August 1, 2017

TP113112 Phase 9000

Regional Municipality of Niagara
1815 Sir Isaac Brock Way
P.O. Box 1042
Thorold, Ontario
L2V 4T7

Attention: Michael Wilson, A.Sc.T. – Project Manager

RE: Testpitting Program
Martindale Road
St. Catharines, Ontario

Dear Mr. Wilson:

Amec Foster Wheeler Environment and Infrastructure, a division of Amec Foster Wheeler Americas Limited (Amec Foster Wheeler) was retained by the Regional Municipality of Niagara (RMON, the Client) to conduct environmental soil quality testing to determine the extent of potential impacted surficial soils at two separate locations located along Martindale Road in St. Catharines, Ontario (the Site) (refer to **Figure 1**). The first location is Martindale Road, west of 222 Martindale Road (Rankin Construction Inc.) and the second location was the intersection of Grapeview Drive and Martindale Road. The environmental soil quality testing is required by the RMON to provide disposal options for excess soil/fill to be generated during the construction project.

The work was carried out as per the scope of work provided to the RMON via email proposal (P17020E) dated June 2, 2017. The following report briefly outlines the scope of work and soil sample results in comparison to the applicable standards.

Amec Foster Wheeler was on-Site June 20, 2017 to collect soil samples from fourteen testpits TP1 to TP14 (**Figure 2**). The testpits were excavated using either a John Deere Backhoe 310 SJ or a CAT 302.5C Mini Excavator. The testpits were excavated to maximum depths ranging from 0.9 to 1.7 metres below ground surface (mbgs). The stratigraphy of the testpits consisted of asphalt or granular material from the surface to maximum depths ranging from 0.3 to 0.7 mbgs in all testpits except for TP7, TP8, and TP10, which all had topsoil at the surface to 0.1 mbgs. Granular fill was noted beneath the topsoil in TP9 and TP12. Below the granular/topsoil, Amec Foster Wheeler encountered fill material to depths ranging from 0.6 to 1.6 mbgs in all testpits. Native silty clay / clayey silt was encountered below the fill material in TP1, TP5, TP6,

Amec Foster Wheeler Environment & Infrastructure
a division of Amec Foster Wheeler Americas Limited
3300 Merrittville Hwy., Unit 5
Thorold, Ontario
Canada L2V 4Y6
Tel +1 (905) 687-6616
Fax +1 (905) 687-6620 . www.amecfw.com

TP8, and TP10. It is noted that asphalt pieces were encountered in TP1 and TP4. Buried asphalt was encountered in TP2 and TP3 and will be discussed further below. Refer to **Appendix A** for testpit logs.

Representative soil/fill samples from all fourteen testpits were analyzed for metals parameters, Electrical Conductivity (EC), Sodium Adsorption Ratio (SAR) and pH and TP7 to TP14 were analyzed for fractionized Petroleum Hydrocarbons (PHCs) in the F1 to F4 ranges and Benzene, Toluene, Ethylbenzene and Xylenes (collectively referred to as BTEX) by Paracel Laboratories Ltd. (Paracel), an ISO 17025-certified laboratory located in Ottawa, Ontario.

The laboratory analysis were compared to Tables 1 and 3 of Ontario's "*Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the* Environmental Protection Act", dated April 15, 2011 as per *O. Reg. 153/04* as amended (hereinafter referred to as the Site Condition Standards [SCS]). The results of the analysis are summarized in **Table 1** (metals and inorganics) and **Table 2** (PHCs/BTEX).

The results of the laboratory analysis and comparison to the Table 1: Full Depth Background Site Condition Standards for residential/parkland/institutional/industrial/commercial/community property use (Table 1 SCS) are summarized as follows:

- The reported concentrations of all metals parameters were below the Table 1 SCS except for antimony in TP1.
- The reported SAR was above the Table 1 SCS in all testpit samples except for TP9, TP10, and TP12.
- The reported concentrations of EC were above the Table 1 SCS in all testpit samples except for TP7, TP8, TP9, TP10 and TP12.
- The reported concentrations for PHCs were below the Table 1 SCS except for PHC F3 and PHC F4 in TP12.
- The reported concentrations of BTEX were below the Table 1 SCS except for ethylbenzene and xylenes in TP12.

As there were exceedances of the Table 1 SCS, the results of the laboratory analysis were compared to the Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition for industrial/commercial/community property use and medium and fine textured soils (Table 3 SCS) are summarized as follows:

- The reported concentrations of all metals parameters were below the Table 3 in all samples.

- The reported SAR was above the Table 3 SCS in TP1, TP2, TP4, TP6, TP11, and TP13.

- The reported concentrations of EC were above the Table 3 SCS in TP1, TP2, TP3, TP4, TP5, TP6 and TP11.

- The reported concentrations for PHCs and BTEX were below the Table 3 SCS.

All laboratory certificates of analyses are included in **Appendix B**. The results of the analysis are summarized on **Figures 3A and 3B**.

A composite sample from TP7 and TP10 (Composite TP7-1 and TP10-1) and a composite sample for TP11 and TP14 (Composite TP11-1 and TP14-1) were submitted for Ontario Regulation 347, as amended by Ontario Regulation 558, Toxicity Characteristic Leaching Procedure (TCLP) testing for heavy metals, Volatile Organic Compounds (VOCs) and Polychlorinated Biphenyls (PCBs) to classify the soil as hazardous or non-hazardous for disposal at MOECC-approved landfill sites. The results were below Schedule 4 and therefore deemed non-hazardous.

Based on the results of the analytical testing, EC and SAR impacted soil above Table 1 SCS is noted in most the testpits which is expected for samples collected near or within a roadway due to road salting. A single Table 1 SCS metals exceedance was noted in TP1. However, there were no exceedances when compared to Table 3 SCS. This exceedance was likely associated with the fill material. TP7 to TP14 were excavated to address potential PHC impacts at Grapeview Drive and Martindale Road and no petroleum impact was noted except for TP12 at a depth of 0.8 mbgs. Therefore, any petroleum impact previously observed associated with this intersection must have been localized.

The following are options for removal/disposal of excess soil/fill material if required during the development project:

- The excess material that exceeds the Table 1 for EC and SAR could be disposed of at a quarry for reclamation purposes. The metal impacted soil at TP1 and the PHC/BTEX-impacted soils at TP12 cannot be accepted here. The material would have to be accepted by the quarry prior to transportation. This option is based on a draft policy of the Ministry of Natural Resources and Forestry (A.R. 6.00.03) referring to the importation of inert fill for rehabilitation. Additional testing would be required for acceptance at the quarry, for example, Walker's Quarry in Vineland, Ontario.

- The excess material could be landfilled at a Ministry of the Environment and Climate Change (MOECC) licensed landfill as the material is deemed as non-hazardous.
- Should the material be deemed geotechnically suitable, the material can remain on-Site.

If any soil/fill materials that appear to be impacted are encountered during excavation activities, Amec Foster Wheeler recommends that the materials be sampled prior to shipment to ensure it meets the receiver's requirements and/or to determine if they should be removed for landfill disposal and replaced with clean fill materials.

This report is subject to the Standard Limitations contained in **Appendix C**.

Buried Asphalt (Macadam)

Buried asphalt was encountered in TP2 and TP3 during the environmental field testing program. The results of the pavement structure is outlined below. All measurements are taken from existing grade.

Testpit ID	Asphalt (m)		Granular Base (m)		Buried Asphalt (m)	
	From	To	From	To	From	To
2	0	0.1	0.1	0.2	0.2	0.3
3	0	0.1	0.1	0.2	0.2	0.3

Asphalt pieces mixed with sand fill were encountered from a depth of 0.1m to 1.0m of TP4.

The buried asphalt (macadam) material as is can be pulverized to meet OPSS 330 and re-used. However, this only applies in the event resurfacing is occurring. In the event trenches are required, the material can be stockpiled on-site or alternatively disposed of. It is recommended that the stockpile remain on-site and not be relocated.

We trust that this information meets your current requirements, however if you have any questions please contact this office at your convenience.

