.
11 12 13 14 15				
16 17 18 19 20				

BGS - Below Ground Surface

Project Location:	**RT 1 Widening**		
Site	**Daniel's Auto Care**		
Location	**STA 321+05.00; 65-ft RT of CL**		
Boring Location:	**B2**		
Date(s) Drilled:	**12/5/18**	Logged By: **Josh Hepler/Carroll Ellis**	Well Information: **N/A**
Drill Rig Type:	**Geo Probe**	Total Depth Drilled: **9'**	Screened Interval:
DTW Within Soil Boring:	**N/A**		Cased Interval:
Static GW Level:	**N/A**	Date GW Measured:	**N/A**

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Depth (feet)	Sample Info			Material Description
	PID (ppm)	Sample Interval (ft)	Time	
1 2 3 4 5	2.9		1:20	0.5-3' orange/brown silty clay, low moisture. 3-4' sandy clay, orange/brown, slightly moist. 4-5' clay, slightly moist. No odors.
6 7 8 9 10	0.2		1:30	5-7' brown/yellow clay, low moisture. 7-8.5' very rocky grey silt, low moisture. 8.5-9' silt stone. Refusal at 9'.
11 12 13 14 15				
16 17 18 19 20				

BGS - Below Ground Surface

Project Location:	**RT 1 Widening**
Site	**Daniel's Auto Care**
Location	**STA 321+80.00; 70-ft RT of CL**
Boring Location:	**B3**

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Date(s) Drilled: **12/5/18**	Logged By: **Josh Hepler/Carroll Ellis**	Well Information: **N/A**
Drill Rig Type: **Geo Probe**	Total Depth Drilled: **8.5'**	Screened Interval:
DTW Within Soil Boring: **N/A**		Cased Interval:
Static GW Level: **N/A**	Date GW Measured: **N/A**	

Depth (feet)	Sample Info			Material Description
	PID (ppm)	Sample Interval (ft)	Time	
1 2 3 4 5	0.0		1:40	75% Recovery; 0-1' asphalt, black, fill (grey with sandy clay), dry. 1-3' brown with green sandy clay. 3-5' black/brown sandy clay trending to all sand. Slight odor and moisture.
6 7 8 9 10	0.0		1:45	5-7' tan brown clay, low moisture, no odor. 7-8' sandy, moist, rocky, low odor. 8-8.5' silt stone. Refusal at 8.5'.
11 12 13 14 15				
16 17 18 19 20				

BGS - Below Ground Surface

Appendix C: Laboratory Reports and Sample Custody Documentation

AIR WATER & SOIL LABORATORIES, INC.

1941 Reymet Road ● Richmond, Virginia 23237 ● Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Laboratory Order ID 18L0344

Client Name:	EEE Consulting (Blacksburg, VA) 201 Church Street Blacksburg, VA 24060	Date Received:	December 7, 2018 15:15
		Date Issued:	December 19, 2018 15:05
		Project Number:	18-796.04
Submitted To:	Josh Hepler	Purchase Order:	18-796.04
Client Site I.D.:	Daniels		

Enclosed are the results of analyses for samples received by the laboratory on 12/07/2018 15:15. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,

Ted Soyars

Laboratory Manager

End Notes:

The test results listed in this report relate only to the samples submitted to the laboratory and as received by the Laboratory.

Unless otherwise noted, the test results for solid materials are calculated on a wet weight basis. Analyses for pH, dissolved oxygen, temperature, residual chlorine and sulfite that are performed in the laboratory do not meet NELAC requirements due to extremely short holding times. These analyses should be performed in the field. The results of field analyses performed by the Sampler included in the Certificate of Analysis are done so at the client's request and are not included in the laboratory's fields of certification nor have they been audited for adherence to a reference method or procedure.

The signature on the final report certifies that these results conform to all applicable NELAC standards unless otherwise specified. For a complete list of the Laboratory's NELAC certified parameters please contact customer service.

Accredited in accordance with nelac — Commonwealth of Virginia, DCLS Accreditation # 460021

NWBOC EDWOSB Certified

Certified SWaM Small, Women and Minority-Owned — Supplier Diversity Strengthens the Commonwealth — by the Virginia Department of Minority Business Enterprise

1941 Reymet Road ● Richmond, Virginia 23230 ● Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Client Name:	EEE Consulting (Blacksburg, VA) 201 Church Street Blacksburg VA, 24060	Date Issued:	12/19/2018 15:05
Submitted To:	Josh Hepler	Project Number:	18-796.04
Client Site I.D.:	Daniels	Purchase Order:	18-796.04

ANALYTICAL REPORT FOR SAMPLES

Laboratory Order ID 18L0344

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B1 0-5	18L0344-01	Soil	12/05/2018 12:55	12/07/2018 15:15
B1 5-10	18L0344-02	Soil	12/05/2018 13:00	12/07/2018 15:15
B2 0-5	18L0344-03	Soil	12/05/2018 13:20	12/07/2018 15:15
B2 5-9	18L0344-04	Soil	12/05/2018 13:30	12/07/2018 15:15
B3 0-5	18L0344-05	Soil	12/05/2018 13:40	12/07/2018 15:15
B3 5-8.5	18L0344-06	Soil	12/05/2018 13:45	12/07/2018 15:15

AIR WATER SOIL LABORATORIES, INC.

1941 Reymet Road ● Richmond, Virginia 23230 ● Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Client Name:	EEE Consulting (Blacksburg, VA) 201 Church Street Blacksburg VA, 24060	Date Issued:	12/19/2018 15:05
Submitted To:	Josh Hepler	Project Number:	18-796.04
Client Site I.D.:	Daniels	Purchase Order:	18-796.04

Laboratory Order ID: 18L0344

Analytical Results

Sample I.D. B1 0-5 **Laboratory Sample ID:** 18L0344-01

Grab Date/Time: 12/05/2018 12:55

Field Residual Cl: **Field pH:**

Parameter	Samp ID	Method	Result	Qual	Reporting Limit	D.F.	Sample Prep Date/Time	Analysis Date/Time	Analyst
Volatile Hydrocarbons by GC									
TPH-Volatiles (GRO)	01	SW8015C	<0.10 mg/kg		0.10	1	12/12/18 15:12	12/12/18 15:12	NJR
Surr: 2,5-Dibromotoluene (Surr FID)	*01*	*SW8015C*	*87.6 %*		*80-120*		*12/12/18 15:12*	*12/12/18 15:12*	*NJR*
Semivolatile Hydrocarbons by GC									
TPH-Semi-Volatiles (DRO)	01	SW8015C	<10.0 mg/kg		10.0	1	12/17/18 09:20	12/18/18 22:50	HLM
Surr: Pentacosane (Surr)	*01*	*SW8015C*	*90.0 %*		*40-160*		*12/17/18 09:20*	*12/18/18 22:50*	*HLM*
TPH-Semi-Volatiles (ORO)	01	SW8015C	<10.0 mg/kg		10.0	1	12/17/18 11:45	12/18/18 19:37	HLM

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Laboratory Order ID: 18L0344

Analytical Results

Sample I.D. B1 5-10 **Laboratory Sample ID:** 18L0344-02

Grab Date/Time: 12/05/2018 13:00

Field Residual Cl: **Field pH:**

Parameter	Samp ID	Method	Result	Qual	Reporting Limit	D.F.	Sample Prep Date/Time	Analysis Date/Time	Analyst
Volatile Hydrocarbons by GC									
TPH-Volatiles (GRO)	02	SW8015C	<0.10 mg/kg		0.10	1	12/12/18 15:34	12/12/18 15:34	NJR
Surr: 2,5-Dibromotoluene (Surr FID)	*02*	*SW8015C*	*84.3 %*		*80-120*		*12/12/18 15:34*	*12/12/18 15:34*	*NJR*
Semivolatile Hydrocarbons by GC									
TPH-Semi-Volatiles (DRO)	02	SW8015C	<10.0 mg/kg		10.0	1	12/17/18 09:20	12/18/18 23:17	HLM
Surr: Pentacosane (Surr)	*02*	*SW8015C*	*92.2 %*		*40-160*		*12/17/18 09:20*	*12/18/18 23:17*	*HLM*
TPH-Semi-Volatiles (ORO)	02	SW8015C	<10.0 mg/kg		10.0	1	12/17/18 11:45	12/18/18 20:01	HLM

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Laboratory Order ID: 18L0344

Analytical Results

Sample I.D. B2 0-5 **Laboratory Sample ID:** 18L0344-03

Grab Date/Time: 12/05/2018 13:20

Field Residual Cl: **Field pH:**

Parameter	Samp ID	Method	Result	Qual	Reporting Limit	D.F.	Sample Prep Date/Time	Analysis Date/Time	Analyst
Volatile Hydrocarbons by GC									
TPH-Volatiles (GRO)	03	SW8015C	<0.10 mg/kg		0.10	1	12/12/18 15:56	12/12/18 15:56	NJR
Surr: 2,5-Dibromotoluene (Surr FID)	*03*	*SW8015C*	*87.3 %*		*80-120*		*12/12/18 15:56*	*12/12/18 15:56*	*NJR*
Semivolatile Hydrocarbons by GC									
TPH-Semi-Volatiles (DRO)	03	SW8015C	<10.0 mg/kg		10.0	1	12/17/18 14:40	12/18/18 17:06	HLM
Surr: Pentacosane (Surr)	*03*	*SW8015C*	*107 %*		*40-160*		*12/17/18 14:40*	*12/18/18 17:06*	*HLM*
TPH-Semi-Volatiles (ORO)	03	SW8015C	<10.0 mg/kg		10.0	1	12/17/18 11:45	12/18/18 20:26	HLM

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Laboratory Order ID: 18L0344

Analytical Results

Sample I.D. B2 5-9 **Laboratory Sample ID:** 18L0344-04

Grab Date/Time: 12/05/2018 13:30

Field Residual Cl: **Field pH:**

Parameter	Samp ID	Method	Result	Qual	Reporting Limit	D.F.	Sample Prep Date/Time	Analysis Date/Time	Analyst
Volatile Hydrocarbons by GC									
TPH-Volatiles (GRO)	04	SW8015C	<0.10 mg/kg		0.10	1	12/12/18 16:19	12/12/18 16:19	NJR
Surr: 2,5-Dibromotoluene (Surr FID)	*04*	*SW8015C*	*78.6 %*	*S*	*80-120*		*12/12/18 16:19*	*12/12/18 16:19*	*NJR*
Semivolatile Hydrocarbons by GC									
TPH-Semi-Volatiles (DRO)	04	SW8015C	<10.0 mg/kg		10.0	1	12/17/18 14:40	12/18/18 17:32	HLM
Surr: Pentacosane (Surr)	*04*	*SW8015C*	*105 %*		*40-160*		*12/17/18 14:40*	*12/18/18 17:32*	*HLM*
TPH-Semi-Volatiles (ORO)	04	SW8015C	<10.0 mg/kg		10.0	1	12/17/18 11:45	12/18/18 20:51	HLM

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Laboratory Order ID: 18L0344

Analytical Results

Sample I.D. B3 0-5 **Laboratory Sample ID:** 18L0344-05

Grab Date/Time: 12/05/2018 13:40

Field Residual Cl: **Field pH:**

Parameter	Samp ID	Method	Result	Qual	Reporting Limit	D.F.	Sample Prep Date/Time	Analysis Date/Time	Analyst
Volatile Hydrocarbons by GC									
TPH-Volatiles (GRO)	05	SW8015C	<0.10 mg/kg		0.10	1	12/12/18 16:41	12/12/18 16:41	NJR
Surr: 2,5-Dibromotoluene (Surr FID)	*05*	*SW8015C*	*80.7 %*		*80-120*		*12/12/18 16:41*	*12/12/18 16:41*	*NJR*
Semivolatile Hydrocarbons by GC									
TPH-Semi-Volatiles (DRO)	05	SW8015C	**14.9 mg/kg**		10.0	1	12/17/18 14:40	12/18/18 17:58	HLM
Surr: Pentacosane (Surr)	*05*	*SW8015C*	*112 %*		*40-160*		*12/17/18 14:40*	*12/18/18 17:58*	*HLM*
TPH-Semi-Volatiles (ORO)	05	SW8015C	<10.0 mg/kg		10.0	1	12/17/18 11:45	12/18/18 21:15	HLM

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Laboratory Order ID: 18L0344

Analytical Results

Sample I.D. B3 5-8.5 **Laboratory Sample ID:** 18L0344-06

Grab Date/Time: 12/05/2018 13:45

Field Residual Cl: **Field pH:**

Parameter	Samp ID	Method	Result	Qual	Reporting Limit	D.F.	Sample Prep Date/Time	Analysis Date/Time	Analyst
Volatile Hydrocarbons by GC									
TPH-Volatiles (GRO)	06	SW8015C	<0.10 mg/kg		0.10	1	12/12/18 17:03	12/12/18 17:03	NJR
Surr: 2,5-Dibromotoluene (Surr FID)	*06*	*SW8015C*	*106 %*		*80-120*		*12/12/18 17:03*	*12/12/18 17:03*	*NJR*
Semivolatile Hydrocarbons by GC									
TPH-Semi-Volatiles (DRO)	06	SW8015C	<10.0 mg/kg		10.0	1	12/17/18 14:40	12/18/18 18:23	HLM
Surr: Pentacosane (Surr)	*06*	*SW8015C*	*102 %*		*40-160*		*12/17/18 14:40*	*12/18/18 18:23*	*HLM*
TPH-Semi-Volatiles (ORO)	06	SW8015C	<10.0 mg/kg		10.0	1	12/17/18 11:45	12/18/18 21:40	HLM

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Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Semivolatile Hydrocarbons by GC		**Preparation Method:**	**SW3550C**		
18L0344-01	51.2 g / 1.00 mL	SW8015C	BBL0469	SBL0507	AK80056
18L0344-02	50.7 g / 1.00 mL	SW8015C	BBL0469	SBL0507	AK80056
Semivolatile Hydrocarbons by GC		**Preparation Method:**	**SW3550C**		
18L0344-01	50.2 g / 1.00 mL	SW8015C	BBL0485	SBL0508	AH80136
18L0344-02	50.5 g / 1.00 mL	SW8015C	BBL0485	SBL0508	AH80136
18L0344-03	50.5 g / 1.00 mL	SW8015C	BBL0485	SBL0508	AH80136
18L0344-04	50.4 g / 1.00 mL	SW8015C	BBL0485	SBL0508	AH80136
18L0344-05	50.3 g / 1.00 mL	SW8015C	BBL0485	SBL0508	AH80136
18L0344-06	50.3 g / 1.00 mL	SW8015C	BBL0485	SBL0508	AH80136
Semivolatile Hydrocarbons by GC		**Preparation Method:**	**SW3550C**		
18L0344-03	52.0 g / 1.00 mL	SW8015C	BBL0499	SBL0487	AK80055
18L0344-04	51.0 g / 1.00 mL	SW8015C	BBL0499	SBL0487	AK80055
18L0344-05	50.4 g / 1.00 mL	SW8015C	BBL0499	SBL0487	AK80055
18L0344-06	51.5 g / 1.00 mL	SW8015C	BBL0499	SBL0487	AK80055

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Hydrocarbons by GC		**Preparation Method:**	**SW5030B**		
18L0344-01	5.04 g / 5.00 mL	SW8015C	BBL0315	SBL0339	AK80042
18L0344-02	5.08 g / 5.00 mL	SW8015C	BBL0315	SBL0339	AK80042
18L0344-03	5.01 g / 5.00 mL	SW8015C	BBL0315	SBL0339	AK80042
18L0344-04	5.05 g / 5.00 mL	SW8015C	BBL0315	SBL0339	AK80042
18L0344-05	5.05 g / 5.00 mL	SW8015C	BBL0315	SBL0339	AK80042
18L0344-06	5.01 g / 5.00 mL	SW8015C	BBL0315	SBL0339	AK80042

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Client Site I.D.:	Daniels	Purchase Order:	18-796.04

Volatile Hydrocarbons by GC - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BBL0315 - SW5030B										
Blank (BBL0315-BLK1)				Prepared & Analyzed: 12/12/2018						
TPH-Volatiles (GRO)	<0.10 mg/kg	0.10	mg/kg							
TPH-Volatiles (GRO)	<0.10 mg/kg	0.10	mg/kg							
TPH-Volatiles (GRO)	<0.10 mg/kg	0.10	mg/kg							
TPH-Volatiles (GRO)	<0.10 mg/kg	0.10	mg/kg							
TPH-Volatiles (GRO)	<0.10 mg/kg	0.10	mg/kg							
TPH-Volatiles (GRO)	<0.10 mg/kg	0.10	mg/kg							
Surr: 2,5-Dibromotoluene (Surr FID)	109		ug/L	100		109	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	109		ug/L	100		109	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	109		ug/L	100		109	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	109		ug/L	100		109	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	109		ug/L	100		109	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	109		ug/L	100		109	80-120			
LCS (BBL0315-BS1)				Prepared & Analyzed: 12/12/2018						
TPH-Volatiles (GRO)	0.84 mg/kg	0.10	mg/kg	0.986	mg/kg	85.6	70-130			
TPH-Volatiles (GRO)	0.84 mg/kg	0.10	mg/kg	0.986	mg/kg	85.6	70-130			
TPH-Volatiles (GRO)	0.84 mg/kg	0.10	mg/kg	0.986	mg/kg	85.6	70-130			
TPH-Volatiles (GRO)	0.84 mg/kg	0.10	mg/kg	0.986	mg/kg	85.6	70-130			
TPH-Volatiles (GRO)	0.84 mg/kg	0.10	mg/kg	0.986	mg/kg	85.6	70-130			
TPH-Volatiles (GRO)	0.84 mg/kg	0.10	mg/kg	0.986	mg/kg	85.6	70-130			
Surr: 2,5-Dibromotoluene (Surr FID)	98.7		ug/L	100	ug/L	98.7	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	98.7		ug/L	100	ug/L	98.7	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	98.7		ug/L	100	ug/L	98.7	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	98.7		ug/L	100	ug/L	98.7	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	98.7		ug/L	100	ug/L	98.7	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	98.7		ug/L	100	ug/L	98.7	80-120			
Matrix Spike (BBL0315-MS1)		**Source: 18L0337-01**		Prepared & Analyzed: 12/12/2018						
TPH-Volatiles (GRO)	0.72 mg/kg	0.10	mg/kg	0.986	<0.10 mg/kg	73.3	70-130			
TPH-Volatiles (GRO)	0.72 mg/kg	0.10	mg/kg	0.986	<0.10 mg/kg	73.3	70-130			
TPH-Volatiles (GRO)	0.72 mg/kg	0.10	mg/kg	0.986	<0.10 mg/kg	73.3	70-130			

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Volatile Hydrocarbons by GC - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BBL0315 - SW5030B										
Matrix Spike (BBL0315-MS1)		**Source: 18L0337-01**		Prepared & Analyzed: 12/12/2018						
TPH-Volatiles (GRO)	0.72 mg/kg	0.10	mg/kg	0.986	<0.10 mg/kg	73.3	70-130			
TPH-Volatiles (GRO)	0.72 mg/kg	0.10	mg/kg	0.986	<0.10 mg/kg	73.3	70-130			
TPH-Volatiles (GRO)	0.72 mg/kg	0.10	mg/kg	0.986	<0.10 mg/kg	73.3	70-130			
Surr: 2,5-Dibromotoluene (Surr FID)	105		ug/L	100	ug/L	105	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	105		ug/L	100	ug/L	105	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	105		ug/L	100	ug/L	105	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	105		ug/L	100	ug/L	105	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	105		ug/L	100	ug/L	105	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	105		ug/L	100	ug/L	105	80-120			
Matrix Spike Dup (BBL0315-MSD1)		**Source: 18L0337-01**		Prepared & Analyzed: 12/12/2018						
TPH-Volatiles (GRO)	0.69 mg/kg	0.10	mg/kg	0.984	<0.10 mg/kg	70.4	70-130	4.33	20	
TPH-Volatiles (GRO)	0.69 mg/kg	0.10	mg/kg	0.984	<0.10 mg/kg	70.4	70-130	4.33	20	
TPH-Volatiles (GRO)	0.69 mg/kg	0.10	mg/kg	0.984	<0.10 mg/kg	70.4	70-130	4.33	20	
TPH-Volatiles (GRO)	0.69 mg/kg	0.10	mg/kg	0.984	<0.10 mg/kg	70.4	70-130	4.33	20	
TPH-Volatiles (GRO)	0.69 mg/kg	0.10	mg/kg	0.984	<0.10 mg/kg	70.4	70-130	4.33	20	
TPH-Volatiles (GRO)	0.69 mg/kg	0.10	mg/kg	0.984	<0.10 mg/kg	70.4	70-130	4.33	20	
Surr: 2,5-Dibromotoluene (Surr FID)	107		ug/L	100	ug/L	107	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	107		ug/L	100	ug/L	107	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	107		ug/L	100	ug/L	107	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	107		ug/L	100	ug/L	107	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	107		ug/L	100	ug/L	107	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	107		ug/L	100	ug/L	107	80-120			

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Semivolatile Hydrocarbons by GC - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BBL0469 - SW3550C										
Blank (BBL0469-BLK1)				Prepared: 12/17/2018 Analyzed: 12/18/2018						
TPH-Semi-Volatiles (DRO)	<10.0 mg/kg	10.0	mg/kg							
TPH-Semi-Volatiles (DRO)	<10.0 mg/kg	10.0	mg/kg							
Surr: Pentacosane (Surr)	5.24		mg/kg	5.03		104	40-160			
Surr: Pentacosane (Surr)	5.24		mg/kg	5.03		104	40-160			
LCS (BBL0469-BS1)				Prepared: 12/17/2018 Analyzed: 12/18/2018						
TPH-Semi-Volatiles (DRO)	72.6 mg/kg	10.0	mg/kg	99.2	mg/kg	73.1	40-160			
TPH-Semi-Volatiles (DRO)	72.6 mg/kg	10.0	mg/kg	99.2	mg/kg	73.1	40-160			
Surr: Pentacosane (Surr)	4.95		mg/kg	5.00	mg/kg	99.1	40-160			
Surr: Pentacosane (Surr)	4.95		mg/kg	5.00	mg/kg	99.1	40-160			
Matrix Spike (BBL0469-MS1)		**Source: 18L0319-07**		Prepared: 12/17/2018 Analyzed: 12/18/2018						
TPH-Semi-Volatiles (DRO)	81.7 mg/kg	10.0	mg/kg	96.2	<10.0 mg/kg	85.0	40-160			
TPH-Semi-Volatiles (DRO)	81.7 mg/kg	10.0	mg/kg	96.2	<10.0 mg/kg	85.0	40-160			
Surr: Pentacosane (Surr)	4.58		mg/kg	4.85	mg/kg	94.5	40-160			
Surr: Pentacosane (Surr)	4.58		mg/kg	4.85	mg/kg	94.5	40-160			
Matrix Spike Dup (BBL0469-MSD1)		**Source: 18L0319-07**		Prepared: 12/17/2018 Analyzed: 12/19/2018						
TPH-Semi-Volatiles (DRO)	77.0 mg/kg	10.0	mg/kg	95.8	<10.0 mg/kg	80.4	40-160	5.96	20	
TPH-Semi-Volatiles (DRO)	77.0 mg/kg	10.0	mg/kg	95.8	<10.0 mg/kg	80.4	40-160	5.96	20	
Surr: Pentacosane (Surr)	4.32		mg/kg	4.83	mg/kg	89.5	40-160			
Surr: Pentacosane (Surr)	4.32		mg/kg	4.83	mg/kg	89.5	40-160			
Batch BBL0485 - SW3550C										
Blank (BBL0485-BLK1)				Prepared: 12/17/2018 Analyzed: 12/18/2018						
TPH-Semi-Volatiles (ORO)	<10.0 mg/kg	10.0	mg/kg							
TPH-Semi-Volatiles (ORO)	<10.0 mg/kg	10.0	mg/kg							
TPH-Semi-Volatiles (ORO)	<10.0 mg/kg	10.0	mg/kg							
TPH-Semi-Volatiles (ORO)	<10.0 mg/kg	10.0	mg/kg							
TPH-Semi-Volatiles (ORO)	<10.0 mg/kg	10.0	mg/kg							

AIR WATER & SOIL LABORATORIES, INC.

1941 Reymet Road ● Richmond, Virginia 23230 ● Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Client Name:	EEE Consulting (Blacksburg, VA) 201 Church Street Blacksburg VA, 24060	Date Issued:	12/19/2018 15:05
Submitted To:	Josh Hepler	Project Number:	18-796.04
Client Site I.D.:	Daniels	Purchase Order:	18-796.04

Semivolatile Hydrocarbons by GC - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BBL0485 - SW3550C										
Blank (BBL0485-BLK1)				Prepared: 12/17/2018 Analyzed: 12/18/2018						
TPH-Semi-Volatiles (ORO)	<10.0 mg/kg	10.0	mg/kg							
LCS (BBL0485-BS1)				Prepared: 12/17/2018 Analyzed: 12/18/2018						
TPH-Semi-Volatiles (ORO)	46.7 mg/kg	10.0	mg/kg	99.6	mg/kg	46.9	40-160			
TPH-Semi-Volatiles (ORO)	46.7 mg/kg	10.0	mg/kg	99.6	mg/kg	46.9	40-160			
TPH-Semi-Volatiles (ORO)	46.7 mg/kg	10.0	mg/kg	99.6	mg/kg	46.9	40-160			
TPH-Semi-Volatiles (ORO)	46.7 mg/kg	10.0	mg/kg	99.6	mg/kg	46.9	40-160			
TPH-Semi-Volatiles (ORO)	46.7 mg/kg	10.0	mg/kg	99.6	mg/kg	46.9	40-160			
TPH-Semi-Volatiles (ORO)	46.7 mg/kg	10.0	mg/kg	99.6	mg/kg	46.9	40-160			
Matrix Spike (BBL0485-MS1)		**Source: 18L0345-01**		Prepared: 12/17/2018 Analyzed: 12/19/2018						
TPH-Semi-Volatiles (ORO)	49.4 mg/kg	10.0	mg/kg	99.2	<10.0 mg/kg	49.8	40-160			
TPH-Semi-Volatiles (ORO)	49.4 mg/kg	10.0	mg/kg	99.2	<10.0 mg/kg	49.8	40-160			
TPH-Semi-Volatiles (ORO)	49.4 mg/kg	10.0	mg/kg	99.2	<10.0 mg/kg	49.8	40-160			
TPH-Semi-Volatiles (ORO)	49.4 mg/kg	10.0	mg/kg	99.2	<10.0 mg/kg	49.8	40-160			
TPH-Semi-Volatiles (ORO)	49.4 mg/kg	10.0	mg/kg	99.2	<10.0 mg/kg	49.8	40-160			
TPH-Semi-Volatiles (ORO)	49.4 mg/kg	10.0	mg/kg	99.2	<10.0 mg/kg	49.8	40-160			
Matrix Spike Dup (BBL0485-MSD1)		**Source: 18L0345-01**		Prepared: 12/17/2018 Analyzed: 12/19/2018						
TPH-Semi-Volatiles (ORO)	47.7 mg/kg	10.0	mg/kg	98.2	<10.0 mg/kg	48.6	40-160	3.52	20	
TPH-Semi-Volatiles (ORO)	47.7 mg/kg	10.0	mg/kg	98.2	<10.0 mg/kg	48.6	40-160	3.52	20	
TPH-Semi-Volatiles (ORO)	47.7 mg/kg	10.0	mg/kg	98.2	<10.0 mg/kg	48.6	40-160	3.52	20	
TPH-Semi-Volatiles (ORO)	47.7 mg/kg	10.0	mg/kg	98.2	<10.0 mg/kg	48.6	40-160	3.52	20	
TPH-Semi-Volatiles (ORO)	47.7 mg/kg	10.0	mg/kg	98.2	<10.0 mg/kg	48.6	40-160	3.52	20	
TPH-Semi-Volatiles (ORO)	47.7 mg/kg	10.0	mg/kg	98.2	<10.0 mg/kg	48.6	40-160	3.52	20	
Batch BBL0499 - SW3550C										
Blank (BBL0499-BLK1)				Prepared: 12/17/2018 Analyzed: 12/18/2018						
TPH-Semi-Volatiles (DRO)	<10.0 mg/kg	10.0	mg/kg							
TPH-Semi-Volatiles (DRO)	<10.0 mg/kg	10.0	mg/kg							
TPH-Semi-Volatiles (DRO)	<10.0 mg/kg	10.0	mg/kg							
TPH-Semi-Volatiles (DRO)	<10.0 mg/kg	10.0	mg/kg							

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Certificate of Analysis

Final Report

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Submitted To:	Josh Hepler	Project Number:	18-796.04
Client Site I.D.:	Daniels	Purchase Order:	18-796.04

Semivolatile Hydrocarbons by GC - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BBL0499 - SW3550C										
Blank (BBL0499-BLK1)				Prepared: 12/17/2018 Analyzed: 12/18/2018						
Surr: Pentacosane (Surr)	6.50		mg/kg	4.97		131	40-160			
Surr: Pentacosane (Surr)	6.50		mg/kg	4.97		131	40-160			
Surr: Pentacosane (Surr)	6.50		mg/kg	4.97		131	40-160			
Surr: Pentacosane (Surr)	6.50		mg/kg	4.97		131	40-160			
LCS (BBL0499-BS1)				Prepared: 12/17/2018 Analyzed: 12/18/2018						
TPH-Semi-Volatiles (DRO)	71.9 mg/kg	10.0	mg/kg	99.2	mg/kg	72.4	40-160			
TPH-Semi-Volatiles (DRO)	71.9 mg/kg	10.0	mg/kg	99.2	mg/kg	72.4	40-160			
TPH-Semi-Volatiles (DRO)	71.9 mg/kg	10.0	mg/kg	99.2	mg/kg	72.4	40-160			
TPH-Semi-Volatiles (DRO)	71.9 mg/kg	10.0	mg/kg	99.2	mg/kg	72.4	40-160			
Surr: Pentacosane (Surr)	6.05		mg/kg	5.00	mg/kg	121	40-160			
Surr: Pentacosane (Surr)	6.05		mg/kg	5.00	mg/kg	121	40-160			
Surr: Pentacosane (Surr)	6.05		mg/kg	5.00	mg/kg	121	40-160			
Surr: Pentacosane (Surr)	6.05		mg/kg	5.00	mg/kg	121	40-160			
Matrix Spike (BBL0499-MS1)	**Source: 18L0345-01**			Prepared: 12/17/2018 Analyzed: 12/18/2018						
TPH-Semi-Volatiles (DRO)	63.5 mg/kg	10.0	mg/kg	99.8	<10.0 mg/kg	63.6	40-160			
TPH-Semi-Volatiles (DRO)	63.5 mg/kg	10.0	mg/kg	99.8	<10.0 mg/kg	63.6	40-160			
TPH-Semi-Volatiles (DRO)	63.5 mg/kg	10.0	mg/kg	99.8	<10.0 mg/kg	63.6	40-160			
TPH-Semi-Volatiles (DRO)	63.5 mg/kg	10.0	mg/kg	99.8	<10.0 mg/kg	63.6	40-160			
Surr: Pentacosane (Surr)	4.56		mg/kg	5.03	mg/kg	90.7	40-160			
Surr: Pentacosane (Surr)	4.56		mg/kg	5.03	mg/kg	90.7	40-160			
Surr: Pentacosane (Surr)	4.56		mg/kg	5.03	mg/kg	90.7	40-160			
Surr: Pentacosane (Surr)	4.56		mg/kg	5.03	mg/kg	90.7	40-160			
Matrix Spike Dup (BBL0499-MSD1)	**Source: 18L0345-01**			Prepared: 12/17/2018 Analyzed: 12/18/2018						
TPH-Semi-Volatiles (DRO)	61.7 mg/kg	10.0	mg/kg	99.4	<10.0 mg/kg	62.1	40-160	2.80	20	
TPH-Semi-Volatiles (DRO)	61.7 mg/kg	10.0	mg/kg	99.4	<10.0 mg/kg	62.1	40-160	2.80	20	
TPH-Semi-Volatiles (DRO)	61.7 mg/kg	10.0	mg/kg	99.4	<10.0 mg/kg	62.1	40-160	2.80	20	
TPH-Semi-Volatiles (DRO)	61.7 mg/kg	10.0	mg/kg	99.4	<10.0 mg/kg	62.1	40-160	2.80	20	
Surr: Pentacosane (Surr)	4.39		mg/kg	5.01	mg/kg	87.6	40-160			
Surr: Pentacosane (Surr)	4.39		mg/kg	5.01	mg/kg	87.6	40-160			

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Final Report

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Submitted To:	Josh Hepler	Project Number:	18-796.04
Client Site I.D.:	Daniels	Purchase Order:	18-796.04

Semivolatile Hydrocarbons by GC - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BBL0499 - SW3550C										
Matrix Spike Dup (BBL0499-MSD1)	**Source: 18L0345-01**		Prepared: 12/17/2018 Analyzed: 12/18/2018							
Surr: Pentacosane (Surr)	4.39		mg/kg	5.01	mg/kg	87.6	40-160			
Surr: Pentacosane (Surr)	4.39		mg/kg	5.01	mg/kg	87.6	40-160			

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Certified Analyses included in this Report

Analyte	Certifications
SW8015C in Solids	
TPH-Semi-Volatiles (DRO)	VELAP,NC,WVDEP
TPH-Semi-Volatiles (ORO)	VELAP
TPH-Volatiles (GRO)	VELAP,NC,WVDEP

Code	Description	Lab Number	Expires
MdDOE	Maryland DE Drinking Water	341	12/31/2019
NC	North Carolina DENR	495	12/31/2018
VELAP	NELAC-Virginia Certificate #10074	460021	06/14/2019

AIR WATER SOIL LABORATORIES, INC.

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Summary of Data Qualifiers

S	Surrogate recovery was outside acceptance criteria
RPD	Relative Percent Difference
Qual	Qualifers
-RE	Denotes sample was re-analyzed
D.F.	Dilution Factor. Please also see the Preparation Factor in the Analysis Summary section.
TIC	Tentatively Identified Compounds are compounds that are identified by comparing the analyte mass spectral pattern with the NIST spectral library . A TIC spectral match is reported when the pattern is at least 75% consistent with the published pattern. Compound concentrations are estimated and are calculated using an internal standard response factor of 1.
PCBs, Total	Total PCBs are defined as the sum of detected Aroclors 1016, 1221, 1232, 1248, 1254, 1260, 1262, and 1268.

AIR WATER & SOIL LABORATORIES, INC.
1941 REYMET ROAD
RICHMOND, VIRGINIA 23237
(804) 358-8295 PHONE
(804)358-8297 FAX

Chain of Custody
Form #: F1331
Rev. 3.0
Effective: Aug 24, 2017

CHAIN OF CUSTODY

COMPANY NAME: EEE Consulting	INVOICE TO: same	PROJECT NAME/Quote #: ~~Daniels~~ Rt 1 widening
CONTACT: Josh Hepler	INVOICE CONTACT:	SITE NAME: Daniels
ADDRESS: 201 Church St Blacksburg	INVOICE ADDRESS:	PROJECT NUMBER: 18-796.04
PHONE #: 540 230 3685	INVOICE PHONE #:	P.O. #: 18-796.04
FAX #: EMAIL: jhepler@eee-consulting.com		Pretreatment Program: NA
Is sample for compliance reporting? YES NO NA	Is sample from a chlorinated supply? YES NO NA	PWS I.D. #: NA
SAMPLER NAME (PRINT): Josh Hepler	SAMPLER SIGNATURE:	Turn Around Time: Circle: (10) 5 Days or __ Day(s)

Matrix Codes: WW=Waste Water/Storm Water GW=Ground Water DW=Drinking Water S=Soil/Solids OR=Organic A=Air WP=Wipe OT=Other_____

CLIENT SAMPLE I.D.	Grab	Composite	Field Filtered (Dissolved Metals)	Composite Start Date	Composite Start Time	Grab Date or Composite Stop Date	Grab Time or Composite Stop Time	Time Preserved	Matrix (See Codes)	Number of Containers	TPH - DRO	TPH - ORO	TPH - GRO ★	BTEX ★				
1) B1 0-5	X			NA	NA	12/5	12:55	NA	S	3	X	X	X	★				
2) B1 5-10							1:00							★				
3) B2 0-5							1:20							★				
4) B2 5-9●							1:30							★				
5) B3 0-5							1:40							★				
6) B3 5-8.5							1:45							★				
7)																		
8)																		
9)																		
10)																		

ANALYSIS / (PRESERVATIVE)

COMMENTS

Preservative Codes: N=Nitric Acid C=Hydrochloric Acid S=Sulfuric Acid H=Sodium Hydroxide A=Ascorbic Acid Z=Zinc Acetate T=Sodium Thiosulfate M=Methanol

PLEASE NOTE PRESERVATIVE(S), INTERFERENCE CHECKS or PUMP RATE (L/min)

★ Analyze BTEX only in GRO detections.

0.6°C

RELINQUISHED:	DATE / TIME	RECEIVED:	DATE / TIME
	12/7 / 12:00		
RELINQUISHED: Gulf Elder III	DATE / TIME 12/7/18 3:14	RECEIVED: 7 DEC 2018	DATE / TIME 15:15
RELINQUISHED:	DATE / TIME	RECEIVED:	DATE / TIME

QC Data Package
Level III ☐
Level IV ☐

LAB USE ONLY
Custody Seals used and intact? (Y/N) _____
COOLER TEMP °C
Received on ice? (Y/N) _____

EEE-Blacksburg 18L0344
Daniel's Auto Care
Recd: 12/07/2018 Due: 12/21/2018

v13032500 1001.xls

1941 Reymet Road ● Richmond, Virginia 23230 ● Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Client Name:	EEE Consulting (Blacksburg, VA) 201 Church Street Blacksburg VA, 24060	Date Issued:	12/19/2018 15:05
Submitted To:	Josh Hepler	Project Number:	18-796.04
Client Site I.D.:	Daniels	Purchase Order:	18-796.04

Sample Conditions Checklist

Samples Received at:	**0.60°C**
How were samples received?	Walk In
Were Custody Seals used? If so, were they received intact?	No
Are the custody papers filled out completely and correctly?	Yes
Do all bottle labels agree with custody papers?	Yes
Is the temperature blank or representative sample within acceptable limits? (above freezing to 6°C) or received on ice and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	Yes
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	No
Are all volatile organic and TOX containers free of headspace?	NA
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	NA
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis.	Yes

Work Order Comments

Appendix D: Laboratory Review of Detected TPH Concentration & Chromatograms

From:	Josh Hepler
To:	Josh Hepler
Subject:	Chromatograph Review Request
Date:	Tuesday, February 5, 2019 11:45:50 AM
Attachments:	image001.jpg

From: Soyars Ted <tsoyars@awslabs.com>
Sent: Tuesday, January 29, 2019 12:45 PM
To: Josh Hepler <jhepler@eee-consulting.com>
Cc: Katrina Cooke <kcooke@awslabs.com>; Mary-Mullen Ricks <mmricks@awslabs.com>
Subject: FW: Chromatograph Review Request

Hi Josh. Looks like there was a formating issue with this email that popped up when I hit SENT, so I'm re-sending so you'll be able to read this without going cross-eyed

- **ID 18L0653**: B3 5-10 DRO (ID -05); (Triangle Service Center):
- Appears to be a very small oil pattern, that's roughly half inside the Diesel Range, and half outside of it (past the heavier end of the range).

- **ID 18L0344**: B3 5-10 DRO (ID -05); (Daniel's Auto Care):
- Also appears to be a small amount of oil, but more than 18L0653-05, however for this sample it appears that only a third of the oil petroleum pattern falls within the Diesel Range limits, and about 2/3 of the pattern is outside of it (past the heavier end of the range)

- **ID 18L0372**: B4 5-10 DRO & ORO (ID -07); (A&M):

- DRO: Very similar pattern as that of 18L0653-05, however it appears to be just slightly lighter…. so that a little more than half of the pattern falls within the Diesel range, and 40% of it or so falls outside of it on the heavier end. The pattern itself is much more similar to 653-05 than 344-05. ORO: Classic oil patterning, extremely similar to the petroleum pattern of our ORO standard which is 10W-30.

- **ID 18L0332**: B2 5-10 ORO (ID -03); (Mrs. K's Carwash):
- This appears to all be within the Oil range, however it looks like it could be a combination of petroleums. There is a petroleum pattern right where 10W-30 is, but also before it, and even a pattern that stretches somewhat past it. Again, this very well may be 2 or even 3 different products mixed together, which makes it impossible for me to speculate on what it could be, other than to confirm it looks to be all within the OIL range, and I don't see anything that looks like it comes before or after it (at least from what I can see).

- **ID 18L0345**: B2 5-10 DRO & ORO (ID -03); B2 10-15 DRO (ID -04); B3 5-10 DRO (ID -05); (1 Performance):

- These three samples appear to be almost identical to each other, with only minor differences (so minor that it wouldn't affect how I would describe them in a PET ID). These 3 are all very small detections that appear to be some sort of oil that falls about half inside the diesel range and half past it into the oil range. It could also be a combination of petroleums, although it's not as clear as the sample above (18L0332-03). So it's either a small amount of two petroleums (possibly more) or a single petroleum that simply has a wider hydrocarbon makeup than 10W-30 (especially on the lighter side / front end of 10W30).

Ted Soyars
Laboratory Manager
Air, Water & Soil Laboratories, Inc.
(804) 358-8295

From: Josh Hepler <jhepler@eee-consulting.com>
Sent: Friday, January 25, 2019 10:15 AM
To: Mary-Mullen Ricks <mmricks@awslabs.com>
Cc: Chris Lalli <clalli@eee-consulting.com>
Subject: Chromatograph Review Request

Good Morning Mary-Mullen,

I was wondering if you would consider reviewing the chromatograms for the following low reported concentrations of TPH-DRO and/or TPH-ORO against the standard.

- **ID 18L0653**: B3 5-10 DRO (ID -05); (Triangle Service Center)
- **ID 18L0344**: B3 5-10 DRO (ID -05); (Daniel's Auto Care)
- **ID 18L0372**: B4 5-10 DRO & ORO (ID -07); (A&M)
- **ID 18L0332**: B2 5-10 ORO (ID -03); (Mrs. K's Carwash)
- **ID 18L0345**: B2 5-10 DRO & ORO (ID -03);
  B2 10-15 DRO (ID -04);
  B3 5-10 DRO (ID -05); (1 Performance)

I appreciate these extra services provided in helping us decipher a site's condition. Also, a separate letter for each report stating that a review was preformed would be appreciated. Please let me

know if this request is feasible.