Sincerely,

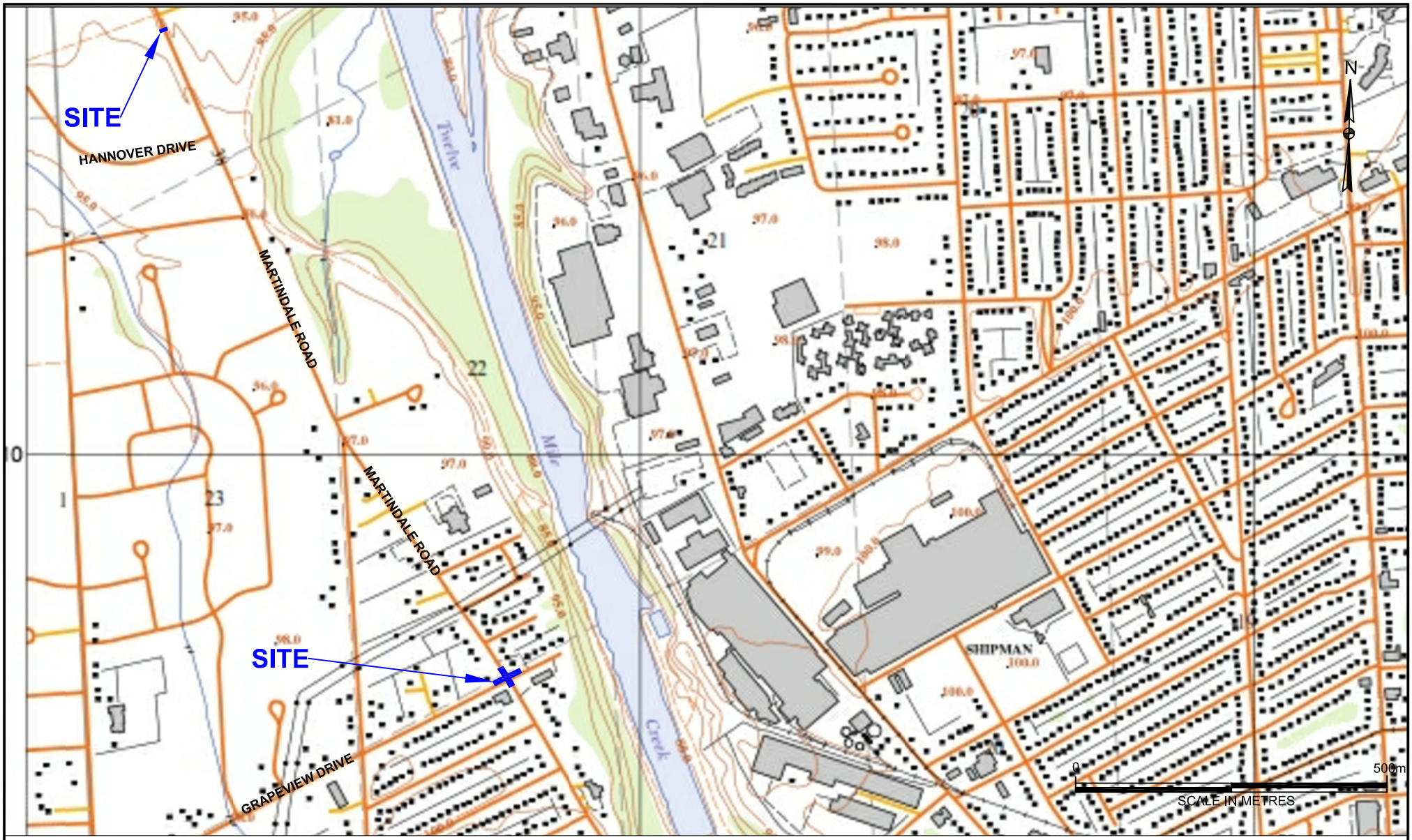
Amec Foster Wheeler Environment & Infrastructure,
a Division of Amec Foster Wheeler Americas Limited.

Kelly Patterson, P.Geo. (ltd.)
Environmental Scientist

Patrick Shriner, P.Geo.
Associate, Environmental Geoscientist

/Attachments:
Figures
Tables
Appendix A: Testpit Logs
Appendix B: Laboratory Certificates of Analyses
Appendix C: Limitations

FIGURES



REFERENCE: Base plan provided by FIRST BASE SOLUTIONS.

FOR ILLUSTRATION PURPOSES ONLY, ALL LOCATIONS APPROXIMATE.

CLIENT:
Regional Municipality of Niagara

Amec Foster Wheeler
Environment & Infrastructure
3300 Merrittville Hwy, Unit 5
Thorold, Ontario

LEGEND:
SITE PROPERTY

DWN BY: KH
CHK'D BY: PS
DATUM: NAD83
PROJECTION: UTM Zone 17
SCALE: As Shown

PROJECT:
TESTPITTING PROGRAM
MARTINDALE ROAD,
ST. CATHARINES, ONTARIO

TITLE:
SITE LOCATION PLAN

REV. NO.: A
DATE: JULY 2017
PROJECT NO.: TP113112
NO.: FIGURE 1



REFERENCE: Base plan provided by NIAGARA NAVIGATOR.

FOR ILLUSTRATION PURPOSES ONLY, ALL LOCATIONS APPROXIMATE.

CLIENT:
Regional Municipality of Niagara

Amec Foster Wheeler
Environment & Infrastructure
3300 Merrittville Hwy, Unit 5
Thorold, Ontario

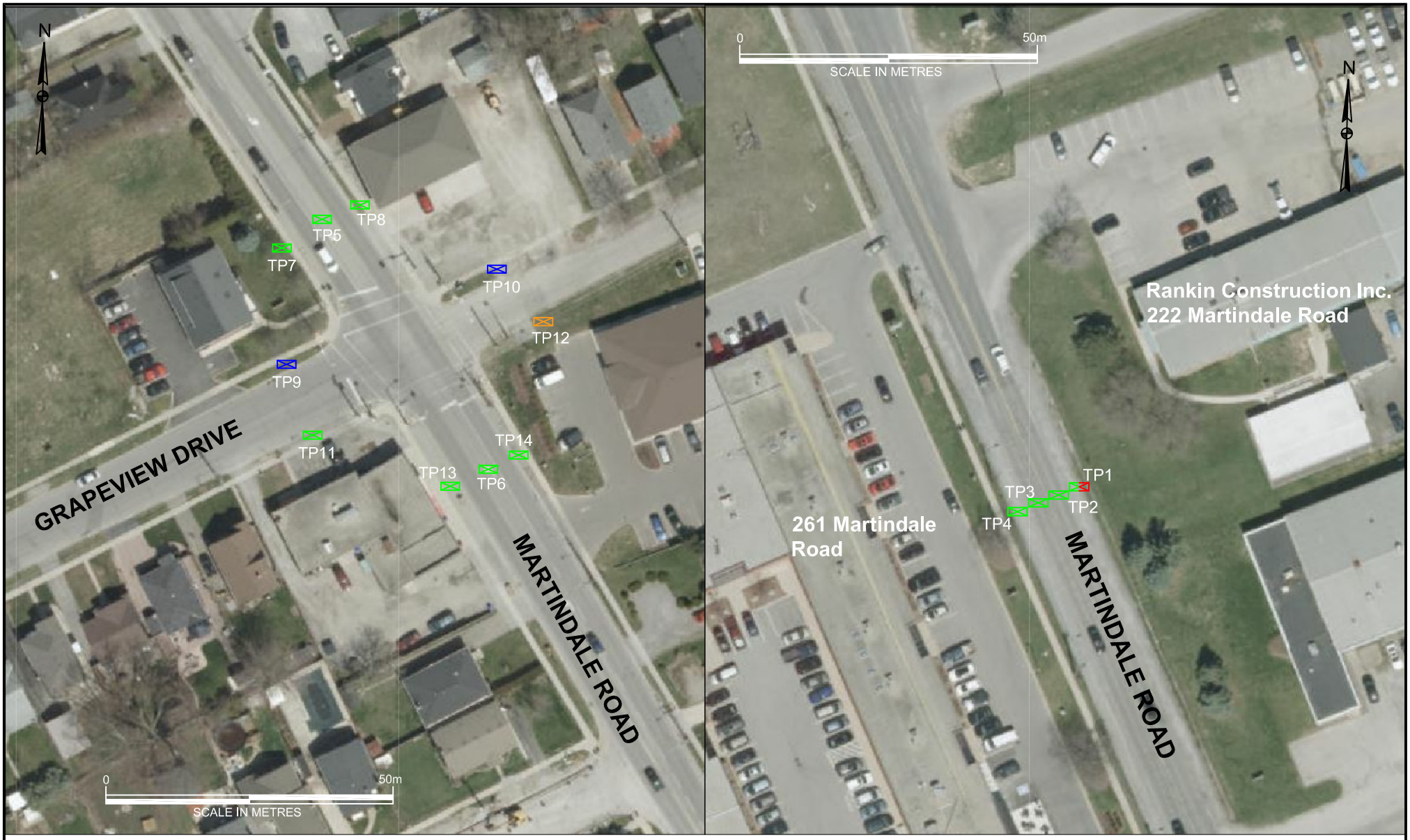
LEGEND:
TESTPIT LOCATION

DWN BY: KH
CHK'D BY: PS
DATUM: NAD83
PROJECTION: UTM Zone 17
SCALE: As Shown

PROJECT:
TESTPITTING PROGRAM
MARTINDALE ROAD,
ST. CATHARINES, ONTARIO

TITLE:
TESTPIT LOCATION PLAN

REV. NO.: A
DATE: JULY 2017
PROJECT NO.: TP113112
NO.: FIGURE 2



REFERENCE: Base plan provided by NIAGARA NAVIGATOR.

NOTE: TP10 could not be completed due to presence of underground utilities.

FOR ILLUSTRATION PURPOSES ONLY, ALL LOCATIONS APPROXIMATE.

CLIENT:

Regional Municipality of Niagara

Amec Foster Wheeler
Environment & Infrastructure
3300 Merrittville Hwy, Unit 5
Thorold, Ontario

LEGEND:

- TESTPIT LOCATION
- TESTPIT LOCATIONS WITH TABLE 1 SCS EXCEEDENCES FOR EC/SAR
- TESTPIT LOCATIONS WITH TABLE 1 SCS EXCEEDENCES FOR PHCs & BTEX
- TESTPIT LOCATIONS WITH TABLE 1 SCS EXCEEDENCES FOR METALS

DWN BY:	KH
CHK'D BY:	PS
DATUM:	NAD83
PROJECTION:	UTM Zone 17
SCALE:	As Shown

PROJECT:

TESTPITTING PROGRAM
MARTINDALE ROAD,
ST. CATHARINES, ONTARIO

TITLE:

LOCATIONS WITH EXCEEDENCES OF TABLE 1 SCS FOR PHCs, BTEX, EC, SAR, AND/OR METALS

REV. NO.:	A
DATE:	JULY 2017
PROJECT NO.:	TP113112
NO.:	FIGURE 3A



REFERENCE: Base plan provided by NIAGARA NAVIGATOR.

NOTE: TP10 could not be completed due to presence of underground utilities.

FOR ILLUSTRATION PURPOSES ONLY, ALL LOCATIONS APPROXIMATE.

CLIENT:

Regional Municipality of Niagara

Amec Foster Wheeler
Environment & Infrastructure
3300 Merrittville Hwy, Unit 5
Thorold, Ontario

LEGEND:

- TESTPIT LOCATION
- TESTPIT LOCATIONS WITH TABLE 3 SCS EXCEEDENCES FOR EC/SAR
- TESTPIT LOCATIONS WITH TABLE 3 SCS EXCEEDENCES FOR PHCs & BTEX
- TESTPIT LOCATIONS WITH TABLE 3 SCS EXCEEDENCES FOR METALS

DWN BY:	KH
CHK'D BY:	PS
DATUM:	NAD83
PROJECTION:	UTM Zone 17
SCALE:	As Shown

PROJECT:

TESTPITTING PROGRAM
MARTINDALE ROAD,
ST. CATHARINES, ONTARIO

TITLE:

LOCATIONS WITH EXCEEDENCES OF TABLE 3 SCS FOR PHCs, BTEX, EC, SAR & METALS

REV. NO.:	A
DATE:	JULY 2017
PROJECT NO.:	TP113112
NO.:	FIGURE 3B

TABLE

Table 1: Summary of Soil Analyses for Metals and Inorganics

Client: Regional Municipality of Niagara
Site: Martindale Road
Project: TP113112

Sample ID					TP1-2	TP2-1	TP3-2	TP4-2	TP5-1	TP6-1	TP7-1	TP8-1	TP9-1	TP10-1	TP11-1	TP12-1	TP13-1	TP14-1
Sample Depth (m)					1.0	1.0	1.1	1.0	0.8	0.7	0.5	0.3	0.8	0.2	0.5	0.8	0.4	0.3
Date Collected					20-Jun-17	20-Jun-17	20-Jun-17	20-Jun-17	20-Jun-17	20-Jun-17	20-Jun-17	20-Jun-17	20-Jun-17	20-Jun-17	20-Jun-17	20-Jun-17	20-Jun-17	20-Jun-17
Laboratory ID					1725371-01	1725371-02	1725371-03	1725371-04	1725371-05	1725371-06	1725371-07	1725371-08	1725371-09	1725371-10	1725371-11	1725371-12	1725371-13	1725371-14
Date Analyzed - pH					23-Jun-17	23-Jun-17	23-Jun-17	23-Jun-17	23-Jun-17	23-Jun-17	23-Jun-17	23-Jun-17	23-Jun-17	23-Jun-17	23-Jun-17	23-Jun-17	23-Jun-17	23-Jun-17
Date Analyzed - EC and SAR					26-Jun-17	26-Jun-17	26-Jun-17	26-Jun-17	26-Jun-17	26-Jun-17	26-Jun-17	26-Jun-17	26-Jun-17	26-Jun-17	26-Jun-17	26-Jun-17	26-Jun-17	26-Jun-17
Date Analyzed - Metals					27-Jun-17	27-Jun-17	27-Jun-17	27-Jun-17	27-Jun-17	27-Jun-17	27-Jun-17	27-Jun-17	27-Jun-17	27-Jun-17	27-Jun-17	27-Jun-17	27-Jun-17	27-Jun-17
Parameter	**Units**	**MDL**	**Table 1 SCS[a]**	**Table 3 SCS[b]**														
General Inorganics																		
SAR	-	0.01	2.4	12	**30.6**	**14.5**	**8.18**	**35.4**	**9.45**	**16.0**	**2.85**	**2.59**	1.60	0.32	**86.0**	0.99	**16.5**	**6.58**
Conductivity	µS/cm	5	570	1400	**4940**	**3970**	**2210**	**3810**	**3470**	**5290**	511	504	326	218	**7120**	345	**1220**	**696**
pH	pH units	0.05	+	+	7.8	6.6	6.7	7.2	7.6	7.6	7.7	7.7	7.5	7.4	7.6	7.0	7.6	7.6
Metals																		
Antimony	µg/g	1.0	1.3	50	**2**	<	<	<	<	<	<	<	<	1	<	<	<	<
Arsenic	µg/g	1.0	18	18	4	2	3	4	3	3	3	3	3	3	3	4	1	2
Barium	µg/g	1.0	220	670	90	99	105	129	114	87	87	100	118	41	96	81	25	44
Beryllium	µg/g	0.5	2.5	10	0.7	0.7	0.7	0.9	0.8	0.7	0.7	0.7	1.0	<	0.7	0.6	<	0.6
Boron	µg/g	5.0	36	120	9.5	5.3	6.3	8.8	8.5	8.9	5.7	8.0	7.3	5.8	6.2	<	<	<
Cadmium	µg/g	0.5	1.2	1.9	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Chromium	µg/g	5.0	70	160	21	17	22	26	25	19	23	22	26	13	19	18	9	16
Cobalt	µg/g	1.0	21	100	10	5	11	12	12	10	12	10	10	5	8	9	6	8
Copper	µg/g	5.0	92	300	28	14	25	33	29	25	28	28	23	17	19	21	22	14
Lead	µg/g	1.0	120	120	21	6	9	10	9	7	8	18	9	34	22	47	15	11
Molybdenum	µg/g	1.0	2	40	2	<	<	<	<	<	<	<	<	<	<	<	<	<
Nickel	µg/g	5.0	82	340	18	12	23	29	26	22	17	23	24	11	15	16	9	13
Selenium	µg/g	1.0	1.5	5.5	1	<	<	<	<	<	<	<	<	<	<	<	<	<
Silver	µg/g	0.5	0.5	50	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Thallium	µg/g	1.0	1	3.3	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Uranium	µg/g	1.0	2.5	33	<	<	<	<	<	<	<	<	<	<	<	<	<	<
Vanadium	µg/g	10	86	86	34	24	32	37	35	29	34	32	35	21	27	30	19	27
Zinc	µg/g	20	290	340	62	46	43	45	45	38	46	94	47	62	71	63	23	40

Notes:
"a" - Table 1: Full Depth Background Site Condition Standards for residential/parkland/institutional/industrial/commercial/community property use; established in "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", Ontario Ministry of the Environment and Climate Change, 15 April 2011 (MOECC).
"b" - Table 3: Full Depth Generic Site Condition Standards for industrial/commercial/community property use; established in " *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the* Environmental Protection Act", Ontario Ministry of the Environment and Climate Change, 15 April 2011 (MOECC). SCS for medium to fine textured soils utilized.

Bolded values exceed the Table 1 SCS.

Shaded values exceed the Table 3 SCS

"µg/g" - micrograms per gram, parts per million.

"MDL" - method detection limit.

"<" - sample results less than the MDL.

"-" - not applicable or parameter not analyzed.

"+" means as per O. Reg. 153/04 as amended, in order to apply the generic Site Condition Standards, pH for surface soil (<1.5 mbgs) should be between 5 and 9 and pH for subsurface soil (>1.5 mbgs) should be between 5 and 11.

Table 2: Summary of Soil Analyses for PHCs and BTEX

Client: Regional Municipality of Niagara
Site: Martindale Road
Project: TP113112

Sample ID					TP7-1	TP8-1	TP9-1	TP10-1	TP11-1	TP12-1	TP13-1	TP14-1
Sample Depth (m)					0.5	0.3	0.8	0.2	0.5	0.8	0.4	0.3
Date Collected					20-Jun-17	20-Jun-17	20-Jun-17	20-Jun-17	20-Jun-17	20-Jun-17	20-Jun-17	20-Jun-17
Laboratory ID					**1725371-07**	**1725371-08**	**1725371-09**	**1725371-10**	**1725371-11**	**1725371-12**	**1725371-13**	**1725371-14**
Date Analyzed - PHCs (F2-F4)					24-Jun-17	24-Jun-17	24-Jun-17	24-Jun-17	24-Jun-17	24-Jun-17	24-Jun-17	24-Jun-17
Date Analyzed - PHCs (F1)					25-Jun-17	25-Jun-17	25-Jun-17	25-Jun-17	25-Jun-17	25-Jun-17	25-Jun-17	25-Jun-17
Date Analyzed - BTEX					25-Jun-17	25-Jun-17	25-Jun-17	25-Jun-17	25-Jun-17	25-Jun-17	25-Jun-17	25-Jun-17
Parameter	**Units**	**MDL**	**Table 1 SCS[a]**	**Table 3 SCS[b]**								
Petroleum Hydrocarbons (PHCs)												
F1 PHCs (C6-C10)	µg/g	7	25	65	<	<	<	<	<	<	<	<
F2 PHCs (C10-C16)	µg/g	4	10	250	<	<	<	<	<	<	<	<
F3 PHCs (C16-C34)	µg/g	8	240	2500	<	<	<	28	11	**563**	<	11
F4 PHCs (C34-C50)	µg/g	6	120	6600	<	<	<	45	<	**477**	<	<
F4G PHCs (gravimetric)	µg/g	50	120	6600	-	-	-	-	-	**1570**	-	-
Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)												
Benzene	µg/g	0.02	0.02	0.4	<	<	<	<	<	<	<	<
Ethylbenzene	µg/g	0.05	0.05	19	<	<	<	<	<	**0.06**	<	<
Toluene	µg/g	0.05	0.20	78	<	<	<	<	<	<	<	<
m/p-Xylene	µg/g	0.05	-	-	<	<	<	<	<	0.09	<	<
o-Xylene	µg/g	0.05	-	-	<	<	<	<	<	<	<	<
Xylenes, total	µg/g	0.05	0.05	30	<	<	<	<	<	**0.09**	<	<

Notes:

"a" - Table 1: Full Depth Background Site Condition Standards for residential/parkland/institutional/industrial/commercial/community property use; established in "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", Ontario Ministry of the Environment and Climate Change, 15 April 2011 (MOECC).

"b" - Table 3: Full Depth Generic Site Condition Standards for industrial/commercial/community property use; established in "*Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the* Environmental Protection Act", Ontario Ministry of the Environment and Climate Change, 15 April 2011 (MOECC). SCS for medium to fine textured soils utilized.

Bolded values exceed the Table 1 SCS.