Thanks,

Joshua P. Hepler, PG
Environmental Scientist
EEE CONSULTING, INC.
201 Church Street, Suite C | Blacksburg, VA 24060
540.953.0170 ext. 309; Cell 540-230-3685

20th Anniversary Email Banner (fullsize)

Appendix E: Full Size Copy of Table 3

Table 3: Daniels Auto Care
Petroleum-Impacted Soil Volume Estimates
Select Drainage Improvements & Pipe Connections

Boring ID	Impacted Soil Depths	Drainage Structure ID	Impacted Excavation Footprint Location	Impacted Soil Excavation Dimensions	Volume Estimate**	Volume Estimate**	Volume Estimate**
Unit	BGS		STA No.	LxWxH	Cubic Feet (ft^3)	Cubic Yards (yd^3)	Tons*
B3 0-5	0-5-ft	13-15	STA No. 321+80; 70-ft RT of CL	5-ft x 5-ft x 6-ft	150	6	8
B3 0-5	0-5-ft	Associated 24-in pipe	STA No. 321+80; 70-ft RT of CL	25-ft x 4-ft x 6-ft	600	22	33

Notes:

***Tons calculated with conversion of $1yd^3$ = 1.5 tons**

****Soil volume estimates are approximate and based on preliminary information available as of the date of this report.**

Phase II Environmental Site Assessment
Roadway Improvement Project

Route 1 Widening Project
Dumfries BP
17400 Jefferson Davis Highway
Dumfries, Virginia 22026
Prince William County

Contract ID: 44115
VDOT Project: 001-212-249
VDOT UPC: 90339 Act: 689
VDOT Task Number: E-FR024.10

Prepared for
Mr. Brutus Cooper
Regional VDOT HAZMAT Manager
Virginia Department of Transportation
NOVA District Office
4975 Alliance Drive
Fairfax, VA 22030

Prepared by
EEE Consulting, Inc.
201 Church Street
Blacksburg, Virginia 24060

February 2019

Prepared by: **Joshua P. Hepler, PG, Project Scientist**

Reviewed by: **Christopher J. Lalli, Vice President**

3e EEE Consulting, Inc.
Environmental, Engineering and Educational Solutions

Table of Contents

Tables

Figures

Appendices

Acronyms

BGS	Below Ground Surface
C	Celsius
COC	Chain of Custody
CL	Center Line
DEQ	Department of Environmental Quality
EPA	Environmental Protection Agency – United States
FT	Feet
LT	Left
mg/kg	Milligrams per Kilogram
MW	Monitoring Well
PG	Professional Geologist
PID	Photoionization Detector
PPM	Parts Per Million
REC	Recognized Environmental Condition
RL	Reporting Limit
Rt	Route
RT	Right
R/W	Right-of-Way
STA	Station
TPH-DRO	Total Petroleum Hydrocarbons - Diesel Range Organics
TPH-GRO	Total Petroleum Hydrocarbons – Gasoline Range Organics
UST	Underground Storage Tank
VDOT	Virginia Department of Transportation
VSWMR	Virginia Solid Waste Management Regulations
3e	EEE Consulting, Inc.

1.0 INTRODUCTION AND BACKGROUND

The Virginia Department of Transportation (VDOT) is administering proposed improvements and realignment of 2.3-miles of Route 1 (Fraley Boulevard) between the intersection with Quantico Gateway Drive and the intersection with Drumfires Road (State Route 234) in Dumfries, Prince William County, Virginia. The general project location and topographic setting are shown on **Figures 1** and **2**, respectively. An aerial photograph of the project area is also presented as **Figure 3.**

The roadway and drainage improvements will occur in existing roadway right-of-way (R/W), proposed R/W, permanent easements (slope & drainage), temporary construction easements (i.e. erosion & sediment control measures) and proposed limited access lines. A Phase I Environmental Site Assessment (ESA) was prepared by EEE Consulting, Inc (**3e**) for the study area in August 2018, which identified Recognized Environmental Conditions (REC) throughout the corridor including the subject property as follows:

- **Dumfries BP** (Parcel 103) located at 17400 Jefferson Davis Highway, Dumfries, VA 22026 (VDOT Plan Sheet Nos. 17 and 18). Parcel 103 is an active petroleum refueling station with three (3), 10,000-gallon gasoline underground storage tanks (USTs) and one (1)10,000-gallon diesel fuel UST. Two documented petroleum releases to the environment also occurred that were tracked by the DEQ under separate Pollution Complaint Nos. (i.e. PC 1994-0678 Closed; PC 2007-3232 Closed).

According to Plan Sheet Nos. 17 and 18, two drainage structures (i.e. 17-11 & 18-1) and associated pipe connections are depicted in existing roadway R/W at Parcel 103 (see **Figure 4**). The Phase I ESA FOIA request documents indicated that residual-phase petroleum impact to soil was documented in the eastern portion of Parcel 103. Additionally, three (3) groundwater monitoring wells installed in or proximate to this portion of Parcel 103 were impacted with dissolved-phase toluene and MtBE concentrations. These documented impacts to subsurface media have the potential to pose adverse impacts to subsurface media that will likely be disturbed at Parcel 103.

The RECs identified at Parcel 103 have the potential to pose adverse impacts to subsurface media that will likely be disturbed during the installation of the noted drainage improvements. The constituents of concern are petroleum-based, which are based on the RECs identified above and detailed in the Phase I ESA Corridor Study Report (**3e**, August 2018). Based on this information, the VDOT – NOVA District Hazardous Materials Manager requested the collection of representative samples to confirm the presence/absence of petroleum impacts to soil and groundwater, if encountered, in and proximate to the proposed disturbance areas. On December 12th, 2018, **3e** completed a Phase II ESA at Parcel 103 to confirm the presence/absence of impacts to subsurface media that will likely be disturbed in response to the proposed drainage improvements.

Subsurface boring advancements, sampling methods, corresponding analytical results, and conclusions/recommendations pertaining to the proposed construction activities at each site are summarized in the following sections of this report.

2.0 PUBLIC/PRIVATE UTILITY CLEARINGS AND MARK OUTS

Prior to implementing the direct push boring installations, the approximate locations of subsurface public utilities were identified and marked by Miss Utility of Virginia. A utility locate request form was also completed with VDOT to identify utilities owned and operated by VDOT. Copies of the Miss Utility and VDOT Tickets are included in **Appendix A**. In addition to public utility identification, private subsurface utilities were also identified and marked in each investigative area prior to commencing drilling activities.

3.0 SOIL SAMPLING METHODS

3.1. Soil Sampling Methods

On December 12th, 2018, a direct push drill rig was utilized to advance three (3) soil borings at the following locations:

- B1 – Installed proximate to STA No. 351+40.00; 75-ft LT of CL to a depth of 5-ft BGS as proposed.
- B2 – Installed proximate to STA No. 352+05.00; 80-ft LT of CL to a depth of 5-ft BGS as proposed.
- B3 – Installed proximate to STA No. 352+85.00; 75-ft LT of CL to a depth of 10-ft BGS as proposed.

The roadway improvements proposed to date, RECs, and boring locations are depicted on **Figure 4**.

Each soil boring was advanced using a Geoprobe® direct push rig. The direct-push rig utilizes a hollow-stem spoon that produced a continuous soil core in five (5)-ft intervals along the vertical depth of each boring. Each boring was advanced to predetermined depths or refusal that occurred at 5-ft BGS. Subsurface conditions (i.e. wet soils) indicative of groundwater were not observed in B1 through B3. The detailed boring logs are presented in **Appendix B**.

Composite soil samples were collected to assess soil that will likely be disturbed during construction. The representative composite soil samples were obtained from the borings by collecting aliquots from the following depth intervals:

- B1 and B2: 0-5-ft BGS.

- B3: 0-5-ft and 5-10-ft BGS.

Each composite soil sample was placed into two (2) pre-cleaned 4-ounce glass jars. The sample jars were appropriately labeled and placed on ice in a cooler to maintain an appropriate temperature (≤ 4°C) while in transit to the certified environmental laboratory. Chain of Custody (COC) documentation was completed for all samples submitted for laboratory analysis.

All composite soil samples obtained from the three (3) direct push borings were submitted for laboratory analysis of Total Petroleum Hydrocarbons Gasoline Range Organics (TPH-GRO) and Total Petroleum Hydrocarbons Diesel Range Organics (TPH-DRO). The COC documentation and laboratory analytical data are provided in **Appendix C**. A detailed discussion of the composite soil sample analytical results is presented in **Section 5.0** of this report.

4.0 PID SCREENING RESULTS

Photoionization Detector (PID) results for the screened direct push soil cores are presented below in **Table 1**. Measurement units are in parts per million (ppm).

Table 1 - PID Soil Screening Data: Route 1 – Dumfries BP

	PID (ppm)	PID (ppm)
Depth (ft BGS)	0-5	5-10
B1	0.2	0.0
B2	2.9	0.2
B3	0.0	0.0

Notes:
ppm = Parts per Million
BGS – Below Ground Surface
Depth Unit – foot BGS

A review of **Table 1** indicates that the PID readings measured in the screened soil cores were <2.9-ppm in B1 through B3. No visual or olfactory evidence of petroleum-impacted media was observed during boring and sampling activities. Additionally, residual-phase petroleum concentrations were noted detected in the soil samples (see **Section 5.0**). Based on this information, the measurable PID readings are likely representative of background soil moisture content, and not reflective of volatile organic compound vapors in the soil.

5.0 COMPOSITE SOIL SAMPLE ANALYTICAL RESULTS

The analytical results obtained from the composite soil samples are summarized in **Table 2** on the following page. All results are listed in units of milligrams-per-kilogram (mg/kg). A detailed laboratory analytical report is provided in **Appendix C**.

Table 2: Soil Sample Analytical Data
Dumfries BP
Route 1 Widening, Dumfries VA
Units = Milligrams per Kilogram (mg/kg)

Location	**B1 0-5**		**B2 0-5**		**B3 0-5**		**B3 5-10**	
Laboratory I.D.	18L0647-01		18L0647-02		18L0647-03		18L0647-04	
Depth Below Grade	0-5 feet		0-5 feet		0-5 feet		5-10-feet	
Sample Time	8:00		8:20		8:30		8:40	
	Result	*RL*	Result	*RL*	Result	*RL*	Result	*RL*
TPH-GRO	ND	*0.10*	ND	*0.10*	ND	*0.10*	ND	*0.46*
TPH-DRO	ND	*10.0*	ND	*10.0*	ND	*10.0*	ND	*10.0*

Notes:
Bold / Underlined text = Concentration reported above RL
RL = Reporting Limit
ND -Below Laboratory Reporting Limit

A review of **Table 2** indicates that residual-phase TPH-GRO and TPH-DRO concentrations were not detected above the laboratory reporting limits (RLs) in the representative soil samples collected at Parcel 103.

6.0 CONCLUSIONS AND RECOMMENDATIONS

A total of three (3) direct push borings were installed to collect representative samples to determine if the RECs identified at Parcel 103 resulted in adverse impacts to subsurface media that will likely be disturbed in response to the proposed drainage improvements.

The representative soil samples collected as part of this investigation did not contain detectable residual-phase petroleum constituent concentrations. Therefore, special management provisions to the construction contract should not apply for soil that will likely be disturbed at Parcel 103 in response to the installation of the drainage improvements proposed as of the date of this report.

Groundwater was not detected at depths of up 10-ft BGS during this investigation. As previously noted, site characterization activities conducted in response to two (2) petroleum releases on-site documented dissolved-phase petroleum impact to groundwater on-site. A review of the FOIA files for these petroleum releases indicates that groundwater was encountered at depths that ranged from 10-11-ft BGS. If roadway construction activities at Parcel 103 will trend to depths greater than 10-ft BGS, then the potential exists to encounter groundwater. If petroleum-impacted groundwater is detected during roadway construction at Parcel 103, then the Project Engineer should be immediately notified to ensure that dewatering and management activities are conducted in accordance with all applicable regulations.

7.0 LIMITATIONS

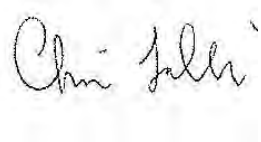
It is impossible to know with certainty the entirety of a site is free of hazardous substances or conditions even with extensive subsurface testing. The conclusions of this investigation are based solely on the scope-of-work and on the sources of information reviewed during this investigation. This report was prepared for the exclusive use of VDOT, and their expressly-designated affiliates. **3e** accepts no responsibility for damages or claims resulting from past or future environmental degradation related to the subject property.

8.0 ACKNOWLEDGEMENT

3e appreciates the opportunity to provide environmental services to VDOT regarding the Dumfries BP - Route 1 roadway improvement project located in Dumfries, VA under the Professional Services HAZMAT Contract. If we may be of further assistance, or you have any questions or comments regarding the project, please contact our office at (540) 953-0170.

9.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS

Joshua P. Hepler, PG
Project Environmental Scientist
Preparer



Chris Lalli
Vice President/Associate
Reviewer

Figures

3e EEE Consulting, Inc.
Environmental, Engineering and Educational Solutions

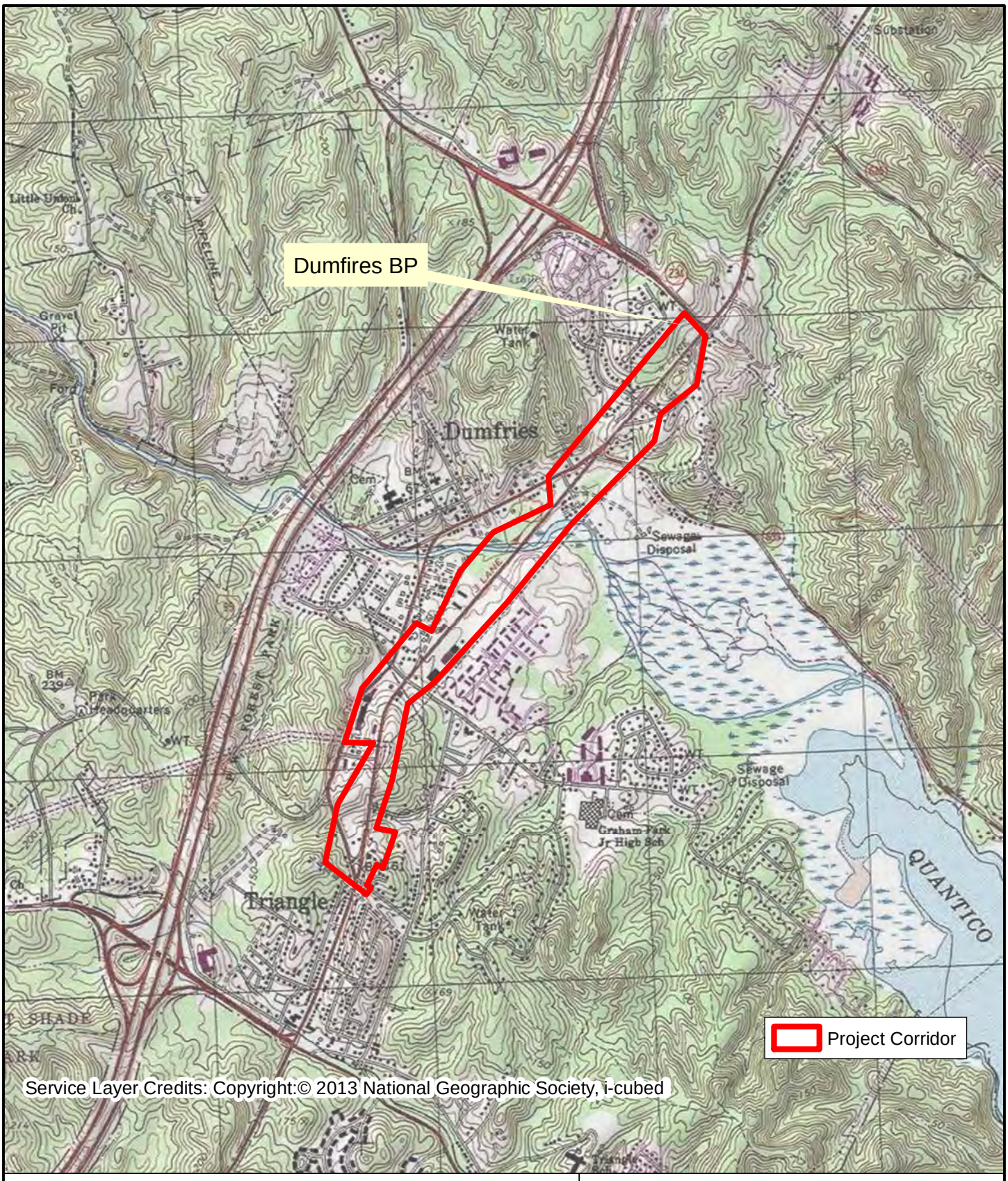
N

Prepared by Leah Potts, 01/24/2019
Projection: NAD 1983 2011 StatePlane Virginia North FIPS 4501 Ft US

FIGURE 1
PROJECT CORRIDOR AERIAL
DUMFRIES BP

0 0.5 1
Miles

Dumfries, VA



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N

FIGURE 2
PROJECT CORRIDOR TOPOGRAPHIC
DUMFRIES BP

0 0.5 1
Miles

Dumfries, VA

1:24,000

Prepared by Leah Potts, 01/24/2019
Projection: NAD 1983 2011 StatePlane Virginia North FIPS 4501 Ft US

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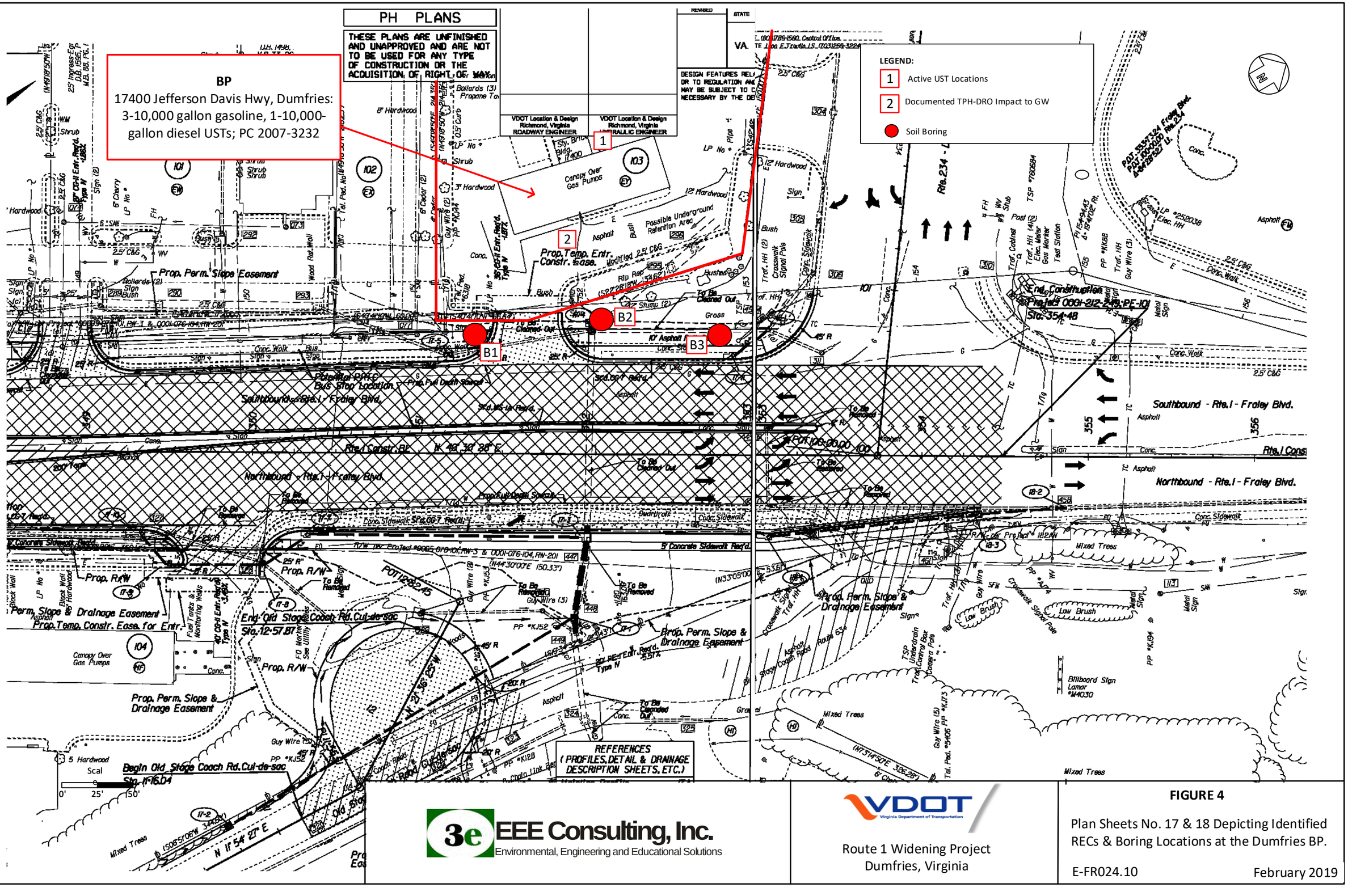
Prepared by Leah Potts, 01/24/2019
Sources: VGIN 2017
Projection: NAD 1983 2011 StatePlane Virginia North FIPS 4501 Ft US

FIGURE 3
AERIAL WITH PROPERTY BOUNDARIES
DUMFRIES BP

0 100 200
Feet

Dumfries, VA



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Environmental, Engineering and Educational Solutions

VDOT Virginia Department of Transportation

Route 1 Widening Project
Dumfries, Virginia

FIGURE 4

Plan Sheets No. 17 & 18 Depicting Identified RECs & Boring Locations at the Dumfries BP.

E-FR024.10 February 2019

Appendix A: Miss Utility Ticket

From: tickets@missutilityofvirginia.com
To: Josh Hepler
Subject: VUPS EMLCFM 2018/12/05 #02761 A833101367-02A RUSH RESP LREQ
Date: Wednesday, December 5, 2018 11:22:23 AM
Importance: High

EMLCFM 02761 VUPSa 12/05/18 11:22:19 A833101367-02A RESPONSE

Thank you for contacting VA811! This is an automatically generated response from the utilities who received your notice of excavation. If you have questions about the response, call the "field contact" for that utility. For your safety, please respect and protect the marks, excavate carefully around the marked utility lines and contact VA811 if you see clear evidence of unmarked utilities.

Remember, you can now reach VA811 by dialing 811.

Ticket : A833101367 Rev: 02A Taken: 12/05/18 07:12 AM

State: VA Cnty: PRINCE WILLIAM Place: DUMFRIES
Address : 17400 JEFFERSON DAVIS HWY
Responses due by: 12/05/18 10:12 AM Expires: 12/19/18 07:00 AM

When the member Marking Code is blue, click for additional information that may be provided by the Operator/Locator.

Marking Code	Description	Response	
CGV	COLUMBIA GAS (CGV930)	11/29/18 01:25 PM	30
	No Conflict; utility is outside of stated work area.		
	Field Contact: UTILIQUEST (703)754-2116		
	In the event of damage to a facility call: (800)543-8911		
CMC	COMCAST (CMC502)	12/04/18 10:25 AM	30
	No Conflict; utility is outside of stated work area.		
	Field Contact: CABLE PROTECTION SERVICES (804)562-3861		
	In the event of damage to a facility call: (800)441-6917 ext opt 1		
DOM	DOMINION ENERGY ELEC DIST (DOM400)	12/04/18 12:25 PM	10
	Marked		
	Field Contact: UTILIQUEST (703)754-2116		
	In the event of damage to a facility call: (888)667-3000		
PWS	PRINCE WILLIAM - WATER (PWS902)	12/04/18 12:27 PM	12
	Marked up to privately owned utility; contact private utility owner		
	for locate		
	Field Contact: BUTCH ROGERS (703)609-8097		
	In the event of damage to a facility call: (703)335-7982		
PWS	PRINCE WILLIAM - SEWER (PWS903)	12/04/18 12:27 PM	12
	Marked up to privately owned utility; contact private utility owner		
	for locate		
	Field Contact: BUTCH ROGERS (703)609-8097		
	In the event of damage to a facility call: (703)335-7982		
UNF	PEG BANDWIDTH (UNF937)	12/05/18 11:22 AM	30
	No Conflict; utility is outside of stated work area.		
	Field Contact: DAVID CADD (804)382-5823		
	In the event of damage to a facility call: (877)652-2321		
VZN	VERIZON (VZN703)	12/04/18 12:26 PM	10
	Marked		
	Field Contact: UTILIQUEST (703)754-2116		
	In the event of damage to a facility call: (888)483-1233		

LC1B

Locate Work Order Number:
N-04432

Project Location:
17711 Fraley Blvd

Utility Location Results Form

Utility Location Results *(completed by utility location service provider)*

Photos attached ☑ Yes ☐ No

Was the location that was requested completed? ☐ Yes ☑ No

Detection cable and/or location tape available ☐ Yes ☑ No
Accurate As-Built Documents available ☐ Yes ☑ No

If no, please check all applicable boxes:

Accurate As-Built Documents:
Requested? ☐ Yes ☑ No Provided? ☐ Yes ☐ No

VDOT on-site assistance:
Requested? ☐ Yes ☑ No Provided? ☐ Yes ☐ No

Does the in-field survey area extend 3 feet beyond the border of the intended excavation area? (Required) ☐ Yes ☑ No

Utility Location Method(s) used: _____

Comments:

☐ Serco/Elite has provided utility markings within the scope of this request for all VDOT owned fiber optic communications cable, and all power cabling from the ITS Device to the ITS Cabinet that was accurately shown on drawings if provided by VDOT, or actual location contained detection cable or tape, and/or VDOT provided on-site assistance.

☐ Where no detection cable/tape and or accurate as-built documents, and/or VDOT assistance was not provided, we have provided approximate markings or no markings have occurred and the 3rd Party Requestor is advised that hand digging with extreme caution is advised. Photos have been attached.

☑ Please be advised that in no case will Serco/Elite be held liable or responsible for any power or communication cabling that falls outside our scope and could not be located due to the lack of accurate documentation, detection cable or tape, and/or VDOT assistance

☑ Arrived onsite to verify no VDOT ITS assets in the area.Team then verified junction boxes in area do not house VDOT fiber.

Certification: The most appropriate equipment and technology to identify all VDOT underground utilities within the requested zone were used.

Utility Locator: (Print) Matt Robinson
(signature) _____
Company: Elite Contracting

Start time: 3:25 PM
End time: 3:28 PM
Date: 11-28-18

This information is valid for 15 days from signed date of marking. Any work performed after 15 days is not covered under this request and will need re-marked.

Appendix B: Boring Logs

Project Location:	**RT 1 Widening**		
Site:	**BP**		
Location:	**STA No 351+40.00; 75-ft LT of CL**		
Boring:	**B1**		

3e EEE Consulting, Inc.
Environmental, Engineering and Educational Solutions

Date(s) Drilled:	**12/12/18**	Logged By: **Josh Hepler/Carroll Ellis**	Well Information:
Drill Rig Type:	**Geo Probe**	Total Depth Drilled: **5'**	Screened Interval: **N/A**
DTW Within Soil Boring:	**N/A**		Cased Interval: **N/A**
Static GW Level:	**N/A**	Date GW Measured:	**N/A**

Depth (feet)	Sample Info			Material Description
	PID (ppm)	Sample Interval (ft)	Time	
1 2 3 4 5	0.0		8:00	0-1' Topsoil. 2-4' Brown/tan sandy clay with some gravel, low moisture. 4-5' Brown clay, dry. Terminated at 5'. No odors.
6 7 8 9 10				
11 12 13 14 15				
16 17 18 19 20				

BGS - Below Ground Surface

Project Location: **RT 1 Widening** Building/Location: **BP** Location: **STA No. 352+05.00; 80-ft LT of CL** Boring: **B2**			3e EEE Consulting, Inc. Environmental, Engineering and Educational Solutions
Date(s) Drilled: **12/12/18**	Logged By: **Josh Hepler/Carroll Ellis**		Well Information:
Drill Rig Type: **Geo Probe**	Total Depth Drilled: **5'**		Screened Interval: **N/A**
DTW Within Soil Boring: **N/A**			Cased Interval: **N/A**
Static GW Level: **N/A**		Date GW Measured: **N/A**	

Depth (feet)	Sample Info			Material Description
	PID (ppm)	Sample Interval (ft)	Time	
1 2 3 4 5	0.0		8:20	0-1' Sandy clay, orange/brown, moist. 1-4' Gravelly sandy clay, orange/brown, moist. 4-5' Sandy clay, orange/brown, moist. No odors. Terminated at 5'.
6 7 8 9 10				
11 12 13 14 15				
16 17 18 19 20				

BGS - Below Ground Surface

Project Location:	**RT 1 Widening**		
Site:	**BP**		
Location:	**STA 352+85.00; 75-ft LT of CL**		
Boring:	**B3**		

3e EEE Consulting, Inc.
Environmental, Engineering and Educational Solutions

Date(s) Drilled: **12/12/18**	Logged By: **Josh Hepler/Carroll Ellis**	Well Information:
Drill Rig Type: **Geo Probe**	Total Depth Drilled: **10'**	Screened Interval: **N/A**
DTW Within Soil Boring: **N/A**		Cased Interval: **N/A**
Static GW Level: **N/A**	Date GW Measured: **N/A**	

Depth (feet)	Sample Info			Material Description
	PID (ppm)	Sample Interval (ft)	Time	
1 2 3 4 5	0.0		8:30	0-0.5' Topsoil, dry. 0.5-2' Brown clay, sandy, slightly moist. 2-5' Brown clay, slightly moist. No odors.
6 7 8 9 10	0.1		8:40	5-9' Brown clay, moist. 9-10' Sandy clay, moist. No odors. Terminated at 10-ft BGS.
11 12 13 14 15				
16 17 18 19 20				

BGS - Below Ground Surface

Appendix C: Laboratory Reports and Sample Custody Documentation

AIR WATER & SOIL LABORATORIES, INC.

1941 Reymet Road ● Richmond, Virginia 23237 ● Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Laboratory Order ID 18L0647

Client Name:	EEE Consulting (Blacksburg, VA) 201 Church Street Blacksburg, VA 24060	Date Received:	December 14, 2018 14:00
		Date Issued:	January 2, 2019 16:24
		Project Number:	18.796.10
Submitted To:	Josh Hepler	Purchase Order:	18.796.10
Client Site I.D.:	BP		

Enclosed are the results of analyses for samples received by the laboratory on 12/14/2018 14:00. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,

Ted Soyars

Laboratory Manager

End Notes:

The test results listed in this report relate only to the samples submitted to the laboratory and as received by the Laboratory.

Unless otherwise noted, the test results for solid materials are calculated on a wet weight basis. Analyses for pH, dissolved oxygen, temperature, residual chlorine and sulfite that are performed in the laboratory do not meet NELAC requirements due to extremely short holding times. These analyses should be performed in the field. The results of field analyses performed by the Sampler included in the Certificate of Analysis are done so at the client's request and are not included in the laboratory's fields of certification nor have they been audited for adherence to a reference method or procedure.

The signature on the final report certifies that these results conform to all applicable NELAC standards unless otherwise specified. For a complete list of the Laboratory's NELAC certified parameters please contact customer service.

1941 Reymet Road ● Richmond, Virginia 23230 ● Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Client Name:	EEE Consulting (Blacksburg, VA) 201 Church Street Blacksburg VA, 24060	Date Issued:	1/2/2019 16:24
Submitted To:	Josh Hepler	Project Number:	18.796.10
Client Site I.D.:	BP	Purchase Order:	18.796.10

ANALYTICAL REPORT FOR SAMPLES

Laboratory Order ID 18L0647

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B1 0-5	18L0647-01	Soil	12/12/2018 08:00	12/14/2018 14:00
B2 0-5	18L0647-02	Soil	12/12/2018 08:20	12/14/2018 14:00
B3 0-5	18L0647-03	Soil	12/12/2018 08:30	12/14/2018 14:00
B3 5-10	18L0647-04	Soil	12/12/2018 08:40	12/14/2018 14:00

AIR WATER SOIL LABORATORIES, INC.

1941 Reymet Road ● Richmond, Virginia 23230 ● Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Client Name:	EEE Consulting (Blacksburg, VA) 201 Church Street Blacksburg VA, 24060	Date Issued:	1/2/2019 16:24
Submitted To:	Josh Hepler	Project Number:	18.796.10
Client Site I.D.:	BP	Purchase Order:	18.796.10

Laboratory Order ID: 18L0647

Analytical Results

Sample I.D. B1 0-5 **Laboratory Sample ID:** 18L0647-01

Grab Date/Time: 12/12/2018 08:00

Field Residual Cl: **Field pH:**

Parameter	Samp ID	Method	Result	Qual	Reporting Limit	D.F.	Sample Prep Date/Time	Analysis Date/Time	Analyst
Volatile Hydrocarbons by GC									
TPH-Volatiles (GRO)	01	SW8015C	<0.10 mg/kg		0.10	1	12/20/18 18:15	12/20/18 18:15	DFH
Surr: 2,5-Dibromotoluene (Surr FID)	*01*	*SW8015C*	*98.3 %*		*80-120*		*12/20/18 18:15*	*12/20/18 18:15*	*DFH*
Semivolatile Hydrocarbons by GC									
TPH-Semi-Volatiles (DRO)	01	SW8015C	<10.0 mg/kg		10.0	1	12/26/18 15:00	12/28/18 15:31	HLM
Surr: Pentacosane (Surr)	*01*	*SW8015C*	*77.8 %*		*40-160*		*12/26/18 15:00*	*12/28/18 15:31*	*HLM*

AIR WATER SOIL LABORATORIES, INC.

1941 Reymet Road ● Richmond, Virginia 23230 ● Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Client Name:	EEE Consulting (Blacksburg, VA) 201 Church Street Blacksburg VA, 24060	Date Issued:	1/2/2019 16:24
Submitted To:	Josh Hepler	Project Number:	18.796.10
Client Site I.D.:	BP	Purchase Order:	18.796.10

Laboratory Order ID: 18L0647

Analytical Results

Sample I.D. B2 0-5 **Laboratory Sample ID:** 18L0647-02

Grab Date/Time: 12/12/2018 08:20

Field Residual Cl: **Field pH:**

Parameter	Samp ID	Method	Result	Qual	Reporting Limit	D.F.	Sample Prep Date/Time	Analysis Date/Time	Analyst
Volatile Hydrocarbons by GC									
TPH-Volatiles (GRO)	02	SW8015C	<0.10 mg/kg		0.10	1	12/20/18 18:37	12/20/18 18:37	DFH
Surr: 2,5-Dibromotoluene (Surr FID)	*02*	*SW8015C*	*89.2 %*		*80-120*		*12/20/18 18:37*	*12/20/18 18:37*	*DFH*
Semivolatile Hydrocarbons by GC									
TPH-Semi-Volatiles (DRO)	02	SW8015C	<10.0 mg/kg		10.0	1	12/26/18 15:00	12/28/18 15:58	HLM
Surr: Pentacosane (Surr)	*02*	*SW8015C*	*94.9 %*		*40-160*		*12/26/18 15:00*	*12/28/18 15:58*	*HLM*

AIR WATER SOIL LABORATORIES, INC.

1941 Reymet Road ● Richmond, Virginia 23230 ● Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Client Name:	EEE Consulting (Blacksburg, VA) 201 Church Street Blacksburg VA, 24060	Date Issued:	1/2/2019 16:24
Submitted To:	Josh Hepler	Project Number:	18.796.10
Client Site I.D.:	BP	Purchase Order:	18.796.10

Laboratory Order ID: 18L0647

Analytical Results

Sample I.D. B3 0-5 **Laboratory Sample ID:** 18L0647-03

Grab Date/Time: 12/12/2018 08:30

Field Residual Cl: **Field pH:**

Parameter	Samp ID	Method	Result	Qual	Reporting Limit	D.F.	Sample Prep Date/Time	Analysis Date/Time	Analyst
Volatile Hydrocarbons by GC									
TPH-Volatiles (GRO)	03	SW8015C	<0.10 mg/kg		0.10	1	12/20/18 18:59	12/20/18 18:59	DFH
Surr: 2,5-Dibromotoluene (Surr FID)	*03*	*SW8015C*	*93.4 %*		*80-120*		*12/20/18 18:59*	*12/20/18 18:59*	*DFH*
Semivolatile Hydrocarbons by GC									
TPH-Semi-Volatiles (DRO)	03	SW8015C	<10.0 mg/kg		10.0	1	12/26/18 15:00	12/28/18 16:25	HLM
Surr: Pentacosane (Surr)	*03*	*SW8015C*	*72.8 %*		*40-160*		*12/26/18 15:00*	*12/28/18 16:25*	*HLM*

AIR WATER SOIL LABORATORIES, INC.

1941 Reymet Road ● Richmond, Virginia 23230 ● Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Client Name:	EEE Consulting (Blacksburg, VA) 201 Church Street Blacksburg VA, 24060	Date Issued:	1/2/2019 16:24
Submitted To:	Josh Hepler	Project Number:	18.796.10
Client Site I.D.:	BP	Purchase Order:	18.796.10

Laboratory Order ID: 18L0647

Analytical Results

Sample I.D. B3 5-10 **Laboratory Sample ID:** 18L0647-04

Grab Date/Time: 12/12/2018 08:40

Field Residual Cl: **Field pH:**

Parameter	Samp ID	Method	Result	Qual	Reporting Limit	D.F.	Sample Prep Date/Time	Analysis Date/Time	Analyst
Volatile Hydrocarbons by GC									
TPH-Volatiles (GRO)	04RE1	SW8015C	<0.46 mg/kg		0.46	1	12/21/18 15:43	12/21/18 15:43	DFH
Surr: 2,5-Dibromotoluene (Surr FID)	*04RE1*	*SW8015C*	*93.6 %*		*80-120*		*12/21/18 15:43*	*12/21/18 15:43*	*DFH*
Semivolatile Hydrocarbons by GC									
TPH-Semi-Volatiles (DRO)	04	SW8015C	<10.0 mg/kg		10.0	1	12/26/18 15:00	12/28/18 16:52	HLM
Surr: Pentacosane (Surr)	*04*	*SW8015C*	*69.8 %*		*40-160*		*12/26/18 15:00*	*12/28/18 16:52*	*HLM*

AIR WATER & SOIL LABORATORIES, INC.

1941 Reymet Road ● Richmond, Virginia 23230 ● Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Client Name:	EEE Consulting (Blacksburg, VA) 201 Church Street Blacksburg VA, 24060	Date Issued:	1/2/2019 16:24
Submitted To:	Josh Hepler	Project Number:	18.796.10
Client Site I.D.:	BP	Purchase Order:	18.796.10

Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Semivolatile Hydrocarbons by GC		**Preparation Method:**	**SW3550C**		
18L0647-01	50.2 g / 1.00 mL	SW8015C	BBL0715	SBL0751	AL80118
18L0647-02	50.7 g / 1.00 mL	SW8015C	BBL0715	SBL0751	AL80118
18L0647-03	50.2 g / 1.00 mL	SW8015C	BBL0715	SBL0751	AL80118
18L0647-04	50.1 g / 1.00 mL	SW8015C	BBL0715	SBL0751	AL80118

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Hydrocarbons by GC		**Preparation Method:**	**SW5030B**		
18L0647-01	5.01 g / 5.00 mL	SW8015C	BBL0617	SBL0580	AK80015
18L0647-02	5.04 g / 5.00 mL	SW8015C	BBL0617	SBL0580	AK80015
18L0647-03	5.00 g / 5.00 mL	SW8015C	BBL0617	SBL0580	AK80015
18L0647-04	5.05 g / 5.00 mL	SW8015C	BBL0617	SBL0580	AK80015
Volatile Hydrocarbons by GC		**Preparation Method:**	**SW5030B**		
18L0647-04RE1	1.08 g / 5.00 mL	SW8015C	BBL0676	SBL0636	AK80015

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Volatile Hydrocarbons by GC - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BBL0617 - SW5030B										
Blank (BBL0617-BLK1)				Prepared & Analyzed: 12/20/2018						
TPH-Volatiles (GRO)	<0.10 mg/kg	0.10	mg/kg							
TPH-Volatiles (GRO)	<0.10 mg/kg	0.10	mg/kg							
TPH-Volatiles (GRO)	<0.10 mg/kg	0.10	mg/kg							
TPH-Volatiles (GRO)	<0.10 mg/kg	0.10	mg/kg							
Surr: 2,5-Dibromotoluene (Surr FID)	95.9		ug/L	100		95.9	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	95.9		ug/L	100		95.9	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	95.9		ug/L	100		95.9	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	95.9		ug/L	100		95.9	80-120			
LCS (BBL0617-BS1)				Prepared & Analyzed: 12/20/2018						
TPH-Volatiles (GRO)	0.96 mg/kg	0.10	mg/kg	0.994	mg/kg	96.4	70-130			
TPH-Volatiles (GRO)	0.96 mg/kg	0.10	mg/kg	0.994	mg/kg	96.4	70-130			
TPH-Volatiles (GRO)	0.96 mg/kg	0.10	mg/kg	0.994	mg/kg	96.4	70-130			
TPH-Volatiles (GRO)	0.96 mg/kg	0.10	mg/kg	0.994	mg/kg	96.4	70-130			
Surr: 2,5-Dibromotoluene (Surr FID)	98.4		ug/L	100	ug/L	98.4	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	98.4		ug/L	100	ug/L	98.4	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	98.4		ug/L	100	ug/L	98.4	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	98.4		ug/L	100	ug/L	98.4	80-120			
Matrix Spike (BBL0617-MS1)		**Source: 18L0653-04**		Prepared & Analyzed: 12/20/2018						
TPH-Volatiles (GRO)	0.76 mg/kg	0.10	mg/kg	0.998	<0.10 mg/kg	75.8	70-130			
TPH-Volatiles (GRO)	0.76 mg/kg	0.10	mg/kg	0.998	<0.10 mg/kg	75.8	70-130			
TPH-Volatiles (GRO)	0.76 mg/kg	0.10	mg/kg	0.998	<0.10 mg/kg	75.8	70-130			
TPH-Volatiles (GRO)	0.76 mg/kg	0.10	mg/kg	0.998	<0.10 mg/kg	75.8	70-130			
Surr: 2,5-Dibromotoluene (Surr FID)	139		ug/L	100	ug/L	139	80-120			S
Surr: 2,5-Dibromotoluene (Surr FID)	139		ug/L	100	ug/L	139	80-120			S
Surr: 2,5-Dibromotoluene (Surr FID)	139		ug/L	100	ug/L	139	80-120			S
Surr: 2,5-Dibromotoluene (Surr FID)	139		ug/L	100	ug/L	139	80-120			S

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Volatile Hydrocarbons by GC - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BBL0617 - SW5030B										
Matrix Spike Dup (BBL0617-MSD1)		**Source: 18L0653-04**		Prepared & Analyzed: 12/20/2018						
TPH-Volatiles (GRO)	0.87 mg/kg	0.10	mg/kg	0.998	<0.10 mg/kg	87.1	70-130	13.8	20	
TPH-Volatiles (GRO)	0.87 mg/kg	0.10	mg/kg	0.998	<0.10 mg/kg	87.1	70-130	13.8	20	
TPH-Volatiles (GRO)	0.87 mg/kg	0.10	mg/kg	0.998	<0.10 mg/kg	87.1	70-130	13.8	20	
TPH-Volatiles (GRO)	0.87 mg/kg	0.10	mg/kg	0.998	<0.10 mg/kg	87.1	70-130	13.8	20	
Surr: 2,5-Dibromotoluene (Surr FID)	119		ug/L	100	ug/L	119	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	119		ug/L	100	ug/L	119	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	119		ug/L	100	ug/L	119	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	119		ug/L	100	ug/L	119	80-120			