Shaded values exceed the Table 3 SCS

"µg/g" - micrograms per gram, parts per million.

"MDL" - method detection limit.

"NV" - no value derived

"<" - sample results less than the MDL.

"-" - not applicable or parameter not analyzed.

APPENDIX A: Testpit Logs

Testpitting Program
Site Location: Martindale Road, St. Catharines
Job Number: TP113112 Phase 9000
Date: June 20th, 2017

TESTPIT LOG: TP1 **(640246,4781646)**

Sample Number	Depth (mbgs)	Comments (odour staining, etc.)	COV/TOV (ppm)	Stratigraphy	
				Depth (mbgs)	Material Description
-	-	No odour or staining	-	0-0.3	Granular
-	0.5	Oxidation Staining, No odour	10/0	0.3-1.6	Brown, Silty Clay/Clayey Silt, Fill, Trace Fine Sand and Asphalt Pieces, APL/WTPL
TP1-2 (Metals, EC, SAR, pH)	1.0	No odour or staining	10/0		
-	1.7	No odour or staining	5/0	1.6-1.7	Brown Silty Clay/Clayey Silt, Native, Trace Fine Sand, DTPL

Upon completion: Open and Dry

Equipment: John Deere Backhoe 310 SJ or CAT 302.5C Mini Excavator

Originated by: DG
Compiled By: CM
Checked By: KP

Notes: "mbgs" means metres below ground surface. "COV" means Combustible Organic Vapour, "TOV" means Total Organic Vapour, "ppm" means parts per million. "PHCs" means fractionized Petroleum Hydrocarbons in the F1 to F4 ranges. "BTEX" means benzene, toluene, ethylbenzene and xylenes. "DTPL" means Drier Than Plastic Limit. "APL" means At Plastic Limit. "WTPL" means Wetter Than Plastic Limit.

Testpitting Program
Site Location: Martindale Road, St. Catharines
Job Number: TP113112 Phase 9000
Date: June 20th, 2017

TESTPIT LOG: TP2 **(640246,4781644)**

Sample Number	Depth (mbgs)	Comments (odour staining, etc.)	COV/TOV (ppm)	Stratigraphy	
				Depth (mbgs)	Material Description
-	-	No odour or staining	-	0-0.1	Asphalt
-	-	No odour or staining	-	0.1-0.2	Brown, Sand and Gravel, Fill, Moist
-	-	No odour or staining	15/29	0.2-0.3	Asphalt
-	-	No odour or staining	-	0.3-0.4	Clearstone, Fill
TP2-1 (Metals, EC, SAR, pH)	1.0	Organics Odour	0/0	0.4-1.4	Black, Sand, Fill, Trace Clay
-	1.5	No odour or staining	0/1	1.4-1.5	Grey, Silty Clay/Clayey Silt, Fill, Mottled, DTPL

Upon completion: Open and Dry

Equipment: John Deere Backhoe 310 SJ or CAT 302.5C Mini Excavator

Originated by: DG
Compiled By: CM
Checked By: KP

Notes: "mbgs" means metres below ground surface. "COV" means Combustible Organic Vapour, "TOV" means Total Organic Vapour, "ppm" means parts per million. "PHCs" means fractionized Petroleum Hydrocarbons in the F1 to F4 ranges. "BTEX" means benzene, toluene, ethylbenzene and xylenes. "DTPL" means Drier Than Plastic Limit. "APL" means At Plastic Limit. "WTPL" means Wetter Than Plastic Limit.

Testpitting Program
Site Location: Martindale Road, St. Catharines
Job Number: TP113112 Phase 9000
Date: June 20th, 2017

TESTPIT LOG: TP3 **(640243,4781642)**

Sample Number	Depth (mbgs)	Comments (odour staining, etc.)	COV/TOV (ppm)	Stratigraphy	
				Depth (mbgs)	Material Description
-	-	Odour Noted in Asphalt	-	0-0.1	Asphalt
-	-	No odour or staining	-	0.1-0.2	Brown, Sand and Gravel, Fill
-	-	Odour Noted in Asphalt	155/153	0.2-0.3	Asphalt
-	-	No odour or staining	-	0.3-0.4	Clearstone, Fill
-	0.5	No odour or staining	0/0	0.4-1.0	Black, Sand, Fill, Trace Clay and Brick, moist
TP3-2 (Metals, EC, SAR, pH)	1.1	No odour or staining	0/0	1.0-1.2	Grey, Silty Clay/Clayey Silt Fill, Trace Fine Sand, Mottled, DTPL

Upon completion: Open and Dry

Equipment: John Deere Backhoe 310 SJ or CAT 302.5C Mini Excavator

Originated by: DG
Compiled By: CM
Checked By: KP

Notes: "mbgs" means metres below ground surface. "COV" means Combustible Organic Vapour, "TOV" means Total Organic Vapour, "ppm" means parts per million. "PHCs" means fractionized Petroleum Hydrocarbons in the F1 to F4 ranges. "BTEX" means benzene, toluene, ethylbenzene and xylenes. "DTPL" means Drier Than Plastic Limit. "APL" means At Plastic Limit. "WTPL" means Wetter Than Plastic Limit.

Testpitting Program
Site Location: Martindale Road, St. Catharines
Job Number: TP113112 Phase 9000
Date: June 20th, 2017

TESTPIT LOG: TP4 **(640239,4781641)**

Sample Number	Depth (mbgs)	Comments (odour staining, etc.)	COV/TOV (ppm)	Stratigraphy	
				Depth (mbgs)	Material Description
-	-	-	-	0-0.1	Granular
-	0.5	No odour or staining	0/0	0.1-1.0	Black, Sand, Fill, Trace Clay, Pieces of Asphalt, Moist
TP4-2 (Metals, EC, SAR, pH)	1.0	No odour or staining	0/0	1.0-1.2	Brown, Silty Clay/Clayey Silt, Fill, Mottled, DTPL

Upon completion: Open and Dry

Equipment: John Deere Backhoe 310 SJ or CAT 302.5C Mini Excavator

Originated by: DG
Compiled By: CM
Checked By: KP

Notes: "mbgs" means metres below ground surface. "COV" means Combustible Organic Vapour, "TOV" means Total Organic Vapour, "ppm" means parts per million. "PHCs" means fractionized Petroleum Hydrocarbons in the F1 to F4 ranges. "BTEX" means benzene, toluene, ethylbenzene and xylenes. "DTPL" means Drier Than Plastic Limit. "APL" means At Plastic Limit. "WTPL" means Wetter Than Plastic Limit.

Testpitting Program
Site Location: Martindale Road, St. Catharines
Job Number: TP113112 Phase 9000
Date: June 20th, 2017

TESTPIT LOG: TP5 **(640766,4780659)**

Sample Number	Depth (mbgs)	Comments (odour staining, etc.)	COV/TOV (ppm)	Stratigraphy	
				Depth (mbgs)	Material Description
-	-	-	-	0-0.1	Asphalt
-	-	-	-	0.1-0.7	Granular
TP5-1 (Metals, EC, SAR, pH)	0.8	No odour or staining	-	0.7-1.0	Brown, Silty Clay/Clayey Silt, Fill, Trace Sand and Gravel, DTPL
-	1.5	No odour or staining	-	1.0-1.5	Brown, Silty Clay/Clayey Silt, Possible Native, Trace Sand and Gravel, Grey Seams, DTPL

Upon completion: Open and Dry

Equipment: John Deere Backhoe 310 SJ or CAT 302.5C Mini Excavator

Originated by: DG
Compiled By: CM
Checked By: KP

Notes: "mbgs" means metres below ground surface. "COV" means Combustible Organic Vapour, "TOV" means Total Organic Vapour, "ppm" means parts per million. "PHCs" means fractionized Petroleum Hydrocarbons in the F1 to F4 ranges. "BTEX" means benzene, toluene, ethylbenzene and xylenes. "DTPL" means Drier Than Plastic Limit. "APL" means At Plastic Limit. "WTPL" means Wetter Than Plastic Limit.

Testpitting Program
Site Location: Martindale Road, St. Catharines
Job Number: TP113112 Phase 9000
Date: June 20th, 2017

TESTPIT LOG: TP6 **(640799,4780601)**

Sample Number	Depth (mbgs)	Comments (odour staining, etc.)	COV/TOV (ppm)	Stratigraphy	
				Depth (mbgs)	Material Description
-	-	-	-	0-0.1	Asphalt
-	-	-	-	0.1-0.6	Granular
TP6-1 (Metals, EC, SAR, pH)	0.7	No odour or staining	-	0.6-0.9	Brown, Silty Clay/Clayey Silt, Fill, Trace Sand and Gravel, Shale Pieces
-	1.0	No odour or staining	-	0.9-1.2	Brown, Silty Clay/Clayey Silt, Possible Native, Trace Sand, Gravel, and Shale

Upon completion: Open and Dry

Equipment: John Deere Backhoe 310 SJ or CAT 302.5C Mini Excavator

Originated by: DG
Compiled By: CM
Checked By: KP

Notes: "mbgs" means metres below ground surface. "COV" means Combustible Organic Vapour, "TOV" means Total Organic Vapour, "ppm" means parts per million. "PHCs" means fractionized Petroleum Hydrocarbons in the F1 to F4 ranges. "BTEX" means benzene, toluene, ethylbenzene and xylenes. "DTPL" means Drier Than Plastic Limit. "APL" means At Plastic Limit. "WTPL" means Wetter Than Plastic Limit.