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Semivolatile Hydrocarbons by GC - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BBL0715 - SW3550C										
Blank (BBL0715-BLK1)				Prepared: 12/26/2018 Analyzed: 12/28/2018						
TPH-Semi-Volatiles (DRO)	<10.0 mg/kg	10.0	mg/kg							
TPH-Semi-Volatiles (DRO)	<10.0 mg/kg	10.0	mg/kg							
TPH-Semi-Volatiles (DRO)	<10.0 mg/kg	10.0	mg/kg							
TPH-Semi-Volatiles (DRO)	<10.0 mg/kg	10.0	mg/kg							
Surr: Pentacosane (Surr)	2.87		mg/kg	5.01		57.3	40-160			
Surr: Pentacosane (Surr)	2.87		mg/kg	5.01		57.3	40-160			
Surr: Pentacosane (Surr)	2.87		mg/kg	5.01		57.3	40-160			
Surr: Pentacosane (Surr)	2.87		mg/kg	5.01		57.3	40-160			
LCS (BBL0715-BS1)				Prepared: 12/26/2018 Analyzed: 12/28/2018						
TPH-Semi-Volatiles (DRO)	83.9 mg/kg	10.0	mg/kg	95.8	mg/kg	87.6	40-160			
TPH-Semi-Volatiles (DRO)	83.9 mg/kg	10.0	mg/kg	95.8	mg/kg	87.6	40-160			
TPH-Semi-Volatiles (DRO)	83.9 mg/kg	10.0	mg/kg	95.8	mg/kg	87.6	40-160			
TPH-Semi-Volatiles (DRO)	83.9 mg/kg	10.0	mg/kg	95.8	mg/kg	87.6	40-160			
Surr: Pentacosane (Surr)	2.35		mg/kg	4.83	mg/kg	48.7	40-160			
Surr: Pentacosane (Surr)	2.35		mg/kg	4.83	mg/kg	48.7	40-160			
Surr: Pentacosane (Surr)	2.35		mg/kg	4.83	mg/kg	48.7	40-160			
Surr: Pentacosane (Surr)	2.35		mg/kg	4.83	mg/kg	48.7	40-160			
Matrix Spike (BBL0715-MS1)		**Source: 18L0940-02**		Prepared: 12/26/2018 Analyzed: 12/28/2018						
TPH-Semi-Volatiles (DRO)	70.6 mg/kg	10.0	mg/kg	100	21.8 mg/kg	48.8	40-160			
TPH-Semi-Volatiles (DRO)	70.6 mg/kg	10.0	mg/kg	100	21.8 mg/kg	48.8	40-160			
TPH-Semi-Volatiles (DRO)	70.6 mg/kg	10.0	mg/kg	100	21.8 mg/kg	48.8	40-160			
TPH-Semi-Volatiles (DRO)	70.6 mg/kg	10.0	mg/kg	100	21.8 mg/kg	48.8	40-160			
Surr: Pentacosane (Surr)	3.15		mg/kg	5.04	mg/kg	62.4	40-160			
Surr: Pentacosane (Surr)	3.15		mg/kg	5.04	mg/kg	62.4	40-160			
Surr: Pentacosane (Surr)	3.15		mg/kg	5.04	mg/kg	62.4	40-160			
Surr: Pentacosane (Surr)	3.15		mg/kg	5.04	mg/kg	62.4	40-160			

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Semivolatile Hydrocarbons by GC - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BBL0715 - SW3550C										
Matrix Spike Dup (BBL0715-MSD1)		**Source: 18L0940-02**		Prepared: 12/26/2018 Analyzed: 12/28/2018						
TPH-Semi-Volatiles (DRO)	73.0 mg/kg	10.0	mg/kg	98.2	21.8 mg/kg	52.1	40-160	3.38	20	
TPH-Semi-Volatiles (DRO)	73.0 mg/kg	10.0	mg/kg	98.2	21.8 mg/kg	52.1	40-160	3.38	20	
TPH-Semi-Volatiles (DRO)	73.0 mg/kg	10.0	mg/kg	98.2	21.8 mg/kg	52.1	40-160	3.38	20	
TPH-Semi-Volatiles (DRO)	73.0 mg/kg	10.0	mg/kg	98.2	21.8 mg/kg	52.1	40-160	3.38	20	
Surr: Pentacosane (Surr)	2.76		mg/kg	4.95	mg/kg	55.7	40-160			
Surr: Pentacosane (Surr)	2.76		mg/kg	4.95	mg/kg	55.7	40-160			
Surr: Pentacosane (Surr)	2.76		mg/kg	4.95	mg/kg	55.7	40-160			
Surr: Pentacosane (Surr)	2.76		mg/kg	4.95	mg/kg	55.7	40-160			

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Certified Analyses included in this Report

Analyte	Certifications
SW8015C in Solids	
TPH-Semi-Volatiles (DRO)	VELAP,NC,WVDEP
TPH-Volatiles (GRO)	VELAP,NC,WVDEP

Code	Description	Lab Number	Expires
MdDOE	Maryland DE Drinking Water	341	12/31/2019
NC	North Carolina DENR	495	12/31/2018
VELAP	NELAC-Virginia Certificate #10074	460021	06/14/2019

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Summary of Data Qualifiers

S	Surrogate recovery was outside acceptance criteria
RPD	Relative Percent Difference
Qual	Qualifers
-RE	Denotes sample was re-analyzed
D.F.	Dilution Factor. Please also see the Preparation Factor in the Analysis Summary section.
TIC	Tentatively Identified Compounds are compounds that are identified by comparing the analyte mass spectral pattern with the NIST spectral library . A TIC spectral match is reported when the pattern is at least 75% consistent with the published pattern. Compound concentrations are estimated and are calculated using an internal standard response factor of 1.
PCBs, Total	Total PCBs are defined as the sum of detected Aroclors 1016, 1221, 1232, 1248, 1254, 1260, 1262, and 1268.

AIR WATER & SOIL LABORATORIES, INC.
1941 REYMET ROAD
RICHMOND, VIRGINIA 23237
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Chain of Custody
Form #: F1331
Rev. 3.0
Effective: Aug 24, 2017

CHAIN OF CUSTODY

PAGE 1 OF 1

COMPANY NAME: EEE Consulting	INVOICE TO: same	PROJECT NAME/Quote #: Rt. 1 Widning
CONTACT: Josh Hepler	INVOICE CONTACT:	SITE NAME: BP
ADDRESS: 201 church St Blacksburg	INVOICE ADDRESS:	PROJECT NUMBER: ~~18.796.10~~ 18.796.10
PHONE #: 540 230 3685	INVOICE PHONE #:	P.O. #: 18.796.10
FAX #: 540 953 0171	EMAIL: jhepler@eee-consulting.com	Pretreatment Program: NA
Is sample for compliance reporting? YES NO NA	Is sample from a chlorinated supply? YES NO NA	PWS I.D. #: NA
SAMPLER NAME (PRINT): Josh Hepler	SAMPLER SIGNATURE:	Turn Around Time: Circle: (10) 5 Days or __ Day(s)

Matrix Codes: WW=Waste Water/Storm Water GW=Ground Water DW=Drinking Water S=Soil/Solids OR=Organic A=Air WP=Wipe OT=Other_____

CLIENT SAMPLE I.D.	Grab	Composite	Field Filtered (Dissolved Metals)	Composite Start Date	Composite Start Time	Grab Date or Composite Stop Date	Grab Time or Composite Stop Time	Time Preserved	Matrix (See Codes)	Number of Containers	ANALYSIS / (PRESERVATIVE) TPH - DRO	TPH - GRO	BTEX*					
1) B1 0-5	X			NA	NA	12/12	8:00	NA	S	2	X	X	*					
2) B2 0-5	X			↓	↓	↓	8:20	↓	↓	↓	↓	↓	*					
3) B3 0-5	X			↓	↓	↓	8:30	↓	↓	↓	↓	↓	*					
4) B3 5-10	X			↓	↓	↓	8:40	↓	↓	↓	↓	↓	*					
5)																		
6)																		
7)																		
8)																		
9)																		
10)																		

COMMENTS

Preservative Codes: N=Nitric Acid C=Hydrochloric Acid S=Sulfuric Acid H=Sodium Hydroxide A=Ascorbic Acid Z=Zinc Acetate T=Sodium Thiosulfate M=Methanol

* BTEX only if GRO is detected.

PLEASE NOTE PRESERVATIVE(S), INTERFERENCE CHECKS or PUMP RATE (L/min)

4.4°C

RELINQUISHED: DATE / TIME	RECEIVED: DATE / TIME
Lull Ellis III 12/13/18	12/14/18 2:50
RELINQUISHED: DATE / TIME	RECEIVED: DATE / TIME
12/14/18 2:01	12/14/18 1400
RELINQUISHED: DATE / TIME	RECEIVED: DATE / TIME

QC Data Package
Level III ☐
Level IV ☐

LAB USE ONLY
Custody Seals used and intact? (Y/N) _____
COOLER TEMP °C
Received on ice? (Y/N) _____

EEE-Blacksburg **18L0647**
RT 1 Widning
Recd: 12/14/2018 Due: 01/02/2019

v130325002

AIR WATER SOIL LABORATORIES, INC.

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Sample Conditions Checklist

Samples Received at:	**4.40°C**
How were samples received?	Walk In
Were Custody Seals used? If so, were they received intact?	No
Are the custody papers filled out completely and correctly?	Yes
Do all bottle labels agree with custody papers?	Yes
Is the temperature blank or representative sample within acceptable limits? (above freezing to 6°C) or received on ice and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	Yes
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	No
Are all volatile organic and TOX containers free of headspace?	NA
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	NA
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis.	Yes

Phase II Environmental Site Assessment
Roadway Improvement Project

Route 1 Widening Project
Former Exxon #27826
17945 Dumfries Shopping Plaza
Dumfries, Virginia 22026
Prince William County

Contract ID: 44115
VDOT Project: 001-212-249
VDOT UPC: 90339 Act: 689
VDOT Task Number: E-FR024.02

Prepared for
Mr. Brutus Cooper
Regional VDOT HAZMAT Manager
Virginia Department of Transportation
NOVA District Office
4975 Alliance Drive
Fairfax, VA 22030

Prepared by
EEE Consulting, Inc.
201 Church Street
Blacksburg, Virginia 24060

January 2019

Prepared by: **Joshua P. Hepler, PG, Project Scientist**

Reviewed by: **Christopher J. Lalli, Vice President**

3e EEE Consulting, Inc.
Environmental, Engineering and Educational Solutions

Table of Contents

Tables

Figures

Appendices

Acronyms

AST	Above Ground Storage Tank
BGS	Below Ground Surface
C	Celsius
COC	Chain of Custody
CL	Center Line
DEQ	Department of Environmental Quality
EPA	Environmental Protection Agency – United States
FT	Feet
LT	Left
mg/kg	Milligrams per Kilogram
MW	Monitoring Well
PG	Professional Geologist
PID	Photoionization Detector
PPM	Parts Per Million
REC	Recognized Environmental Condition
RL	Reporting Limit
Rt	Route
RT	Right
R/W	Right-of-Way
STA	Station
TPH-DRO	Total Petroleum Hydrocarbons - Diesel Range Organics
TPH-GRO	Total Petroleum Hydrocarbons – Gasoline Range Organics
UST	Underground Storage Tank
VDOT	Virginia Department of Transportation
VOC	Volatile Organic Compounds
VSWMR	Virginia Solid Waste Management Regulations
3e	EEE Consulting, Inc.

1.0 INTRODUCTION AND BACKGROUND

The Virginia Department of Transportation (VDOT) is administering proposed improvements and realignment of 2.3-miles of Route 1 (Fraley Boulevard) between the intersection with Quantico Gateway Drive and the intersection with Drumfires Road (State Route 234) in Dumfries, Prince William County, Virginia. The general project location and topographic setting are shown on **Figures 1** and **2**, respectively. An aerial photograph of the project area is also presented as **Figure 3.**

The roadway and drainage improvements will occur in existing roadway right-of-way (R/W), proposed R/W, permanent easements (slope & drainage), temporary construction easements (i.e. erosion & sediment control measures) and proposed limited access lines. A Phase I Environmental Site Assessment (ESA) was prepared by EEE Consulting, Inc (**3e**) for the study area in August 2018, which identified Recognized Environmental Conditions (REC) throughout the corridor, including the subject property as follows:

- **Former Exxon #27826** (Parcel 048) located at 17945 Dumfries Shopping Plaza, Dumfries, VA 22026 (VDOT Plan Sheet No 9). This former business stored gasoline in 8,000-gallon, 6,000-gallon, and 4,000-gallon USTs that were closed/removed from the ground. The closure of these petroleum USTs resulted in confirmation of a petroleum release to the environment that was tracked by the DEQ under Pollution Complaint (PC) No. 1996-3206.

According to Plan Sheet No. 9, two drainage structures and associated pipe connections are depicted for installation in proposed R/W (i.e. 9-4) and a permanent drainage easement (i.e. pipe connection to 9-8) at Parcel 048 (see **Figure 4**).

The RECs identified at Parcel 048 have the potential to pose adverse impacts to subsurface media that will likely be disturbed during the installation of the noted drainage improvements. The constituents of concern are petroleum-based, which are based on the RECs identified above and detailed in the Phase I ESA Corridor Study Report (**3e**, August 2018). Based on this information, the VDOT – NOVA District Hazardous Materials Manager requested the collection of representative samples to confirm the presence/absence of petroleum impacts to soil and groundwater, if encountered, in and proximate to the proposed disturbance areas. On December 7th, 2018, **3e** completed a Phase II ESA at Parcel 048 to confirm the presence/absence of impacts to subsurface media that will likely be disturbed in response to the proposed drainage improvements.

Subsurface boring advancements, sampling methods, corresponding analytical results, and conclusions/recommendations pertaining to the proposed construction activities at Parcel 048 are summarized in the following sections of this report.

2.0 PUBLIC/PRIVATE UTILITY CLEARINGS AND MARK OUTS

Prior to implementing the direct push boring installations, the approximate locations of subsurface public utilities were identified and marked by Miss Utility of Virginia. A utility locate request form was also completed with VDOT to identify utilities owned and operated by VDOT. Copies of the Miss Utility and VDOT Tickets are included in **Appendix A**. In addition to public utility identification, private subsurface utilities were also identified and marked in each investigative area prior to commencing drilling activities.

3.0 SOIL AND GROUNDWATER SAMPLING METHODS

3.1. Soil Sampling Methods

On December 7th, 2018, a direct push drill rig was utilized to advance three (3) soil borings with two (2) converted to temporary groundwater monitoring wells at the following locations:

- B1 – Installed proximate to STA No. 296+75; 130-ft, RT of CL to a depth of 18-ft BGS upon refusal on consolidated material with subsequent conversion to a temporary groundwater monitoring well (MW).
- B2 – Installed proximate to STA No. 296+60; 50-ft, RT of CL to a depth of 18-ft BGS upon refusal on consolidated material with subsequent conversion to temporary MW.
- B3 – Installed proximate to STA No. 295+00; 50-ft, RT of CL to a depth of 15-ft BGS as proposed.

The roadway improvements proposed to date, RECs, and boring locations are depicted on **Figure 4**.

Each soil boring was advanced using a Geoprobe® direct push rig. The direct-push rig utilizes a hollow-stem spoon that produced a continuous soil core in five (5)-ft intervals along the vertical depth of each boring. Each boring was advanced to predetermined depths or refusal at depths that ranged from 15- to 18.5-ft BGS. Subsurface conditions (i.e. wet soils) indicative of groundwater were observed in B1, B2 and B3. The detailed boring logs are presented in **Appendix B**.

Composite soil samples were collected to assess soil that will likely be disturbed during construction. The representative composite soil samples were obtained from the borings by collecting aliquots from the following depth intervals:

- B1, B2 and B3: 5-10-ft and 10-15-ft BGS.

Each composite soil sample was placed into two (2) pre-cleaned 4-ounce glass jars. The sample jars were appropriately labeled and placed on ice in a cooler to maintain an appropriate temperature

(≤ 4°C) while in transit to the certified environmental laboratory. Chain of Custody (COC) documentation was completed for all samples submitted for laboratory analysis.

All composite soil samples obtained from the 3 direct push borings were submitted for laboratory analysis of TPH-GRO. The COC documentation and laboratory analytical data are provided in **Appendix C**. A detailed discussion of the composite soil sample analytical results is presented in **Section 5.0** of this report.

3.2. Groundwater Sampling Methods

Temporary monitoring wells were constructed in B1 and B2 to collect representative groundwater samples to confirm the presence/absence of petroleum impact to the shallow groundwater table. Each temporary well was constructed with 1-inch diameter, PVC well screen (slotted at 0.01-ft intervals) and solid 1-inch diameter casing. Screen and casing intervals for the temporary monitoring wells are documented on the boring logs (see **Appendix B)**. PVC caps were fitted over each well to prevent intrusion of foreign material. Clean sand was then placed in the remaining annular space of the borehole to form a filter pack around the well screen.

On December 7th, 2018, an oil/water interface probe was utilized to determine the depth-to-groundwater and confirm the presence or absence of separate-phase petroleum in each temporary monitoring well. The static groundwater levels in B1 and B2 were measured at depths of 7.40- and 4.35-ft BGS, respectively (see **Appendix B**). Separate-phase petroleum or petroleum odors were not detected in the temporary monitoring wells.

Representative groundwater samples were collected from B1 and B2, which were prepared for transport to the laboratory in accordance the following procedures: 1) the samples were collected using disposable nylon string and a one-half-inch diameter, disposable polyethylene bailers; 2) the samples were placed into containers provided by the laboratory with the appropriate preservative; 3) placed on ice in a cooler to maintain appropriate temperature while in transport to the environmental laboratory and; 4) Chain of Custody documentation completed.

Both groundwater samples were submitted for analysis of TPH-GRO and BTEX by EPA Methods 8015C and 8021, respectively. The analytical data for the representative groundwater samples is provided in **Appendix C**. A discussion of the groundwater analytical results are provided in **Section 6.0** of this report.

After completion of the gauging/sampling activities, each temporary monitoring well was abandoned by removing the PVC screen and casing from the ground surface and filling the resulting voids to grade with bentonite chips.

4.0 PID SCREENING RESULTS

Photoionization Detector (PID) results for the screened direct push soil cores are presented below in **Table 1**. Measurement units are in parts per million (ppm).

Table 1 - PID Soil Screening Data: Route 1 – Former Exxon #27826

	PID (ppm)	PID (ppm)	PID (ppm)	PID (ppm)
Depth (ft BGS)	0-5	5-10	10-15	15-20
B1	0.1	0.1	0.1	0.3
B2	0.8	0.3	0.0	0.1
B3	0.0	0.0	0.0	NA

Notes:
ppm = Parts per Million
BGS – Below Ground Surface
Depth Unit – foot BGS
NA – Not Applicable

A review of **Table 1** indicates that PID readings measured in the screened soil cores were < 1.0-parts-per-million (ppm) in B1 through B3. No visual or olfactory evidence of petroleum-impacted media was observed during boring and sampling activities. Based on this information, these low measurable PID readings are likely representative of background soil moisture content, and not reflective of volatile organic compound vapors in the soil.

5.0 SOIL SAMPLE ANALYTICAL RESULTS

The analytical results obtained from the soil samples are summarized below in **Table 2**. All results are listed in units of milligrams-per-kilogram (mg/kg). A detailed laboratory analytical report is provided in **Appendix C**.

Table 2: Soil Sample Analytical Data
Exxon #27826
Route 1 Widening, Dumfries VA
Units = Milligrams per Kilogram (mg/kg)

Location	**B1 5-10**		**B1 10-15**		**B2 5-10**		**B2 10-15**		**B3 5-10**		**B3 10-15**	
Laboratory I.D.	18L0337-01		18L0337-02		18L0337-03		18L0337-04		18L0337-05		18L003-06	
Depth Below Grade	5-10 feet		10-15 feet		5-10 feet		10-15 feet		5-10 feet		10-15 feet	
Sample Time	7:55		8:00		8:15		8:20		8:50		8:55	
	Result	*RL*	Result	*RL*	Result	*RL*	Result	*RL*	Result	*RL*	Result	*RL*
TPH-GRO	ND	*0.10*	ND	*0.46*	ND	*0.10*	ND	*0.10*	ND	*0.10*	ND	*0.46*

Notes:
Bold / Underlined text = Concentration reported above RL
RL = Reporting Limit
ND -Below Laboratory Reporting Limit

A review of **Table 2** indicates that residual-phase TPH-GRO concentrations were not detected above the laboratory reporting limit (RL) in the representative soil samples collected at Parcel 048.

6.0 DISSOLVED PHASE ANALYTICAL RESULTS

The dissolved-phase analytical results obtained from the groundwater samples collected at B1 and B2 are summarized in **Table 3** below. All results are listed in milligrams per liter (mg/L). A detailed laboratory analytical report is provided in **Appendix C**.

Table 3: Groundwater Sample Analytical Data
Route 1 Widening: Exxon #27826
Units = Milligrams per Liter (mg/l)

Location	B1		B2		Trip Blank	
Laboratory I.D.	18L0337-07		18L0337-08		18L0337-09	
Sample Time	9:10		9:20		16:00	
	Result	*RL*	Result	*RL*	Result	*RL*
Benzene	ND	*0.001*	ND	*0.001*	ND	*0.001*
Toulene	ND	*0.001*	ND	*0.001*	ND	*0.001*
Ethylbenzene	ND	*0.001*	ND	*0.001*	ND	*0.001*
m+p-Xylenes	ND	*0.004*	ND	*0.004*	ND	*0.004*
o-Xylenes	ND	*0.002*	ND	*0.002*	ND	*0.002*
TPH-GRO	ND	*0.10*	ND	*0.10*	ND	*0.10*

Notes:
Bold / Underlined text = Concentration reported above RL
RL = Reporting Limit
ND -Below Laboratory Reporting Limit

A review of **Table 3** indicates that dissolved-phase petroleum constituents were not detected above the applicable laboratory RLs in the representative groundwater samples collected from B1 and B2. Additionally, the trip blank did not contain dissolved-phase petroleum constituent concentrations above the applicable laboratory RLs.

7.0 CONCLUSIONS AND RECOMMENDATIONS

A total of 3 direct push borings with 2 converted to temporary groundwater monitoring wells were installed to collect representative samples to determine if the RECs identified at Parcel 048 resulted in adverse impacts to subsurface media that will likely be disturbed in response to the proposed drainage improvements.

The representative soil and groundwater samples collected as part of this investigation did not contain detectable residual-phase and dissolved-phase petroleum constituent concentrations, respectively. Therefore, special management provisions to the construction contract should not

apply for soil and groundwater that will likely be disturbed at Parcel 048 in response to the installation of the drainage improvements proposed as of the date of this report.

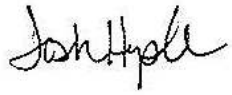
8.0 LIMITATIONS

It is impossible to know with certainty the entirety of a site is free of hazardous substances or conditions even with extensive subsurface testing. The conclusions of this investigation are based solely on the scope-of-work and on the sources of information reviewed during this investigation. This report was prepared for the exclusive use of VDOT, and their expressly-designated affiliates. **3e** accepts no responsibility for damages or claims resulting from past or future environmental degradation related to the subject property.

9.0 ACKNOWLEDGEMENT

3e appreciates the opportunity to provide environmental services to VDOT regarding the Former Exxon #27826 - Route 1 roadway improvement project located in Dumfries, VA under the Professional Services HAZMAT Contract. If we may be of further assistance, or you have any questions or comments regarding the project, please contact our office at (540) 953-0170.

10.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS



Joshua P. Hepler, PG
Project Environmental Scientist
Preparer

Chris Lalli
Vice President/Associate
Reviewer

Figures

3e EEE Consulting, Inc.
Environmental, Engineering and Educational Solutions

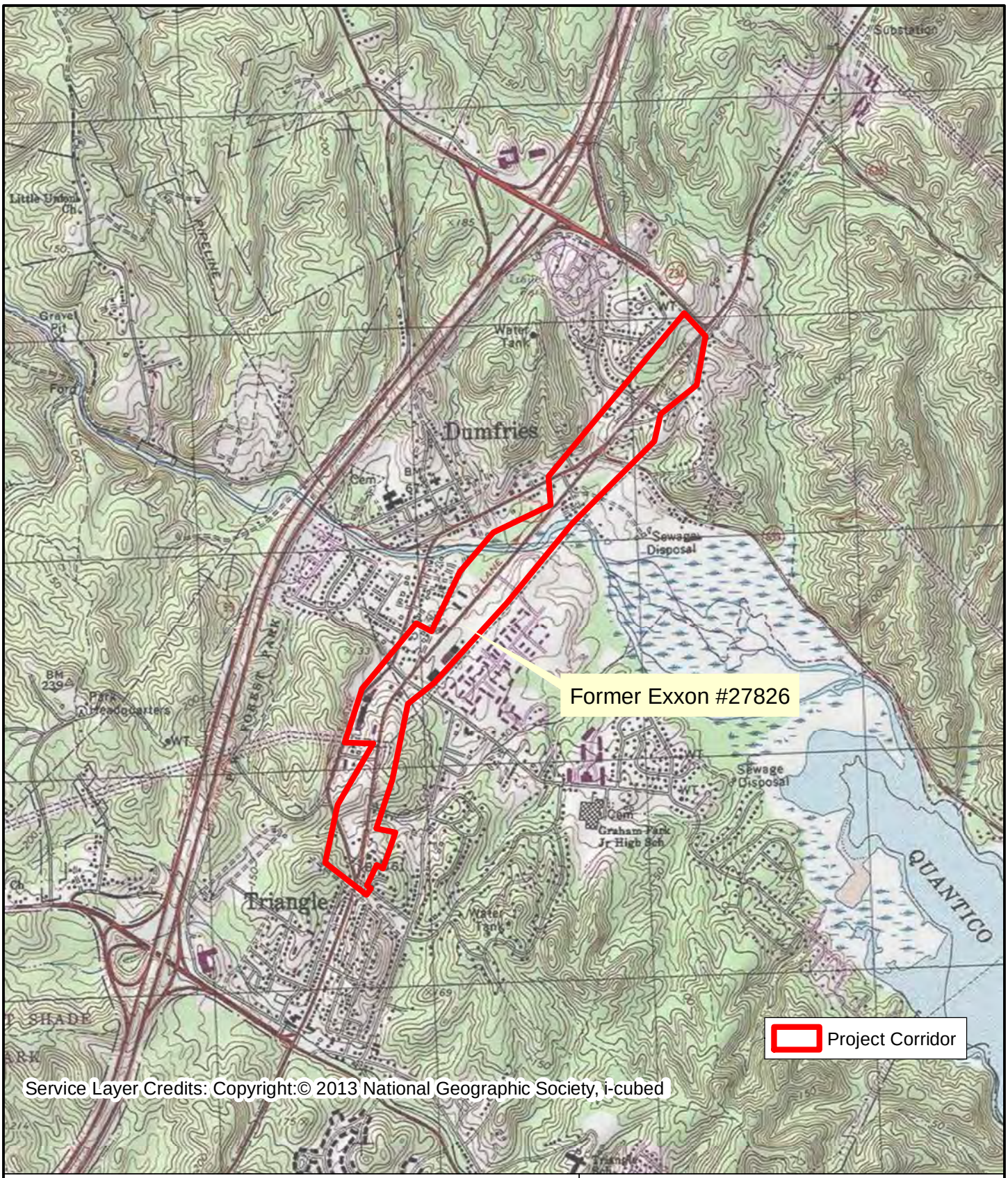
N

Prepared by Leah Potts, 01/24/2019
Projection: NAD 1983 2011 StatePlane Virginia North FIPS 4501 Ft US

FIGURE 1
PROJECT CORRIDOR AERIAL
FORMER EXXON #27826

0 0.5 1
Miles

Dumfries, VA



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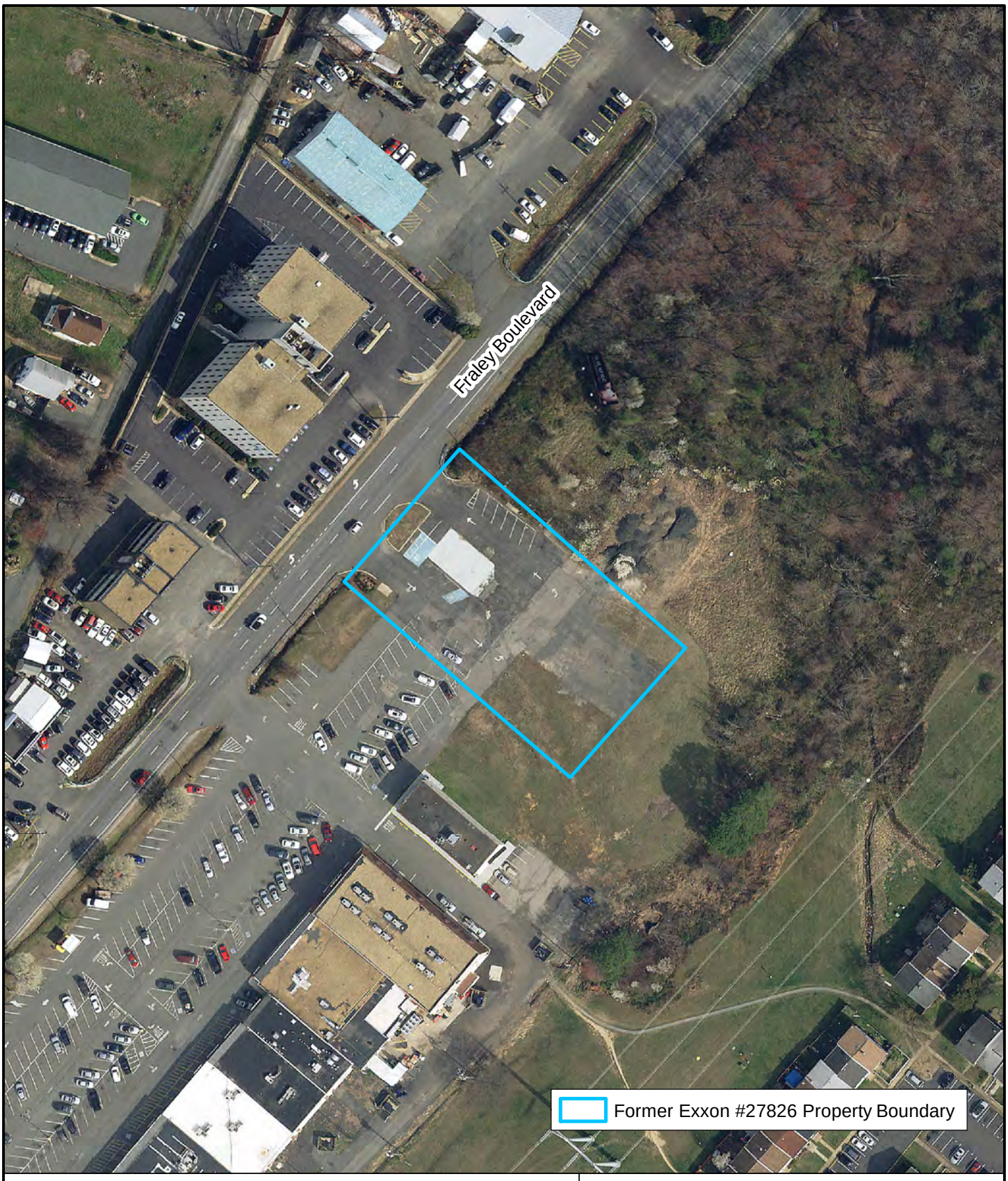
Prepared by Leah Potts, 01/24/2019
Projection: NAD 1983 2011 StatePlane Virginia North FIPS 4501 Ft US

FIGURE 2
PROJECT CORRIDOR TOPOGRAPHIC
FORMER EXXON #27826

0 0.5 1
Miles

Dumfries, VA

1:24,000



EEE Consulting, Inc.
Environmental, Engineering and Educational Solutions

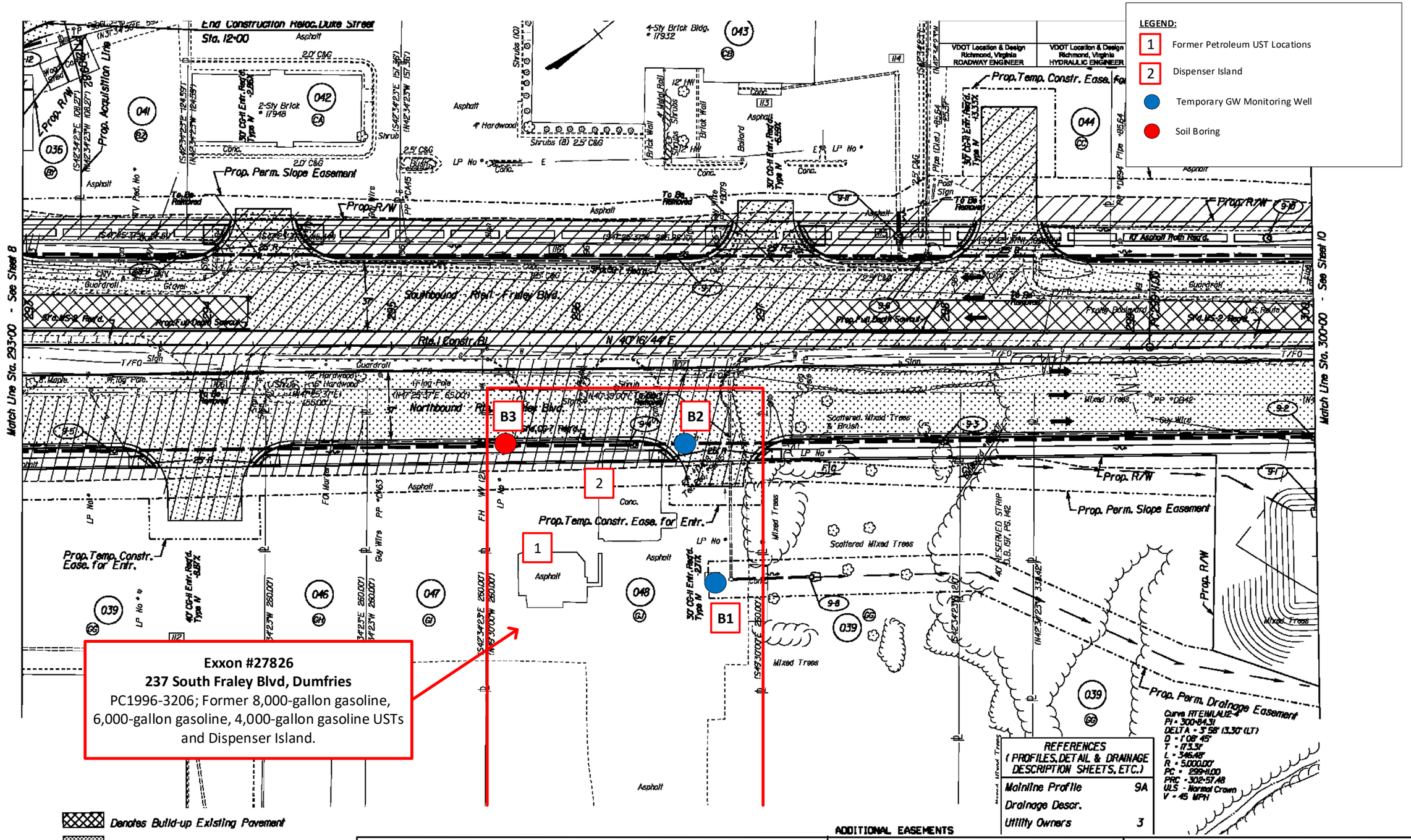
N

Prepared by Leah Potts, 01/24/2019
Sources: VGIN 2017
Projection: NAD 1983 2011 StatePlane Virginia North FIPS 4501 Ft US

FIGURE 3
AERIAL WITH PROPERTY BOUNDARIES
FORMER EXXON #27826

0 100 200
Feet

Dumfries, VA



3e EEE Consulting, Inc.
Environmental, Engineering and Educational Solutions

VDOT Virginia Department of Transportation

Route 1 Widening Project
Dumfries, Virginia

Figure 4

Plan Sheet 9 Depicting Identified RECs and Boring Locations at Exxon #27826.

E-FR024.02 January 2019

Appendix A: Miss Utility Ticket and VDOT Ticket

From: tickets@missutilityofvirginia.com
To: Josh Hepler
Subject: VUPS EMLCFM 2018/12/04 #01701 A833101239-01A RUSH RESP LREQ
Date: Tuesday, December 4, 2018 9:30:55 AM
Importance: High

EMLCFM 01701 VUPSa 12/04/18 09:30:51 A833101239-01A RESPONSE

Thank you for contacting VA811! This is an automatically generated response from the utilities who received your notice of excavation. If you have questions about the response, call the "field contact" for that utility. For your safety, please respect and protect the marks, excavate carefully around the marked utility lines and contact VA811 if you see clear evidence of unmarked utilities.

Remember, you can now reach VA811 by dialing 811.

Ticket : A833101239 Rev: 01A Taken: 12/03/18 11:47 AM

State: VA Cnty: PRINCE WILLIAM Place: DUMFRIES
Address : 17945 DUMFRIES SHOPPING PLZ
Responses due by: 12/03/18 02:48 PM Expires: 12/19/18 07:00 AM

When the member Marking Code is blue, click for additional information that may be provided by the Operator/Locator.

Marking Code	Description	Response	
CGV	COLUMBIA GAS (CGV930)	12/04/18 09:30 AM	10
	Marked Field Contact: UTILIQUEST (703)754-2116 In the event of damage to a facility call: (800)543-8911		
CMC	COMCAST (CMC502)	12/03/18 02:35 PM	30
	No Conflict; utility is outside of stated work area. Field Contact: CABLE PROTECTION SERVICES (804)562-3861 In the event of damage to a facility call: (800)441-6917 ext opt 1		
DOM	DOMINION ENERGY ELEC DIST (DOM400)	11/29/18 11:50 AM	30
	No Conflict; utility is outside of stated work area. Field Contact: UTILIQUEST (703)754-2116 In the event of damage to a facility call: (888)667-3000		
PWS	PRINCE WILLIAM - WATER (PWS902)	11/29/18 10:15 AM	32
	No conflict; privately owned utility on property. Contact private utility owner for locate. Field Contact: BUTCH ROGERS (703)609-8097 In the event of damage to a facility call: (703)335-7982		
PWS	PRINCE WILLIAM - SEWER (PWS903)	11/29/18 10:15 AM	32
	No conflict; privately owned utility on property. Contact private utility owner for locate. Field Contact: BUTCH ROGERS (703)609-8097 In the event of damage to a facility call: (703)335-7982		
VZN	VERIZON (VZN703)	12/04/18 09:30 AM	10
	Marked Field Contact: UTILIQUEST (703)754-2116 In the event of damage to a facility call: (888)483-1233		

LC1B

Locate Work Order Number:
N-04432

Project Location:
17711 Fraley Blvd

Utility Location Results Form

Utility Location Results *(completed by utility location service provider)*

Photos attached ☑ Yes ☐ No

Was the location that was requested completed? ☐ Yes ☑ No

Detection cable and/or location tape available ☐ Yes ☑ No
Accurate As-Built Documents available ☐ Yes ☑ No

If no, please check all applicable boxes:

Accurate As-Built Documents:
Requested? ☐ Yes ☑ No Provided? ☐ Yes ☐ No

VDOT on-site assistance:
Requested? ☐ Yes ☑ No Provided? ☐ Yes ☐ No

Does the in-field survey area extend 3 feet beyond the border of the intended excavation area? (Required) ☐ Yes ☑ No

Utility Location Method(s) used: _____

Comments:

☐ Serco/Elite has provided utility markings within the scope of this request for all VDOT owned fiber optic communications cable, and all power cabling from the ITS Device to the ITS Cabinet that was accurately shown on drawings if provided by VDOT, or actual location contained detection cable or tape, and/or VDOT provided on-site assistance.

☐ Where no detection cable/tape and or accurate as-built documents, and/or VDOT assistance was not provided, we have provided approximate markings or no markings have occurred and the 3rd Party Requestor is advised that hand digging with extreme caution is advised. Photos have been attached.

☑ Please be advised that in no case will Serco/Elite be held liable or responsible for any power or communication cabling that falls outside our scope and could not be located due to the lack of accurate documentation, detection cable or tape, and/or VDOT assistance

☑ Arrived onsite to verify no VDOT ITS assets in the area.Team then verified junction boxes in area do not house VDOT fiber.

Certification: The most appropriate equipment and technology to identify all VDOT underground utilities within the requested zone were used.

Utility Locator: (Print) Matt Robinson
(signature) _____
Company: Elite Contracting

Start time: 3:25 PM
End time: 3:28 PM
Date: 11-28-18

This information is valid for 15 days from signed date of marking. Any work performed after 15 days is not covered under this request and will need re-marked.

Appendix B: Boring Logs

Project Location:	**RT 1 Widening**		
Site	**Former Exxon #27826**		
Location	**STA 296+75.00; 130-ft RT of CL**		
Boring Location:	**B1**		

3e EEE Consulting, Inc.
Environmental, Engineering and Educational Solutions

Date(s) Drilled: **12/7/18**	Logged By: **Josh Hepler/Carroll Ellis**	Well Information:
Drill Rig Type: **Geoprobe**	Total Depth Drilled: **18.5-ft**	Screened Interval: **5-18.5-ft**
DTW Within Soil Boring: **15.5-ft**		Cased Interval: **0-5-ft**
Static GW Level: **7.40-ft**	Date GW Measured: **December 7, 2018**	

Depth (feet)	Sample Info			Material Description
	PID (ppm)	Sample Interval (ft)	Time	
1 2 3 4 5	0.1			0-1' Topsoil. 1-5' Grey sandy clay, slightly moist. No odors observed. 50% recovery
6 7 8 9 10	0.1		7:55	5-8' Grey sandy clay, very moist. 8-10' Grey clay with orange streaks, moist. No odors. 60% recovery
11 12 13 14 15	0.1		8:00	10-14' Gray/orange clay, slightly moist. 14-15' Tan sandy clay, moist. No odors. 100% recovery
16 17 18 19 20	0.3			15-17' Brown sand, saturated. 17-18' Grey siltstone. No odors. 90% recovery Refusal at 18.5-ft BGS at grey siltstone.