Testpitting Program
Site Location: Martindale Road, St. Catharines
Job Number: TP113112 Phase 9000
Date: June 20th, 2017

TESTPIT LOG: TP7 **(640765,4780647)**

Sample Number	Depth (mbgs)	Comments (odour staining, etc.)	COV/TOV (ppm)	Stratigraphy	
				Depth (mbgs)	Material Description
-	-	No odour or staining	-	0-0.1	Topsoil
-	-	No odour or staining	-	0.1-0.4	Sand and Gravel, Fill
TP7-1 (PHCs, BTEX, Metals, EC, SAR, pH)	0.5	No odour or staining	0/0	0.4-0.8	Brown, Silty Sand, Fill, Moist
-	1.0	No odour or staining	0/0	0.8-1.0	Brown, Silty Clay/Clayey Silt, Fill, DTPL/APL

Upon completion: Open and Dry

Equipment: John Deere Backhoe 310 SJ or CAT 302.5C Mini Excavator

Originated by: DG
Compiled By: CM
Checked By: KP

Notes: "mbgs" means metres below ground surface. "COV" means Combustible Organic Vapour, "TOV" means Total Organic Vapour, "ppm" means parts per million. "PHCs" means fractionized Petroleum Hydrocarbons in the F1 to F4 ranges. "BTEX" means benzene, toluene, ethylbenzene and xylenes. "DTPL" means Drier Than Plastic Limit. "APL" means At Plastic Limit. "WTPL" means Wetter Than Plastic Limit.

Testpitting Program
Site Location: Martindale Road, St. Catharines
Job Number: TP113112 Phase 9000
Date: June 20th, 2017

TESTPIT LOG: TP8 **(640771,4780663)**

Sample Number	Depth (mbgs)	Comments (odour staining, etc.)	COV/TOV (ppm)	Stratigraphy	
				Depth (mbgs)	Material Description
-	-	-	-	0-0.1	Topsoil
TP8-1 (PHCs, BTEX, Metals, EC, SAR, pH)	0.3	No odour or staining	-	0.1-0.9	Brown Silty Clay/Cayey Silt, Fill, Trace Sand and Gravel, DTPL
-	0.9	No odour or staining	-	0.9	Brown, Silty Clay/Clayey Silt, Possible Native, Trace Sand and Gravel

Upon completion: Open and Dry

Equipment: John Deere Backhoe 310 SJ or CAT 302.5C Mini Excavator

Originated by: DG
Compiled By: CM
Checked By: KP

Notes: "mbgs" means metres below ground surface. "COV" means Combustible Organic Vapour, "TOV" means Total Organic Vapour, "ppm" means parts per million. "PHCs" means fractionized Petroleum Hydrocarbons in the F1 to F4 ranges. "BTEX" means benzene, toluene, ethylbenzene and xylenes. "DTPL" means Drier Than Plastic Limit. "APL" means At Plastic Limit. "WTPL" means Wetter Than Plastic Limit.

Testpitting Program
Site Location: Martindale Road, St. Catharines
Job Number: TP113112 Phase 9000
Date: June 20th, 2017

TESTPIT LOG: TP9 **(640756,4780632)**

Sample Number	Depth (mbgs)	Comments (odour staining, etc.)	COV/TOV (ppm)	Stratigraphy	
				Depth (mbgs)	Material Description
-	-	-	-	0-0.1	Topsoil
-	-	No odour or staining	-	0.1-0.3	Granular Fill
TP9-1 (PHCs, BTEX, Metals, EC, SAR, pH)	0.8	No odour or staining	0/0	0.3-1.0	Brown Silty Clay/Clayey Silt, Fill, DTPL

Upon completion: Open and Dry.

Equipment: John Deere Backhoe 310 SJ or CAT 302.5C Mini Excavator

Originated by: DG
Compiled By: CM
Checked By: KP

Notes: "mbgs" means metres below ground surface. "COV" means Combustible Organic Vapour, "TOV" means Total Organic Vapour, "ppm" means parts per million. "PHCs" means fractionized Petroleum Hydrocarbons in the F1 to F4 ranges. "BTEX" means benzene, toluene, ethylbenzene and xylenes. "DTPL" means Drier Than Plastic Limit. "APL" means At Plastic Limit. "WTPL" means Wetter Than Plastic Limit.

Testpitting Program
Site Location: Martindale Road, St. Catharines
Job Number: TP113112 Phase 9000
Date: June 20th, 2017

TESTPIT LOG: TP10 **(640793,4780643)**

Sample Number	Depth (mbgs)	Comments (odour staining, etc.)	COV/TOV (ppm)	Stratigraphy	
				Depth (mbgs)	Material Description
-	-	-	-	0-0.1	Topsoil
TP10-1 (PHCs, BTEX, Metals, EC, SAR, pH)	0.2	No odour or staining	-	0.1-0.3	Brown Silty Clay/Clayey Silt, Fill, Trace Sand and Gravel, DTPL
-	0.5	No odour or staining	-	0.3-0.6	Brown Silty Clay/Clayey Silt, Fill, Moist
-	0.9	No odour or staining	-	0.6-1.0	Brown Silty Clay/Clayey Silt, Native, Trace Sand and Gravel, Red Shale Pieces, DTPL

Upon completion: Open and Dry. TP 10 not extended due to presence of underground utilities.

Equipment: John Deere Backhoe 310 SJ or CAT 302.5C Mini Excavator

Originated by: DG
Compiled By: CM
Checked By: KP

Notes: "mbgs" means metres below ground surface. "COV" means Combustible Organic Vapour, "TOV" means Total Organic Vapour, "ppm" means parts per million. "PHCs" means fractionized Petroleum Hydrocarbons in the F1 to F4 ranges. "BTEX" means benzene, toluene, ethylbenzene and xylenes. "DTPL" means Drier Than Plastic Limit. "APL" means At Plastic Limit. "WTPL" means Wetter Than Plastic Limit.

Testpitting Program
Site Location: Martindale Road, St. Catharines
Job Number: TP113112 Phase 9000
Date: June 20th, 2017

TESTPIT LOG: TP11

Sample Number	Depth (mbgs)	Comments (odour staining, etc.)	COV/TOV (ppm)	Stratigraphy	
				Depth (mbgs)	Material Description
-	-	-	-	0-0.1	Asphalt
-	-	-	-	0.1-0.4	Granular Fill
TP11-1 (PHCs, BTEX, Metals, EC, SAR, pH)	0.5	Organics odour, possible black staining	0/0	0.4-0.6	Black Silty Clay/Clayey Silt, Fill
-	0.8	No odour or staining	0/0	0.6-1.2	Brown Silty Clay/Clayey Silt, Fill, APL/WTPL

Upon completion: Open and Dry

Equipment: John Deere Backhoe 310 SJ or CAT 302.5C Mini Excavator

Originated by: DG
Compiled By: CM
Checked By: KP

Notes: "mbgs" means metres below ground surface. "COV" means Combustible Organic Vapour, "TOV" means Total Organic Vapour, "ppm" means parts per million. "PHCs" means fractionized Petroleum Hydrocarbons in the F1 to F4 ranges. "BTEX" means benzene, toluene, ethylbenzene and xylenes. "DTPL" means Drier Than Plastic Limit. "APL" means At Plastic Limit. "WTPL" means Wetter Than Plastic Limit.

Testpitting Program
Site Location: Martindale Road, St. Catharines
Job Number: TP113112 Phase 9000
Date: June 20th, 2017

TESTPIT LOG: TP12 **(640806,4780634)**

Sample Number	Depth (mbgs)	Comments (odour staining, etc.)	COV/TOV (ppm)	Stratigraphy	
				Depth (mbgs)	Material Description
-	-	No odour or staining	-	0-0.03	Topsoil
-	-	No odour or staining	-	0.03-0.5	Granular Fill
TP12-1 (PHCs, BTEX, Metals, EC, SAR, pH)	0.8	No odour or staining	0/0	0.5-1.0	Silty Clay/Clayey Silt Fill, Fissured, DTPL

Upon completion: Open and Dry

Equipment: John Deere Backhoe 310 SJ or CAT 302.5C Mini Excavator

Originated by: DG
Compiled By: CM
Checked By: KP

Notes: "mbgs" means metres below ground surface. "COV" means Combustible Organic Vapour, "TOV" means Total Organic Vapour, "ppm" means parts per million. "PHCs" means fractionized Petroleum Hydrocarbons in the F1 to F4 ranges. "BTEX" means benzene, toluene, ethylbenzene and xylenes. "DTPL" means Drier Than Plastic Limit. "APL" means At Plastic Limit. "WTPL" means Wetter Than Plastic Limit.

Testpitting Program
Site Location: Martindale Road, St. Catharines
Job Number: TP113112 Phase 9000
Date: June 20th, 2017

TESTPIT LOG: TP13 **(640788,4780616)**

Sample Number	Depth (mbgs)	Comments (odour staining, etc.)	COV/TOV (ppm)	Stratigraphy	
				Depth (mbgs)	Material Description
-	-	No odour or staining	-	0-0.08	Asphalt
-	-	No odour or staining	-	0.08-0.3	Granular Fill
TP13-1 (PHCs, BTEX, Metals, EC, SAR, pH)	0.4	No odour or staining	0/0	0.3-0.5	Brown, Sand, Fill, Moist
-	0.8	No odour or staining	0/0	0.5-1.1	Brown, Silty Clay/Clayey Silt Fill, Mottled, Trace Fine Sand

Upon completion: Open and Dry

Equipment: John Deere Backhoe 310 SJ or CAT 302.5C Mini Excavator

Originated by: DG
Compiled By: CM
Checked By: KP

Notes: "mbgs" means metres below ground surface. "COV" means Combustible Organic Vapour, "TOV" means Total Organic Vapour, "ppm" means parts per million. "PHCs" means fractionized Petroleum Hydrocarbons in the F1 to F4 ranges. "BTEX" means benzene, toluene, ethylbenzene and xylenes. "DTPL" means Drier Than Plastic Limit. "APL" means At Plastic Limit. "WTPL" means Wetter Than Plastic Limit.