BGS - Below Ground Surface

Project Location: **RT 1 Widening**			
Building/Location: **Exxon**			
Location **STA 296+60.00; 50-ft RT of CL**			
Boring Location: **B2**			
Date(s) Drilled: **12/7/18**	Logged By: **Josh Hepler/Carroll Ellis**	Well Information:	
Drill Rig Type: **Geoprobe**	Total Depth Drilled: **16-ft**	Screened Interval: **5-16-ft**	
DTW Within Soil Boring: **9-ft**		Cased Interval: **0-5-ft**	
Static GW Level: **4.35-ft**	Date GW Measured: **December 7, 2018**		

Depth (feet)	Sample Info			Material Description
	PID (ppm)	Sample Interval (ft)	Time	
1 2 3 4 5	0.8			0-1.0' Black/grey asphalt/fill, dry. 1.0-5' Gray/brown sandy clay, slightly moist to moist. No odors observed. 60% recovery
6 7 8 9 10	0.3		8:15	5-8' Grey sand, moist. 8-10' Orange/gray sandy clay, slightly moist to saturated. No odors. 80% recovery
11 12 13 14 15	0.0		8:20	10-12' Orange clay,dry. Grey/tan sandy clay, moist. Gravel, very moist. Grey siltstone with green gravel, saturated. No odors. 20% recovery/refusal.
16 17 18 19 20	0.1			15-16' Grey siltstone. Refusal on Grey Siltstone at 16-ft BGS.

BGS - Below Ground Surface

Project Location: **RT 1 Widening**			
Building/Location: **Exxon**			
Location **STA 295+00.00; 50-ft RT of CL**			
Boring Location: **B3**			
Date(s) Drilled: **12/7/18**	Logged By: **Josh Hepler/Carroll Ellis**	Well Information: NA	
Drill Rig Type: **Geoprobe**	Total Depth Drilled: **15-ft**	Screened Interval: NA	
DTW Within Soil Boring: **9-ft BGS**		Cased Interval: NA	
Static GW Level: NA NA	Date GW Measured: **December 7, 2018**		

Depth (feet)	Sample Info			Material Description
	PID (ppm)	Sample Interval (ft)	Time	
1 2 3 4 5	0.0			0-1.0' Black/grey asphalt/fill dry. 1.0-3.5' Grey/orange sandy clay, dry. 3.5-5' Orange/brown sand, dry. No odors observed. 40% recovery
6 7 8 9 10	0.0		8:50	5-9' Orange sand, moist to saturated. 9-10' Grey sandy clay, wet. No odors. 60% recovery
11 12 13 14 15	0.0		8:55	10-13' Brown/grey sand, saturated. Gravel, wet. No odors. 30% recovery. Boring terminated at 15-ft BGS as proposed.
16 17 18 19 20				

BGS - Below Ground Surface

Appendix C: Laboratory Reports and Sample Custody Documentation

AIR WATER & SOIL LABORATORIES, INC.

1941 Reymet Road ● Richmond, Virginia 23237 ● Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Laboratory Order ID 18L0337

Client Name:	EEE Consulting (Blacksburg, VA) 201 Church Street Blacksburg, VA 24060	Date Received:	December 7, 2018 15:15
		Date Issued:	December 19, 2018 15:07
		Project Number:	18-796.02
Submitted To:	Josh Hepler	Purchase Order:	18-796.02
Client Site I.D.:	Exxon		

Enclosed are the results of analyses for samples received by the laboratory on 12/07/2018 15:15. If you have any questions concerning this report, please feel free to contact the laboratory.

Sincerely,

Ted Soyars

Laboratory Manager

End Notes:

The test results listed in this report relate only to the samples submitted to the laboratory and as received by the Laboratory.

Unless otherwise noted, the test results for solid materials are calculated on a wet weight basis. Analyses for pH, dissolved oxygen, temperature, residual chlorine and sulfite that are performed in the laboratory do not meet NELAC requirements due to extremely short holding times. These analyses should be performed in the field. The results of field analyses performed by the Sampler included in the Certificate of Analysis are done so at the client's request and are not included in the laboratory's fields of certification nor have they been audited for adherence to a reference method or procedure.

The signature on the final report certifies that these results conform to all applicable NELAC standards unless otherwise specified. For a complete list of the Laboratory's NELAC certified parameters please contact customer service.

Accredited in accordance with nelac — Commonwealth of Virginia, DCLS Accreditation # 460021

NWBOC EDWOSB Certified

Certified SWaM Small, Women and Minority-Owned — Supplier Diversity Strengthens the Commonwealth — by the Virginia Department of Minority Business Enterprise

AIR WATER & SOIL LABORATORIES, INC.

1941 Reymet Road ● Richmond, Virginia 23230 ● Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Client Name:	EEE Consulting (Blacksburg, VA) 201 Church Street Blacksburg VA, 24060	Date Issued:	12/19/2018 15:07
Submitted To:	Josh Hepler	Project Number:	18-796.02
Client Site I.D.:	Exxon	Purchase Order:	18-796.02

ANALYTICAL REPORT FOR SAMPLES

Laboratory Order ID 18L0337

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
B1 5-10	18L0337-01	Soil	12/07/2018 07:55	12/07/2018 15:15
B1 10-15	18L0337-02	Soil	12/07/2018 08:00	12/07/2018 15:15
B2 5-10	18L0337-03	Soil	12/07/2018 08:15	12/07/2018 15:15
B2 10-15	18L0337-04	Soil	12/07/2018 08:20	12/07/2018 15:15
B3 5-10	18L0337-05	Soil	12/07/2018 08:50	12/07/2018 15:15
B3 10-15	18L0337-06	Soil	12/07/2018 08:55	12/07/2018 15:15
B1	18L0337-07	Ground Water	12/07/2018 09:10	12/07/2018 15:15
B2	18L0337-08	Ground Water	12/07/2018 09:20	12/07/2018 15:15
Trip Blank	18L0337-09	Ground Water	11/27/2018 16:00	12/07/2018 15:15

AIR WATER SOIL LABORATORIES, INC.

1941 Reymet Road ● Richmond, Virginia 23230 ● Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Client Name:	EEE Consulting (Blacksburg, VA) 201 Church Street Blacksburg VA, 24060	Date Issued:	12/19/2018 15:07
Submitted To:	Josh Hepler	Project Number:	18-796.02
Client Site I.D.:	Exxon	Purchase Order:	18-796.02

Laboratory Order ID: 18L0337

Analytical Results

Sample I.D. B1 5-10 **Laboratory Sample ID:** 18L0337-01

Grab Date/Time: 12/07/2018 07:55

Field Residual Cl: **Field pH:**

Parameter	Samp ID	Method	Result	Qual	Reporting Limit	D.F.	Sample Prep Date/Time	Analysis Date/Time	Analyst
Volatile Hydrocarbons by GC									
TPH-Volatiles (GRO)	01	SW8015C	<0.10 mg/kg		0.10	1	12/12/18 12:58	12/12/18 12:58	NJR
Surr: 2,5-Dibromotoluene (Surr FID)	*01*	*SW8015C*	*105 %*		*80-120*		*12/12/18 12:58*	*12/12/18 12:58*	*NJR*

AIR WATER SOIL LABORATORIES, INC.

1941 Reymet Road ● Richmond, Virginia 23230 ● Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Client Name:	EEE Consulting (Blacksburg, VA) 201 Church Street Blacksburg VA, 24060	Date Issued:	12/19/2018 15:07
Submitted To:	Josh Hepler	Project Number:	18-796.02
Client Site I.D.:	Exxon	Purchase Order:	18-796.02

Laboratory Order ID: 18L0337

Analytical Results

Sample I.D. B1 10-15 **Laboratory Sample ID:** 18L0337-02

Grab Date/Time: 12/07/2018 08:00

Field Residual Cl: **Field pH:**

Parameter	Samp ID	Method	Result	Qual	Reporting Limit	D.F.	Sample Prep Date/Time	Analysis Date/Time	Analyst
Volatile Hydrocarbons by GC									
TPH-Volatiles (GRO)	02RE1	SW8015C	<0.46 mg/kg		0.46	1	12/13/18 12:10	12/13/18 12:10	DFH
Surr: 2,5-Dibromotoluene (Surr FID)	*02RE1*	*SW8015C*	*105 %*		*80-120*		*12/13/18 12:10*	*12/13/18 12:10*	*DFH*

AIR WATER SOIL LABORATORIES, INC.

1941 Reymet Road ● Richmond, Virginia 23230 ● Tel: (804)-358-8295 Fax: (804)-358-8297

Certificate of Analysis

Final Report

Client Name:	EEE Consulting (Blacksburg, VA) 201 Church Street Blacksburg VA, 24060	Date Issued:	12/19/2018 15:07
Submitted To:	Josh Hepler	Project Number:	18-796.02
Client Site I.D.:	Exxon	Purchase Order:	18-796.02

Laboratory Order ID: 18L0337

Analytical Results

Sample I.D. B2 5-10 **Laboratory Sample ID:** 18L0337-03

Grab Date/Time: 12/07/2018 08:15

Field Residual Cl: **Field pH:**

Parameter	Samp ID	Method	Result	Qual	Reporting Limit	D.F.	Sample Prep Date/Time	Analysis Date/Time	Analyst
Volatile Hydrocarbons by GC									
TPH-Volatiles (GRO)	03	SW8015C	<0.10 mg/kg		0.10	1	12/12/18 13:42	12/12/18 13:42	NJR
Surr: 2,5-Dibromotoluene (Surr FID)	*03*	*SW8015C*	*101 %*		*80-120*		*12/12/18 13:42*	*12/12/18 13:42*	*NJR*

AIR WATER SOIL LABORATORIES, INC.

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Certificate of Analysis

Final Report

Client Name:	EEE Consulting (Blacksburg, VA) 201 Church Street Blacksburg VA, 24060	Date Issued:	12/19/2018 15:07
Submitted To:	Josh Hepler	Project Number:	18-796.02
Client Site I.D.:	Exxon	Purchase Order:	18-796.02

Laboratory Order ID: 18L0337

Analytical Results

Sample I.D. B2 10-15 **Laboratory Sample ID:** 18L0337-04

Grab Date/Time: 12/07/2018 08:20

Field Residual Cl: **Field pH:**

Parameter	Samp ID	Method	Result	Qual	Reporting Limit	D.F.	Sample Prep Date/Time	Analysis Date/Time	Analyst
Volatile Hydrocarbons by GC									
TPH-Volatiles (GRO)	04	SW8015C	<0.10 mg/kg		0.10	1	12/12/18 14:05	12/12/18 14:05	NJR
Surr: 2,5-Dibromotoluene (Surr FID)	*04*	*SW8015C*	*98.7 %*		*80-120*		*12/12/18 14:05*	*12/12/18 14:05*	*NJR*

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Laboratory Order ID: 18L0337

Analytical Results

Sample I.D. B3 5-10 **Laboratory Sample ID:** 18L0337-05

Grab Date/Time: 12/07/2018 08:50

Field Residual Cl: **Field pH:**

Parameter	Samp ID	Method	Result	Qual	Reporting Limit	D.F.	Sample Prep Date/Time	Analysis Date/Time	Analyst
Volatile Hydrocarbons by GC									
TPH-Volatiles (GRO)	05	SW8015C	<0.10 mg/kg		0.10	1	12/12/18 14:27	12/12/18 14:27	NJR
Surr: 2,5-Dibromotoluene (Surr FID)	*05*	*SW8015C*	*103 %*		*80-120*		*12/12/18 14:27*	*12/12/18 14:27*	*NJR*

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Laboratory Order ID: 18L0337

Analytical Results

Sample I.D. B3 10-15 **Laboratory Sample ID:** 18L0337-06

Grab Date/Time: 12/07/2018 08:55

Field Residual Cl: **Field pH:**

Parameter	Samp ID	Method	Result	Qual	Reporting Limit	D.F.	Sample Prep Date/Time	Analysis Date/Time	Analyst
Volatile Hydrocarbons by GC									
TPH-Volatiles (GRO)	06RE1	SW8015C	<0.46 mg/kg		0.46	1	12/13/18 12:32	12/13/18 12:32	DFH
Surr: 2,5-Dibromotoluene (Surr FID)	*06RE1*	*SW8015C*	*109 %*		*80-120*		*12/13/18 12:32*	*12/13/18 12:32*	*DFH*

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Laboratory Order ID: 18L0337

Analytical Results

Sample I.D. B1 **Laboratory Sample ID:** 18L0337-07

Grab Date/Time: 12/07/2018 09:10

Field Residual Cl: **Field pH:**

Parameter	Samp ID	Method	Result	Qual	Reporting Limit	D.F.	Sample Prep Date/Time	Analysis Date/Time	Analyst
Volatile Organic Compounds by GC									
Benzene	07	SW8021B	<1.00 ug/L		1.00	1	12/17/18 13:08	12/17/18 13:08	NJR
Toluene	07	SW8021B	<1.00 ug/L		1.00	1	12/17/18 13:08	12/17/18 13:08	NJR
Ethylbenzene	07	SW8021B	<1.00 ug/L		1.00	1	12/17/18 13:08	12/17/18 13:08	NJR
m+p-Xylenes	07	SW8021B	<4.00 ug/L		4.00	1	12/17/18 13:08	12/17/18 13:08	NJR
o-Xylene	07	SW8021B	<2.00 ug/L		2.00	1	12/17/18 13:08	12/17/18 13:08	NJR
Xylenes, Total	07	SW8021B	<6.00 ug/L		6.00	1	12/17/18 13:08	12/17/18 13:08	NJR
Surr: 2,5-Dibromotoluene (Surr PID)	*07*	*SW8021B*	*97.2 %*		*80-120*		*12/17/18 13:08*	*12/17/18 13:08*	*NJR*
Surr: 2,5-Dibromotoluene (Surr FID)	*07*	*SW8021B*	*102 %*		*80-120*		*12/17/18 13:08*	*12/17/18 13:08*	*NJR*
Volatile Hydrocarbons by GC									
TPH-Volatiles (GRO)	07	SW8015C	<0.10 mg/L		0.10	1	12/17/18 13:08	12/17/18 13:08	NJR
Surr: 2,5-Dibromotoluene (Surr FID)	*07*	*SW8015C*	*102 %*		*80-120*		*12/17/18 13:08*	*12/17/18 13:08*	*NJR*

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Laboratory Order ID: 18L0337

Analytical Results

Sample I.D. B2 **Laboratory Sample ID:** 18L0337-08

Grab Date/Time: 12/07/2018 09:20

Field Residual Cl: **Field pH:**

Parameter	Samp ID	Method	Result	Qual	Reporting Limit	D.F.	Sample Prep Date/Time	Analysis Date/Time	Analyst
Volatile Organic Compounds by GC									
Benzene	08	SW8021B	<1.00 ug/L		1.00	1	12/17/18 14:43	12/17/18 14:43	NJR
Toluene	08	SW8021B	<1.00 ug/L		1.00	1	12/17/18 14:43	12/17/18 14:43	NJR
Ethylbenzene	08	SW8021B	<1.00 ug/L		1.00	1	12/17/18 14:43	12/17/18 14:43	NJR
m+p-Xylenes	08	SW8021B	<4.00 ug/L		4.00	1	12/17/18 14:43	12/17/18 14:43	NJR
o-Xylene	08	SW8021B	<2.00 ug/L		2.00	1	12/17/18 14:43	12/17/18 14:43	NJR
Xylenes, Total	08	SW8021B	<6.00 ug/L		6.00	1	12/17/18 14:43	12/17/18 14:43	NJR
Surr: 2,5-Dibromotoluene (Surr PID)	*08*	*SW8021B*	*97.3 %*		*80-120*		*12/17/18 14:43*	*12/17/18 14:43*	*NJR*
Surr: 2,5-Dibromotoluene (Surr FID)	*08*	*SW8021B*	*101 %*		*80-120*		*12/17/18 14:43*	*12/17/18 14:43*	*NJR*
Volatile Hydrocarbons by GC									
TPH-Volatiles (GRO)	08	SW8015C	<0.10 mg/L		0.10	1	12/17/18 14:43	12/17/18 14:43	NJR
Surr: 2,5-Dibromotoluene (Surr FID)	*08*	*SW8015C*	*101 %*		*80-120*		*12/17/18 14:43*	*12/17/18 14:43*	*NJR*

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Laboratory Order ID: 18L0337

Analytical Results

Sample I.D. Trip Blank **Laboratory Sample ID:** 18L0337-09

Grab Date/Time: 11/27/2018 16:00

Field Residual Cl: **Field pH:**

Parameter	Samp ID	Method	Result	Qual	Reporting Limit	D.F.	Sample Prep Date/Time	Analysis Date/Time	Analyst
Volatile Organic Compounds by GC									
Benzene	09	SW8021B	<1.00 ug/L		1.00	1	12/14/18 12:30	12/14/18 12:30	NJR
Toluene	09	SW8021B	<1.00 ug/L		1.00	1	12/14/18 12:30	12/14/18 12:30	NJR
Ethylbenzene	09	SW8021B	<1.00 ug/L		1.00	1	12/14/18 12:30	12/14/18 12:30	NJR
m+p-Xylenes	09	SW8021B	<4.00 ug/L		4.00	1	12/14/18 12:30	12/14/18 12:30	NJR
o-Xylene	09	SW8021B	<2.00 ug/L		2.00	1	12/14/18 12:30	12/14/18 12:30	NJR
Xylenes, Total	09	SW8021B	<6.00 ug/L		6.00	1	12/14/18 12:30	12/14/18 12:30	NJR
Surr: 2,5-Dibromotoluene (Surr PID)	*09*	*SW8021B*	*108 %*		*80-120*		*12/14/18 12:30*	*12/14/18 12:30*	*NJR*
Surr: 2,5-Dibromotoluene (Surr FID)	*09*	*SW8021B*	*110 %*		*80-120*		*12/14/18 12:30*	*12/14/18 12:30*	*NJR*
Volatile Hydrocarbons by GC									
TPH-Volatiles (GRO)	09	SW8015C	<0.10 mg/L		0.10	1	12/14/18 12:30	12/14/18 12:30	NJR
Surr: 2,5-Dibromotoluene (Surr FID)	*09*	*SW8015C*	*110 %*		*80-120*		*12/14/18 12:30*	*12/14/18 12:30*	*NJR*

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Client Site I.D.:	Exxon	Purchase Order:	18-796.02

Analytical Summary

Sample ID	Preparation Factors Initial / Final	Method	Batch ID	Sequence ID	Calibration ID
Volatile Hydrocarbons by GC		**Preparation Method:**	**SW5030B**		
18L0337-01	5.04 g / 5.00 mL	SW8015C	BBL0315	SBL0339	AK80042
18L0337-02	5.05 g / 5.00 mL	SW8015C	BBL0315	SBL0339	AK80042
18L0337-03	5.01 g / 5.00 mL	SW8015C	BBL0315	SBL0339	AK80042
18L0337-04	5.01 g / 5.00 mL	SW8015C	BBL0315	SBL0339	AK80042
18L0337-05	5.00 g / 5.00 mL	SW8015C	BBL0315	SBL0339	AK80042
18L0337-06	5.04 g / 5.00 mL	SW8015C	BBL0315	SBL0339	AK80042
Volatile Hydrocarbons by GC		**Preparation Method:**	**SW5030B**		
18L0337-09	5.00 mL / 5.00 mL	SW8015C	BBL0348	SBL0350	AK80042
18L0337-09	5.00 mL / 5.00 mL	SW8021B	BBL0348	SBL0350	AK80042
Volatile Hydrocarbons by GC		**Preparation Method:**	**SW5030B**		
18L0337-02RE1	1.09 g / 5.00 mL	SW8015C	BBL0372	SBL0371	AK80042
18L0337-06RE1	1.08 g / 5.00 mL	SW8015C	BBL0372	SBL0371	AK80042
Volatile Hydrocarbons by GC		**Preparation Method:**	**SW5030B**		
18L0337-07	5.00 mL / 5.00 mL	SW8015C	BBL0473	SBL0434	AK80042
18L0337-08	5.00 mL / 5.00 mL	SW8015C	BBL0473	SBL0434	AK80042
18L0337-07	5.00 mL / 5.00 mL	SW8021B	BBL0473	SBL0434	AK80042
18L0337-08	5.00 mL / 5.00 mL	SW8021B	BBL0473	SBL0434	AK80042

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Client Site I.D.:	Exxon	Purchase Order:	18-796.02

Volatile Organic Compounds by GC - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BBL0348 - SW5030B										
Blank (BBL0348-BLK1)				Prepared & Analyzed: 12/14/2018						
Benzene	<1.00 ug/L	1.00	ug/L							
Toluene	<1.00 ug/L	1.00	ug/L							
Ethylbenzene	<1.00 ug/L	1.00	ug/L							
m+p-Xylenes	<4.00 ug/L	4.00	ug/L							
o-Xylene	<2.00 ug/L	2.00	ug/L							
Xylenes, Total	<6.00 ug/L	6.00	ug/L							
Surr: 2,5-Dibromotoluene (Surr PID)	100		ug/L	100		100	80-120			
LCS (BBL0348-BS1)				Prepared & Analyzed: 12/14/2018						
Benzene	102 ug/L	1.00	ug/L	100	ug/L	102	70-130			
Toluene	109 ug/L	1.00	ug/L	100	ug/L	109	70-130			
Ethylbenzene	106 ug/L	1.00	ug/L	100	ug/L	106	70-130			
m+p-Xylenes	221 ug/L	4.00	ug/L	200	ug/L	110	70-130			
o-Xylene	114 ug/L	2.00	ug/L	100	ug/L	114	70-130			
Surr: 2,5-Dibromotoluene (Surr PID)	106		ug/L	100	ug/L	106	80-120			
Matrix Spike (BBL0348-MS1)	**Source: 18L0386-01**			Prepared & Analyzed: 12/14/2018						
Benzene	104 ug/L	1.00	ug/L	100	<1.00 ug/L	104	70-130			
Toluene	110 ug/L	1.00	ug/L	100	<1.00 ug/L	110	70-130			
Ethylbenzene	106 ug/L	1.00	ug/L	100	<1.00 ug/L	106	70-130			
m+p-Xylenes	220 ug/L	4.00	ug/L	200	<4.00 ug/L	110	70-130			
o-Xylene	115 ug/L	2.00	ug/L	100	<2.00 ug/L	115	70-130			
Surr: 2,5-Dibromotoluene (Surr PID)	111		ug/L	100	ug/L	111	80-120			
Matrix Spike Dup (BBL0348-MSD1)	**Source: 18L0386-01**			Prepared & Analyzed: 12/14/2018						
Benzene	102 ug/L	1.00	ug/L	100	<1.00 ug/L	102	70-130	2.17	20	
Toluene	108 ug/L	1.00	ug/L	100	<1.00 ug/L	108	70-130	1.65	20	
Ethylbenzene	105 ug/L	1.00	ug/L	100	<1.00 ug/L	105	70-130	1.07	20	
m+p-Xylenes	217 ug/L	4.00	ug/L	200	<4.00 ug/L	108	70-130	1.55	20	
o-Xylene	112 ug/L	2.00	ug/L	100	<2.00 ug/L	112	70-130	2.07	20	
Surr: 2,5-Dibromotoluene (Surr PID)	109		ug/L	100	ug/L	109	80-120			