Testpitting Program
Site Location: Martindale Road, St. Catharines
Job Number: TP113112 Phase 9000
Date: June 20th, 2017

TESTPIT LOG: TP14 **(640802,4780610)**

Sample Number	Depth (mbgs)	Comments (odour staining, etc.)	COV/TOV (ppm)	Stratigraphy	
				Depth (mbgs)	Material Description
-	-	No odour or staining	-	0-0.03	Topsoil
-	-	No odour or staining	-	0.03-0.3	Granular Fill
TP14-1 (PHCs, BTEX, Metals, EC, SAR, pH)	0.3	No odour or staining	0/0	0.3-0.45	Brown, Sand, Fill, Moist
-	0.8	No odour or staining	0/0	0.45-0.9	Brown, Silty Clay/Clayey Silt, Fill, Trace Fine Sand, DTPL/APL

Upon completion: Open and Dry

Equipment: John Deere Backhoe 310 SJ or CAT 302.5C Mini Excavator

Originated by: DG
Compiled By: CM
Checked By: KP

Notes: "mbgs" means metres below ground surface. "COV" means Combustible Organic Vapour, "TOV" means Total Organic Vapour, "ppm" means parts per million. "PHCs" means fractionized Petroleum Hydrocarbons in the F1 to F4 ranges. "BTEX" means benzene, toluene, ethylbenzene and xylenes. "DTPL" means Drier Than Plastic Limit. "APL" means At Plastic Limit. "WTPL" means Wetter Than Plastic Limit.

Appendix B: Laboratory Certificates of Analysis

Paracel Order Number:
1711074

PARACEL LABORATORIES LTD.
TRUSTED. RESPONSIVE. RELIABLE.

300 - 2319 St. Laurent Blvd
Ottawa, ON, K1G 4J8
1-800-749-1947
www.paracellabs.com

Certificate of Analysis

Amec Foster Wheeler (Thorold)

3300 Merrittville Hwy, Unit 5
Thorold, ON L2V 4Y6
Attn: Kelly Patterson

Client PO:
Project: TP113112
Custody: 113764/113765/113766/110791

Report Date: 28-Jun-2017
Order Date: 21-Jun-2017

Order #: 1725371

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1725371-01	TP1-2
1725371-02	TP2-1
1725371-03	TP3-2
1725371-04	TP4-2
1725371-05	TP5-1
1725371-06	TP6-1
1725371-07	TP7-1
1725371-08	TP8-1
1725371-09	TP9-1
1725371-10	TP10-1
1725371-11	TP11-1
1725371-12	TP12-1
1725371-13	TP13-1
1725371-14	TP14-1

Approved By:



Dale Robertson, BSc
Laboratory Director

Any use of these results implies your agreement that our total liabilty in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

Certificate of Analysis
Client: Amec Foster Wheeler (Thorold)
Client PO:

Report Date: 28-Jun-2017
Order Date: 21-Jun-2017
Project Description: TP113112

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	23-Jun-17	25-Jun-17
Conductivity	MOE E3138 - probe @25 °C, water ext	24-Jun-17	26-Jun-17
Metals, ICP-MS	EPA 6020 - Digestion - ICP-MS	27-Jun-17	27-Jun-17
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	22-Jun-17	23-Jun-17
PHC F1	CWS Tier 1 - P&T GC-FID	23-Jun-17	25-Jun-17
PHC F4G (gravimetric)	CWS Tier 1 - Extraction Gravimetric	26-Jun-17	26-Jun-17
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	22-Jun-17	24-Jun-17
SAR	Calculated	24-Jun-17	26-Jun-17
Solids, %	Gravimetric, calculation	23-Jun-17	23-Jun-17

Certificate of Analysis

Client: Amec Foster Wheeler (Thorold)

Client PO:

Report Date: 28-Jun-2017

Order Date: 21-Jun-2017

Project Description: TP113112

	Client ID:	TP1-2	TP2-1	TP3-2	TP4-2
	Sample Date:	20-Jun-17	20-Jun-17	20-Jun-17	20-Jun-17
	Sample ID:	1725371-01	1725371-02	1725371-03	1725371-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	81.0	79.8	85.1	82.7
General Inorganics					
SAR	0.01 N/A	30.6	14.5	8.18	35.4
Conductivity	5 uS/cm	4940	3970	2210	3810
pH	0.05 pH Units	7.78	6.60	6.67	7.23
Metals					
Antimony	1 ug/g dry	2	<1	<1	<1
Arsenic	1 ug/g dry	4	2	3	4
Barium	1 ug/g dry	90	99	105	129
Beryllium	0.5 ug/g dry	0.7	0.7	0.7	0.9
Boron	5.0 ug/g dry	9.5	5.3	6.3	8.8
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	5 ug/g dry	21	17	22	26
Cobalt	1 ug/g dry	10	5	11	12
Copper	5 ug/g dry	28	14	25	33
Lead	1 ug/g dry	21	6	9	10
Molybdenum	1 ug/g dry	2	<1	<1	<1
Nickel	5 ug/g dry	18	12	23	29
Selenium	1 ug/g dry	1	<1	<1	<1
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	<0.3
Thallium	1 ug/g dry	<1	<1	<1	<1
Uranium	1 ug/g dry	<1	<1	<1	<1
Vanadium	10 ug/g dry	34	24	32	37
Zinc	20 ug/g dry	62	46	43	45

Certificate of Analysis

Client: Amec Foster Wheeler (Thorold)

Client PO:

Report Date: 28-Jun-2017

Order Date: 21-Jun-2017

Project Description: TP113112

	Client ID:	TP5-1	TP6-1	TP7-1	TP8-1
	Sample Date:	20-Jun-17	20-Jun-17	20-Jun-17	20-Jun-17
	Sample ID:	1725371-05	1725371-06	1725371-07	1725371-08
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	83.3	86.4	86.3	85.1
General Inorganics					
SAR	0.01 N/A	9.45	16.0	2.85	2.59
Conductivity	5 uS/cm	3470	5290	511	504
pH	0.05 pH Units	7.61	7.62	7.66	7.71
Metals					
Antimony	1 ug/g dry	<1	<1	<1	<1
Arsenic	1 ug/g dry	3	3	3	3
Barium	1 ug/g dry	114	87	87	100
Beryllium	0.5 ug/g dry	0.8	0.7	0.7	0.7
Boron	5.0 ug/g dry	8.5	8.9	5.7	8.0
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	5 ug/g dry	25	19	23	22
Cobalt	1 ug/g dry	12	10	12	10
Copper	5 ug/g dry	29	25	28	28
Lead	1 ug/g dry	9	7	8	18
Molybdenum	1 ug/g dry	<1	<1	<1	<1
Nickel	5 ug/g dry	26	22	17	23
Selenium	1 ug/g dry	<1	<1	<1	<1
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	<0.3
Thallium	1 ug/g dry	<1	<1	<1	<1
Uranium	1 ug/g dry	<1	<1	<1	<1
Vanadium	10 ug/g dry	35	29	34	32
Zinc	20 ug/g dry	45	38	46	94
Volatiles					
Benzene	0.02 ug/g dry	-	-	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	-	-	<0.05	<0.05
Toluene	0.05 ug/g dry	-	-	<0.05	<0.05
m,p-Xylenes	0.05 ug/g dry	-	-	<0.05	<0.05
o-Xylene	0.05 ug/g dry	-	-	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	-	-	<0.05	<0.05
Toluene-d8	Surrogate	-	-	81.9%	81.1%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	-	-	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	-	-	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	-	-	<8	<8

Certificate of Analysis
Client: Amec Foster Wheeler (Thorold)
Client PO:

Report Date: 28-Jun-2017
Order Date: 21-Jun-2017
Project Description: TP113112

	Client ID:	TP5-1	TP6-1	TP7-1	TP8-1
	Sample Date:	20-Jun-17	20-Jun-17	20-Jun-17	20-Jun-17
	Sample ID:	1725371-05	1725371-06	1725371-07	1725371-08
	MDL/Units	Soil	Soil	Soil	Soil
F4 PHCs (C34-C50)	6 ug/g dry	-	-	<6	<6

Certificate of Analysis

Client: Amec Foster Wheeler (Thorold)

Client PO:

Report Date: 28-Jun-2017

Order Date: 21-Jun-2017

Project Description: TP113112

	Client ID:	TP9-1	TP10-1	TP11-1	TP12-1
	Sample Date:	20-Jun-17	20-Jun-17	20-Jun-17	20-Jun-17
	Sample ID:	1725371-09	1725371-10	1725371-11	1725371-12
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	85.9	94.9	80.3	81.4
General Inorganics					
SAR	0.01 N/A	1.60	0.32	86.0	0.99
Conductivity	5 uS/cm	326	218	7120	345
pH	0.05 pH Units	7.50	7.40	7.63	7.00
Metals					
Antimony	1 ug/g dry	<1	1	<1	<1
Arsenic	1 ug/g dry	3	3	3	4
Barium	1 ug/g dry	118	41	96	81
Beryllium	0.5 ug/g dry	1.0	<0.5	0.7	0.6
Boron	5.0 ug/g dry	7.3	5.8	6.2	<5.0
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	5 ug/g dry	26	13	19	18
Cobalt	1 ug/g dry	10	5	8	9
Copper	5 ug/g dry	23	17	19	21
Lead	1 ug/g dry	9	34	22	47
Molybdenum	1 ug/g dry	<1	<1	<1	<1
Nickel	5 ug/g dry	24	11	15	16
Selenium	1 ug/g dry	<1	<1	<1	<1
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	<0.3
Thallium	1 ug/g dry	<1	<1	<1	<1
Uranium	1 ug/g dry	<1	<1	<1	<1
Vanadium	10 ug/g dry	35	21	27	30
Zinc	20 ug/g dry	47	62	71	63
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	0.06
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	0.09
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	0.09
Toluene-d8	Surrogate	78.3%	79.4%	83.2%	81.9%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	<8	28	11	563

Certificate of Analysis
Client: Amec Foster Wheeler (Thorold)
Client PO:

Report Date: 28-Jun-2017
Order Date: 21-Jun-2017
Project Description: TP113112

	Client ID:	TP9-1	TP10-1	TP11-1	TP12-1
	Sample Date:	20-Jun-17	20-Jun-17	20-Jun-17	20-Jun-17
	Sample ID:	1725371-09	1725371-10	1725371-11	1725371-12
	MDL/Units	Soil	Soil	Soil	Soil
F4 PHCs (C34-C50)	6 ug/g dry	<6	45	<6	477 [1]
F4G PHCs (gravimetric)	50 ug/g dry	-	-	-	1570

Certificate of Analysis
Client: Amec Foster Wheeler (Thorold)
Client PO:

Report Date: 28-Jun-2017
Order Date: 21-Jun-2017
Project Description: TP113112

	Client ID:	TP13-1	TP14-1	-	-
	Sample Date:	20-Jun-17	20-Jun-17	-	-
	Sample ID:	1725371-13	1725371-14	-	-
	MDL/Units	Soil	Soil	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	82.6	90.1	-	-
General Inorganics					
SAR	0.01 N/A	16.5	6.58	-	-
Conductivity	5 uS/cm	1220	696	-	-
pH	0.05 pH Units	7.58	7.55	-	-
Metals					
Antimony	1 ug/g dry	<1	<1	-	-
Arsenic	1 ug/g dry	1	2	-	-
Barium	1 ug/g dry	25	44	-	-
Beryllium	0.5 ug/g dry	<0.5	0.6	-	-
Boron	5.0 ug/g dry	<5.0	<5.0	-	-
Cadmium	0.5 ug/g dry	<0.5	<0.5	-	-
Chromium	5 ug/g dry	9	16	-	-
Cobalt	1 ug/g dry	6	8	-	-
Copper	5 ug/g dry	22	14	-	-
Lead	1 ug/g dry	15	11	-	-
Molybdenum	1 ug/g dry	<1	<1	-	-
Nickel	5 ug/g dry	9	13	-	-
Selenium	1 ug/g dry	<1	<1	-	-
Silver	0.3 ug/g dry	<0.3	<0.3	-	-
Thallium	1 ug/g dry	<1	<1	-	-
Uranium	1 ug/g dry	<1	<1	-	-
Vanadium	10 ug/g dry	19	27	-	-
Zinc	20 ug/g dry	23	40	-	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene	0.05 ug/g dry	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene-d8	Surrogate	83.4%	80.7%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	11	-	-

Certificate of Analysis
Client: Amec Foster Wheeler (Thorold)
Client PO:

Report Date: 28-Jun-2017
Order Date: 21-Jun-2017
Project Description: TP113112

	Client ID:	TP13-1	TP14-1	-	-
	Sample Date:	20-Jun-17	20-Jun-17	-	-
	Sample ID:	1725371-13	1725371-14	-	-
	MDL/Units	Soil	Soil	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Conductivity	ND	5	uS/cm						
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
F4G PHCs (gravimetric)	ND	50	ug/g						
Metals									
Antimony	ND	1	ug/g						
Arsenic	ND	1	ug/g						
Barium	ND	1	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium	ND	5	ug/g						
Cobalt	ND	1	ug/g						
Copper	ND	5	ug/g						
Lead	ND	1	ug/g						
Molybdenum	ND	1	ug/g						
Nickel	ND	5	ug/g						
Selenium	ND	1	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1	ug/g						
Uranium	ND	1	ug/g						
Vanadium	ND	10	ug/g						
Zinc	ND	20	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*2.77*		*ug/g*		*86.4*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
SAR	0.28	0.01	N/A	0.28			0.0	200	
Conductivity	684	5	uS/cm	718			4.8	6.2	
pH	7.75	0.05	pH Units	7.78			0.4	10	
Hydrocarbons									
F1 PHCs (C6-C10)	1500	7	ug/g dry	1600			6.3	40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	129	8	ug/g dry	71			57.7	30	QR-04
F4 PHCs (C34-C50)	19	6	ug/g dry	17			7.8	30	
Metals									
Antimony	ND	1	ug/g dry	1.2			0.0	30	
Arsenic	3.3	1	ug/g dry	3.2			4.9	30	
Barium	96.8	1	ug/g dry	97.9			1.1	30	
Beryllium	0.62	0.5	ug/g dry	0.55			12.1	30	
Boron	10.1	5.0	ug/g dry	9.4			6.7	30	
Cadmium	ND	0.5	ug/g dry	ND			0.0	30	
Chromium	17.0	5	ug/g dry	17.1			0.5	30	
Cobalt	5.5	1	ug/g dry	5.4			1.2	30	
Copper	13.6	5	ug/g dry	13.6			0.4	30	
Lead	10.4	1	ug/g dry	10.4			0.4	30	
Molybdenum	ND	1	ug/g dry	1.3			0.0	30	
Nickel	16.0	5	ug/g dry	15.9			0.5	30	
Selenium	1.7	1	ug/g dry	ND			0.0	30	
Silver	ND	0.3	ug/g dry	ND			0.0	30	
Thallium	ND	1	ug/g dry	ND			0.0	30	
Uranium	ND	1	ug/g dry	ND			0.0	30	
Vanadium	24.6	10	ug/g dry	25.1			1.9	30	
Zinc	44.6	20	ug/g dry	44.0			1.3	30	
Physical Characteristics									
% Solids	87.0	0.1	% by Wt.	87.0			0.0	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND			0.0	50	
Surrogate: Toluene-d8	*3.18*		*ug/g dry*		*81.8*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	182	7	ug/g		91.0	80-120			
F2 PHCs (C10-C16)	125	4	ug/g	ND	116	60-140			
F3 PHCs (C16-C34)	294	8	ug/g	71	100	60-140			
F4 PHCs (C34-C50)	186	6	ug/g	17	113	60-140			
F4G PHCs (gravimetric)	830	50	ug/g		83.0	80-120			
Metals									
Antimony	37.8		ug/L	ND	74.6	70-130			
Arsenic	42.0		ug/L	1.3	81.5	70-130			
Barium	87.2		ug/L	39.1	96.2	70-130			
Beryllium	48.5		ug/L	ND	96.5	70-130			
Boron	47.8		ug/L	ND	88.1	70-130			
Cadmium	40.6		ug/L	ND	81.0	70-130			
Chromium	53.5		ug/L	6.9	93.2	70-130			
Cobalt	49.6		ug/L	2.2	94.9	70-130			
Copper	51.9		ug/L	5.4	92.9	70-130			
Lead	52.5		ug/L	4.2	96.6	70-130			
Molybdenum	38.4		ug/L	ND	75.8	70-130			
Nickel	53.3		ug/L	6.4	93.9	70-130			
Selenium	40.1		ug/L	ND	79.7	70-130			
Silver	31.7		ug/L	ND	63.3	70-130			QM-07
Thallium	48.3		ug/L	ND	96.5	70-130			
Uranium	49.3		ug/L	ND	97.9	70-130			
Vanadium	56.8		ug/L	10.0	93.5	70-130			
Zinc	57.3		ug/L	ND	79.4	70-130			
Volatiles									
Benzene	3.61	0.02	ug/g		90.4	60-130			
Ethylbenzene	3.20	0.05	ug/g		80.0	60-130			
Toluene	2.74	0.05	ug/g		68.6	60-130			
m,p-Xylenes	6.30	0.05	ug/g		78.8	60-130			
o-Xylene	3.01	0.05	ug/g		75.2	60-130			
Surrogate: Toluene-d8	*2.36*		*ug/g*		*73.8*	*50-140*			

Qualifier Notes:

Sample Qualifiers :

1 : GC-FID signal did not return to baseline by C50

QC Qualifiers :

QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

QR-04 : Duplicate results exceeds RPD limits due to non-homogeneous matrix.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

Paracel ID: 1725371

PARACEL LABORATORIES LTD. | TRUSTED. RESPONSIVE. RELIABLE.

e: paracel@paracellabs.com

Chain of Custody (Lab Use Only) Nº 113764

Client Name: Amec Foster Wheeler	Project Reference: TP113112
Contact Name: Kelly Patterson	Quote #: Tier 2
Address: 3300 Merritville Hwy Thorold, ON, L2V 4Y6	PO #:
Telephone: (905)687-1616	Email Address: kelly.patterson@amecfw.com

Turnaround Time: ☐ 1 Day ☐ 3 Day ☐ 2 Day ☒ Regular Date Required: _____

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 1 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: _____ ☐ Other: _____

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Paracel Order Number: 1725371 - Soil, 1725375 - TCLP

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	EC	SAR	pH	Required Analyses
1	TP1-1	S		1	June 2017	9:10				X				X	X	X	-250mL-
2	1-2					9:14											
3	1-3					9:20											
4	1-4					9:24				X				X	X	X	-250mL-
5	TP2-1					10:13											
6	TP2-2					10:20											
7	TP3-1					12:48				X				X	X	X	-250mL-
8	3-2					12:59											
9	TP4-1					1:18				X				X	X	X	-250mL-
10	4-2					1:25											

Comments: Covered by the terms + conditions of the agreement #SNF07-003.
Hold remaining samples for potential future analyses.

Method of Delivery: P/U.