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Volatile Organic Compounds by GC - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BBL0473 - SW5030B										
Blank (BBL0473-BLK1)				Prepared & Analyzed: 12/17/2018						
Benzene	<1.00 ug/L	1.00	ug/L							
Benzene	<1.00 ug/L	1.00	ug/L							
Toluene	<1.00 ug/L	1.00	ug/L							
Toluene	<1.00 ug/L	1.00	ug/L							
Ethylbenzene	<1.00 ug/L	1.00	ug/L							
Ethylbenzene	<1.00 ug/L	1.00	ug/L							
m+p-Xylenes	<4.00 ug/L	4.00	ug/L							
m+p-Xylenes	<4.00 ug/L	4.00	ug/L							
o-Xylene	<2.00 ug/L	2.00	ug/L							
o-Xylene	<2.00 ug/L	2.00	ug/L							
Xylenes, Total	<6.00 ug/L	6.00	ug/L							
Xylenes, Total	<6.00 ug/L	6.00	ug/L							
Surr: 2,5-Dibromotoluene (Surr PID)	96.0		ug/L	100		96.0	80-120			
Surr: 2,5-Dibromotoluene (Surr PID)	96.0		ug/L	100		96.0	80-120			
LCS (BBL0473-BS1)				Prepared & Analyzed: 12/17/2018						
Benzene	101 ug/L	1.00	ug/L	100	ug/L	101	70-130			
Benzene	101 ug/L	1.00	ug/L	100	ug/L	101	70-130			
Toluene	108 ug/L	1.00	ug/L	100	ug/L	108	70-130			
Toluene	108 ug/L	1.00	ug/L	100	ug/L	108	70-130			
Ethylbenzene	105 ug/L	1.00	ug/L	100	ug/L	105	70-130			
Ethylbenzene	105 ug/L	1.00	ug/L	100	ug/L	105	70-130			
m+p-Xylenes	216 ug/L	4.00	ug/L	200	ug/L	108	70-130			
m+p-Xylenes	216 ug/L	4.00	ug/L	200	ug/L	108	70-130			
o-Xylene	111 ug/L	2.00	ug/L	100	ug/L	111	70-130			
o-Xylene	111 ug/L	2.00	ug/L	100	ug/L	111	70-130			
Surr: 2,5-Dibromotoluene (Surr PID)	97.3		ug/L	100	ug/L	97.3	80-120			
Surr: 2,5-Dibromotoluene (Surr PID)	97.3		ug/L	100	ug/L	97.3	80-120			

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Volatile Organic Compounds by GC - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BBL0473 - SW5030B										
Matrix Spike (BBL0473-MS1)	**Source: 18L0386-02**			Prepared & Analyzed: 12/17/2018						
Benzene	99.2 ug/L	1.00	ug/L	100	<1.00 ug/L	99.2	70-130			
Benzene	99.2 ug/L	1.00	ug/L	100	<1.00 ug/L	99.2	70-130			
Toluene	107 ug/L	1.00	ug/L	100	<1.00 ug/L	107	70-130			
Toluene	107 ug/L	1.00	ug/L	100	<1.00 ug/L	107	70-130			
Ethylbenzene	97.4 ug/L	1.00	ug/L	100	<1.00 ug/L	97.4	70-130			
Ethylbenzene	97.4 ug/L	1.00	ug/L	100	<1.00 ug/L	97.4	70-130			
m+p-Xylenes	211 ug/L	4.00	ug/L	200	<4.00 ug/L	106	70-130			
m+p-Xylenes	211 ug/L	4.00	ug/L	200	<4.00 ug/L	106	70-130			
o-Xylene	110 ug/L	2.00	ug/L	100	<2.00 ug/L	110	70-130			
o-Xylene	110 ug/L	2.00	ug/L	100	<2.00 ug/L	110	70-130			
Surr: 2,5-Dibromotoluene (Surr PID)	92.3		ug/L	100	ug/L	92.3	80-120			
Surr: 2,5-Dibromotoluene (Surr PID)	92.3		ug/L	100	ug/L	92.3	80-120			
Matrix Spike Dup (BBL0473-MSD1)	**Source: 18L0386-02**			Prepared & Analyzed: 12/17/2018						
Benzene	93.2 ug/L	1.00	ug/L	100	<1.00 ug/L	93.2	70-130	6.15	20	
Benzene	93.2 ug/L	1.00	ug/L	100	<1.00 ug/L	93.2	70-130	6.15	20	
Toluene	101 ug/L	1.00	ug/L	100	<1.00 ug/L	101	70-130	5.72	20	
Toluene	101 ug/L	1.00	ug/L	100	<1.00 ug/L	101	70-130	5.72	20	
Ethylbenzene	97.3 ug/L	1.00	ug/L	100	<1.00 ug/L	97.3	70-130	0.123	20	
Ethylbenzene	97.3 ug/L	1.00	ug/L	100	<1.00 ug/L	97.3	70-130	0.123	20	
m+p-Xylenes	206 ug/L	4.00	ug/L	200	<4.00 ug/L	103	70-130	2.77	20	
m+p-Xylenes	206 ug/L	4.00	ug/L	200	<4.00 ug/L	103	70-130	2.77	20	
o-Xylene	107 ug/L	2.00	ug/L	100	<2.00 ug/L	107	70-130	2.19	20	
o-Xylene	107 ug/L	2.00	ug/L	100	<2.00 ug/L	107	70-130	2.19	20	
Surr: 2,5-Dibromotoluene (Surr PID)	91.4		ug/L	100	ug/L	91.4	80-120			
Surr: 2,5-Dibromotoluene (Surr PID)	91.4		ug/L	100	ug/L	91.4	80-120			

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Certificate of Analysis

Final Report

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Submitted To:	Josh Hepler	Project Number:	18-796.02
Client Site I.D.:	Exxon	Purchase Order:	18-796.02

Volatile Hydrocarbons by GC - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BBL0315 - SW5030B										
Blank (BBL0315-BLK1)				Prepared & Analyzed: 12/12/2018						
TPH-Volatiles (GRO)	<0.10 mg/kg	0.10	mg/kg							
TPH-Volatiles (GRO)	<0.10 mg/kg	0.10	mg/kg							
TPH-Volatiles (GRO)	<0.10 mg/kg	0.10	mg/kg							
TPH-Volatiles (GRO)	<0.10 mg/kg	0.10	mg/kg							
TPH-Volatiles (GRO)	<0.10 mg/kg	0.10	mg/kg							
TPH-Volatiles (GRO)	<0.10 mg/kg	0.10	mg/kg							
Surr: 2,5-Dibromotoluene (Surr FID)	109		ug/L	100		109	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	109		ug/L	100		109	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	109		ug/L	100		109	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	109		ug/L	100		109	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	109		ug/L	100		109	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	109		ug/L	100		109	80-120			
LCS (BBL0315-BS1)				Prepared & Analyzed: 12/12/2018						
TPH-Volatiles (GRO)	0.84 mg/kg	0.10	mg/kg	0.986 mg/kg		85.6	70-130			
TPH-Volatiles (GRO)	0.84 mg/kg	0.10	mg/kg	0.986 mg/kg		85.6	70-130			
TPH-Volatiles (GRO)	0.84 mg/kg	0.10	mg/kg	0.986 mg/kg		85.6	70-130			
TPH-Volatiles (GRO)	0.84 mg/kg	0.10	mg/kg	0.986 mg/kg		85.6	70-130			
TPH-Volatiles (GRO)	0.84 mg/kg	0.10	mg/kg	0.986 mg/kg		85.6	70-130			
TPH-Volatiles (GRO)	0.84 mg/kg	0.10	mg/kg	0.986 mg/kg		85.6	70-130			
Surr: 2,5-Dibromotoluene (Surr FID)	98.7		ug/L	100 ug/L		98.7	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	98.7		ug/L	100 ug/L		98.7	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	98.7		ug/L	100 ug/L		98.7	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	98.7		ug/L	100 ug/L		98.7	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	98.7		ug/L	100 ug/L		98.7	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	98.7		ug/L	100 ug/L		98.7	80-120			
Matrix Spike (BBL0315-MS1)		**Source: 18L0337-01**		Prepared & Analyzed: 12/12/2018						
TPH-Volatiles (GRO)	0.72 mg/kg	0.10	mg/kg	0.986	<0.10 mg/kg	73.3	70-130			
TPH-Volatiles (GRO)	0.72 mg/kg	0.10	mg/kg	0.986	<0.10 mg/kg	73.3	70-130			
TPH-Volatiles (GRO)	0.72 mg/kg	0.10	mg/kg	0.986	<0.10 mg/kg	73.3	70-130			
TPH-Volatiles (GRO)	0.72 mg/kg	0.10	mg/kg	0.986	<0.10 mg/kg	73.3	70-130			

AIR WATER & SOIL LABORATORIES, INC.

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Certificate of Analysis

Final Report

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Client Site I.D.:	Exxon	Purchase Order:	18-796.02

Volatile Hydrocarbons by GC - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BBL0315 - SW5030B										
Matrix Spike (BBL0315-MS1)		**Source: 18L0337-01**		Prepared & Analyzed: 12/12/2018						
TPH-Volatiles (GRO)	0.72 mg/kg	0.10	mg/kg	0.986	<0.10 mg/kg	73.3	70-130			
TPH-Volatiles (GRO)	0.72 mg/kg	0.10	mg/kg	0.986	<0.10 mg/kg	73.3	70-130			
Surr: 2,5-Dibromotoluene (Surr FID)	105		ug/L	100	ug/L	105	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	105		ug/L	100	ug/L	105	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	105		ug/L	100	ug/L	105	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	105		ug/L	100	ug/L	105	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	105		ug/L	100	ug/L	105	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	105		ug/L	100	ug/L	105	80-120			
Matrix Spike Dup (BBL0315-MSD1)		**Source: 18L0337-01**		Prepared & Analyzed: 12/12/2018						
TPH-Volatiles (GRO)	0.69 mg/kg	0.10	mg/kg	0.984	<0.10 mg/kg	70.4	70-130	4.33	20	
TPH-Volatiles (GRO)	0.69 mg/kg	0.10	mg/kg	0.984	<0.10 mg/kg	70.4	70-130	4.33	20	
TPH-Volatiles (GRO)	0.69 mg/kg	0.10	mg/kg	0.984	<0.10 mg/kg	70.4	70-130	4.33	20	
TPH-Volatiles (GRO)	0.69 mg/kg	0.10	mg/kg	0.984	<0.10 mg/kg	70.4	70-130	4.33	20	
TPH-Volatiles (GRO)	0.69 mg/kg	0.10	mg/kg	0.984	<0.10 mg/kg	70.4	70-130	4.33	20	
TPH-Volatiles (GRO)	0.69 mg/kg	0.10	mg/kg	0.984	<0.10 mg/kg	70.4	70-130	4.33	20	
Surr: 2,5-Dibromotoluene (Surr FID)	107		ug/L	100	ug/L	107	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	107		ug/L	100	ug/L	107	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	107		ug/L	100	ug/L	107	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	107		ug/L	100	ug/L	107	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	107		ug/L	100	ug/L	107	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	107		ug/L	100	ug/L	107	80-120			
Batch BBL0348 - SW5030B										
Blank (BBL0348-BLK1)				Prepared & Analyzed: 12/14/2018						
TPH-Volatiles (GRO)	<0.10 mg/L	0.10	mg/L							
Surr: 2,5-Dibromotoluene (Surr FID)	105		ug/L	100		105	80-120			

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Volatile Hydrocarbons by GC - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BBL0348 - SW5030B										
LCS (BBL0348-BS1)				Prepared & Analyzed: 12/14/2018						
TPH-Volatiles (GRO)	1.02 mg/L	0.10	mg/L	1.00	mg/L	102	70-130			
Surr: 2,5-Dibromotoluene (Surr FID)	107		ug/L	100	ug/L	107	80-120			
Matrix Spike (BBL0348-MS1)	**Source: 18L0386-01**			Prepared & Analyzed: 12/14/2018						
TPH-Volatiles (GRO)	1.04 mg/L	0.10	mg/L	1.00	<0.10 mg/L	104	70-130			
Surr: 2,5-Dibromotoluene (Surr FID)	111		ug/L	100	ug/L	111	80-120			
Matrix Spike Dup (BBL0348-MSD1)	**Source: 18L0386-01**			Prepared & Analyzed: 12/14/2018						
TPH-Volatiles (GRO)	1.02 mg/L	0.10	mg/L	1.00	<0.10 mg/L	102	70-130	1.56	20	
Surr: 2,5-Dibromotoluene (Surr FID)	110		ug/L	100	ug/L	110	80-120			
Batch BBL0473 - SW5030B										
Blank (BBL0473-BLK1)				Prepared & Analyzed: 12/17/2018						
TPH-Volatiles (GRO)	<0.10 mg/L	0.10	mg/L							
TPH-Volatiles (GRO)	<0.10 mg/L	0.10	mg/L							
Surr: 2,5-Dibromotoluene (Surr FID)	101		ug/L	100		101	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	101		ug/L	100		101	80-120			
LCS (BBL0473-BS1)				Prepared & Analyzed: 12/17/2018						
TPH-Volatiles (GRO)	1.02 mg/L	0.10	mg/L	1.00	mg/L	102	70-130			
TPH-Volatiles (GRO)	1.02 mg/L	0.10	mg/L	1.00	mg/L	102	70-130			
Surr: 2,5-Dibromotoluene (Surr FID)	102		ug/L	100	ug/L	102	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	102		ug/L	100	ug/L	102	80-120			
Matrix Spike (BBL0473-MS1)	**Source: 18L0386-02**			Prepared & Analyzed: 12/17/2018						
TPH-Volatiles (GRO)	1.07 mg/L	0.10	mg/L	1.00	<0.10 mg/L	107	70-130			
TPH-Volatiles (GRO)	1.07 mg/L	0.10	mg/L	1.00	<0.10 mg/L	107	70-130			
Surr: 2,5-Dibromotoluene (Surr FID)	101		ug/L	100	ug/L	101	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	101		ug/L	100	ug/L	101	80-120			

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Volatile Hydrocarbons by GC - Quality Control

Air Water & Soil Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qual
Batch BBL0473 - SW5030B										
Matrix Spike Dup (BBL0473-MSD1)	**Source: 18L0386-02**			Prepared & Analyzed: 12/17/2018						
TPH-Volatiles (GRO)	1.02 mg/L	0.10	mg/L	1.00	<0.10 mg/L	102	70-130	5.25	20	
TPH-Volatiles (GRO)	1.02 mg/L	0.10	mg/L	1.00	<0.10 mg/L	102	70-130	5.25	20	
Surr: 2,5-Dibromotoluene (Surr FID)	98.2		ug/L	100	ug/L	98.2	80-120			
Surr: 2,5-Dibromotoluene (Surr FID)	98.2		ug/L	100	ug/L	98.2	80-120			

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Certified Analyses included in this Report

Analyte	Certifications
SW8015C in Non-Potable Water	
TPH-Volatiles (GRO)	VELAP,NC,WVDEP
SW8015C in Solids	
TPH-Volatiles (GRO)	VELAP,NC,WVDEP
SW8021B in Non-Potable Water	
Benzene	VELAP,WVDEP
Toluene	VELAP,WVDEP
Ethylbenzene	VELAP,WVDEP
m+p-Xylenes	VELAP,WVDEP
o-Xylene	VELAP,WVDEP
Xylenes, Total	VELAP,WVDEP

Code	Description	Lab Number	Expires
MdDOE	Maryland DE Drinking Water	341	12/31/2019
NC	North Carolina DENR	495	12/31/2018
VELAP	NELAC-Virginia Certificate #10074	460021	06/14/2019

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Summary of Data Qualifiers

RPD	Relative Percent Difference
Qual	Qualifers
-RE	Denotes sample was re-analyzed
D.F.	Dilution Factor. Please also see the Preparation Factor in the Analysis Summary section.
TIC	Tentatively Identified Compounds are compounds that are identified by comparing the analyte mass spectral pattern with the NIST spectral library . A TIC spectral match is reported when the pattern is at least 75% consistent with the published pattern. Compound concentrations are estimated and are calculated using an internal standard response factor of 1.
PCBs, Total	Total PCBs are defined as the sum of detected Aroclors 1016, 1221, 1232, 1248, 1254, 1260, 1262, and 1268.

AIR WATER & SOIL LABORATORIES, INC.

1941 REYMET ROAD
RICHMOND, VIRGINIA 23237
(804) 358-8295 PHONE
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Chain of Custody
Form #: F1331
Rev. 3.0
Effective: Aug 24, 2017

CHAIN OF CUSTODY

PAGE 1 OF 1

COMPANY NAME: EEE Consulting	INVOICE TO: same	PROJECT NAME/Quote #: Rt 1 Widening
CONTACT: Josh Hepler	INVOICE CONTACT:	SITE NAME: Exxon
ADDRESS: 201 Church St Blacksburg	INVOICE ADDRESS:	PROJECT NUMBER: 18-796.02
PHONE #: 540 230 3685	INVOICE PHONE #:	P.O. #: 18-796.02
FAX #:	EMAIL: jhepler@eee-consulting.com	Pretreatment Program: NA
Is sample for compliance reporting? YES NO NA	Is sample from a chlorinated supply? YES NO NA	PWS I.D. #: NA
SAMPLER NAME (PRINT): Josh Hepler	SAMPLER SIGNATURE:	Turn Around Time: Circle: (10) 5 Days or __ Day(s)

Matrix Codes: WW=Waste Water/Storm Water GW=Ground Water DW=Drinking Water S=Soil/Solids OR=Organic A=Air WP=Wipe OT=Other_____

CLIENT SAMPLE I.D.	Grab	Composite	Field Filtered (Dissolved Metals)	Composite Start Date	Composite Start Time	Grab Date or Composite Stop Date	Grab Time or Composite Stop Time	Time Preserved	Matrix (See Codes)	Number of Containers	ANALYSIS / (PRESERVATIVE) TPH - GRO	BTEX						
1) B1 5-10	X			*NA	NA	12|7	7:55	NA	S	2	X							
2) B1 10-15	X			↓	↓	↓	8:00	↓	↓	↓	↓							
3) B2 5-10	X						8:15											
4) B2 10-15	X						8:20											
5) B3 5-10	X						8:50											
6) B3 10-15	X			↓	↓	↓	8:55	↓	↓	↓	↓							
7) B1	X						9:10		GW		X	X						
8) B2	X			↓	↓	↓	9:20	↓	GW		X	X						
9)																		
10)																		

COMMENTS

Preservative Codes: N=Nitric Acid C=Hydrochloric Acid S=Sulfuric Acid H=Sodium Hydroxide A=Ascorbic Acid Z=Zinc Acetate T=Sodium Thiosulfate M=Methanol

PLEASE NOTE PRESERVATIVE(S), INTERFERENCE CHECKS or PUMP RATE (L/min)

3.8°C

RELINQUISHED:	DATE / TIME 12/7/18 12:31	RECEIVED: DATE / TIME
RELINQUISHED: Cull Elliott III	DATE / TIME 12/8/18 3:14	RECEIVED: 7 DEC 2018 15:15 DATE / TIME
RELINQUISHED:	DATE / TIME	RECEIVED: DATE / TIME

QC Data Package
Level III ☐
Level IV ☐

LAB USE ONLY
Custody Seals used and intact? (Y/N) (N)
COOLER TEMP °C
Received on ice? (Y/N) (Y)

EEE-Blacksburg **18L0337**
Exxon #27826
Recd: 12/07/2018 Due: 12/21/2018

v130325002

F1331 AWS COC v171001.xls

AIR WATER SOIL LABORATORIES, INC.

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Sample Conditions Checklist

Samples Received at:	**3.80°C**
How were samples received?	Walk In
Were Custody Seals used? If so, were they received intact?	No
Are the custody papers filled out completely and correctly?	No
Do all bottle labels agree with custody papers?	Yes
Is the temperature blank or representative sample within acceptable limits? (above freezing to 6°C) or received on ice and recently taken?	Yes
Are all samples within holding time for requested laboratory tests?	Yes
Is a sufficient amount of sample provided to perform the tests included?	Yes
Are all samples in appropriate containers for the analyses requested?	Yes
Were volatile organic containers received?	Yes
Are all volatile organic and TOX containers free of headspace?	No
Is a trip blank provided for each VOC sample set? VOC sample sets include EPA8011, EPA504, EPA8260, EPA624, EPA8015 GRO, EPA8021, EPA524, and RSK-175.	Yes
Are all samples received appropriately preserved? Note that metals containers do not require field preservation but lab preservation may delay analysis.	Yes

Trip Blank received with samples and added it to the work order. Date and time (27 Nov 2018/16.00) logged as per the container label.

BTEX was logged by Method 8021.

Groundwater sample B2 was received with headspace.

Josh Hepler was notified by email.

THM 11 Dec 2018/10.47