Relinquished By (Sign):	Received by Driver/Depot: B-Barton	Received at Lab:	Verified By:
Relinquished By (Print): Deanna Gemmell	Date/Time: June 21/17 3:05pm	Date/Time: 06/22/17 10:20	Date/Time: 06/22/17 11:26a
Date/Time: June 21/17	Temperature: 12°C	Temperature: 6.6°C	pH Verified [ ] By:

Paracel ID: 1725371

PARACEL LABORATORIES LTD. | TRUSTED. RESPONSIVE. RELIABLE.

e: paracel@paracellabs.com

Chain of Custody (Lab Use Only)

№ 113765

Client Name: Amec FW	Project Reference: TC113112	**Turnaround Time:**
Contact Name: Kelly Patterson	Quote #: Tier 2	☐ 1 Day ☐ 3 Day
Address: 3300 Merritville Hwy, Thorold, ON, L2V 4Y6	PO #:	☐ 2 Day ☒ Regular
Telephone: (905) 687-0616	Email Address: kelly.patterson@amecfw.com	Date Required:

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 1 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: ☐ Other:

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Paracel Order Number: 1725371 - Soil, 1725375 - TCLP

Required Analyses

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	EC	SAR	pH				
1	TP5-1	S		1	June 20/17	12:30				X				X	X	X	- 250mL -			✓
2	5-2			↓		12:40														
3	TP6-1					1:55				X				X	X	X	- 250mL -			✓
4	6-2			↓		2:00														
5	TP7-1			2		3:25	X			X				X	X	X	- 250mL + vial -			✓
6	7-2			↓		3:30														
7	TP8-1			↓		1:05	X			X				X	X	X	- 250mL + vial -			✓
8	8-2			↓		1:10														
9	TP9-1			↓		3:40	X			X				X	X	X	- 250mL + vial -			✓
10	TP10-1			↓		1:30	X			X				X	X	X	↓			✓

Method of Delivery: P/U.

Comments: See pg 1
→ Vial reads SH 8-2. KW

Relinquished By (Sign):	Received by Driver/Depot: B. Bart	Received at Lab:	Verified By:
Relinquished By (Print): Deanna Gammell	Date/Time: June 21/17 3:05pm	Date/Time: 06/22/17 10:50am	Date/Time: 06/22/17 11:26
Date/Time: June 21/17	Temperature: 13°C	Temperature: 6.8°C	pH Verified [ ] By:

Paracel ID: 1725371

PARACEL LABORATORIES LTD. | TRUSTED. RESPONSIVE. RELIABLE.

e: paracel@paracellabs.com

Chain of Custody (Lab Use Only) Nº 113766

Page 3 of 4

Client Name: Amec Foster Wheeler	Project Reference: TP113112	**Turnaround Time:**
Contact Name: Kelly Patterson	Quote #: Tier 2	☐ 1 Day ☐ 3 Day
Address: 3300 Merritville Hwy Thorold, ON L2V 4Y6	PO #:	☐ 2 Day ☒ Regular
Telephone: (905) 687-6006	Email Address: Kelly.Patterson@amecfw.com	Date Required:

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 1 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: ☐ Other:

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Paracel Order Number: 1725371 - Soil, 1725375 - TCLP

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	EC	SAR	pH	
1	TP10-2	S		2	June 2017	1:40											(vial marked BB TP 10-3)
2	10-3					1:50											
3	TP11-1					3:00	X			X				X	X	X	-250 mL vial - ✓
4	11-2					3:10											
5	TP12-1					2:10	X			X				X	X	X	- 250 mL vial - ✓
6	TP13-1					2:40	X			X				X	X	X	- 250 mL + vial - ✓
7	13-2					2:45											
8	TP14-1					2:56	X			X				X	X	X	- 250 mL + vial - ✓
9	14-2					3:00											
10	Dup-1	↓		1	↓	—											

Comments: see page 1

Method of Delivery: P/U

Relinquished By (Sign):	Received by Driver/Depot: B. Bacon	Received at Lab:	Verified By:
Relinquished By (Print): Deanna Gemmell	Date/Time: June 21/17 3:05pm	Date/Time: 06/22/17 10:30	Date/Time: 06/22/17 11:26
Date/Time: June 21/17 13:00	Temperature: 13°C.	Temperature: 0.8 °C	pH Verified [ ] By:

Chain of Custody (Env) - Rev 0.7 Feb. 2016

PARACEL LABORATORIES LTD. | TRUSTED . RESPONSIVE . RELIABLE .

Paracel ID: 1725371

Chain of Custody (Lab Use Only) № 110791

Page 4 of 4

Client Name: Amec Foster Wheeler	Project Reference: TP113112	**Turnaround Time:**
Contact Name: Kelly Patterson	Quote #: Tier 2	☐ 1 Day ☐ 3 Day
Address: 3300 Merritville Hwy Thorold, ON, L2V 4Y6	PO #:	☐ 2 Day ☐ Regular
Telephone: (905) 687-7776	Email Address: kelly.patterson@amecfw.com	Date Required:

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 1 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: ☐ Other:

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Paracel Order Number: 1725371 - Soil, 1725375 - TCLP

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	Required Analyses: PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	TCLP Inorganics	TCLP PCBs	TCLP Metals	TCLP VOCs
1	Dup-2	S		1	June 2017	—											
2	Dup-3	↓		2	↓	—											
3	~~Composite BH5-1 & BH6-1~~																
4	Composite TP7-1 & TP10-1													X	X	X	X
5	Composite TP11-1 & TP14-1													X	X	X	X
6																	
7																	
8																	
9																	
10																	

Comments: See page 1 - ~~Composit~~ Analyze ~~samples from BH5-1 & BH6-1 for pack~~ - Analyze TP7-1 and TP10-1 as indicated on page 2, then composite TP7-1 and TP10-1 for 1 TCLP analysis
- Analyze TP11-1 and TP14-1 as indicated on page 3, then composite TP11-1 and TP14-1 for 1 TCLP analysis
- TCLP analysis to meet MNSL requirements

Method of Delivery: P/U

Relinquished By (Sign):	Received by Driver/Depot: B Baxter	Received at Lab:	Verified By:
Relinquished By (Print): Jeanna Connell	Date/Time: Jun 21/17 3:05pm	Date/Time: 06/22/17 10:50am	Date/Time: 06/22/17 11:26am
Date/Time: June 21/17	Temperature: 14°C	Temperature: 6.5 °C	pH Verified [ ] By:

PARACEL LABORATORIES LTD.
TRUSTED. RESPONSIVE. RELIABLE.

300 - 2319 St. Laurent Blvd
Ottawa, ON, K1G 4J8
1-800-749-1947
www.paracellabs.com

Certificate of Analysis

Amec Foster Wheeler (Thorold)

3300 Merrittville Hwy, Unit 5
Thorold, ON L2V 4Y6
Attn: Kelly Patterson

Client PO:
Project: TP113112
Custody: 110791

Report Date: 27-Jun-2017
Order Date: 21-Jun-2017

Order #: 1725375

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1725375-01	Composite TP7-1 & TP10-1
1725375-02	Composite TP11-1 & TP14-1

Approved By:

Dale Robertson, BSc
Laboratory Director

Any use of these results implies your agreement that our total liabilty in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

Certificate of Analysis
Client: Amec Foster Wheeler (Thorold)
Client PO:

Report Date: 27-Jun-2017
Order Date: 21-Jun-2017
Project Description: TP113112

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
REG 558 - Cyanide	MOE E3015- Auto Colour	26-Jun-17	26-Jun-17
REG 558 - Fluoride	EPA 340.2 - ISE	26-Jun-17	26-Jun-17
REG 558 - Mercury by CVAA	EPA 7470A - Cold Vapour AA	24-Jun-17	24-Jun-17
REG 558 - Metals, ICP-MS	EPA 6020 - Digestion - ICP-MS	26-Jun-17	27-Jun-17
REG 558 - NO3/NO2	EPA 300.1 - IC	26-Jun-17	26-Jun-17
REG 558 - PCBs	EPA 608 - GC-ECD	26-Jun-17	26-Jun-17
REG 558 - VOCs	EPA 624 - P&T GC-MS	27-Jun-17	27-Jun-17
Solids, %	Gravimetric, calculation	26-Jun-17	26-Jun-17

Certificate of Analysis

Client: Amec Foster Wheeler (Thorold)

Client PO:

Report Date: 27-Jun-2017

Order Date: 21-Jun-2017

Project Description: TP113112

	Client ID:	Composite TP7-1 & TP10-1	Composite TP11-1 & TP14-1	-	-
	Sample Date:	20-Jun-17	20-Jun-17	-	-
	Sample ID:	1725375-01	1725375-02	-	-
	MDL/Units	Soil	Soil	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	89.2	84.4	-	-
EPA 1311 - TCLP Leachate Inorganics					
Arsenic	0.05 mg/L	<0.05	<0.05	-	-
Barium	0.05 mg/L	0.37	0.41	-	-
Boron	0.05 mg/L	0.07	0.06	-	-
Cadmium	0.01 mg/L	<0.01	<0.01	-	-
Chromium	0.05 mg/L	<0.05	<0.05	-	-
Lead	0.05 mg/L	<0.05	<0.05	-	-
Mercury	0.005 mg/L	<0.005	<0.005	-	-
Selenium	0.05 mg/L	<0.05	<0.05	-	-
Silver	0.05 mg/L	<0.05	<0.05	-	-
Uranium	0.05 mg/L	<0.05	<0.05	-	-
Fluoride	0.05 mg/L	0.15	0.15	-	-
Nitrate as N	1 mg/L	<1	<1	-	-
Nitrite as N	1 mg/L	<1	<1	-	-
Cyanide, free	0.02 mg/L	<0.02	<0.02	-	-
EPA 1311 - TCLP Leachate Organics					
Benzene	0.005 mg/L	<0.005	<0.005	-	-
Carbon Tetrachloride	0.005 mg/L	<0.005	<0.005	-	-
Chlorobenzene	0.004 mg/L	<0.004	<0.004	-	-
Chloroform	0.006 mg/L	<0.006	<0.006	-	-
1,2-Dichlorobenzene	0.004 mg/L	<0.004	<0.004	-	-
1,4-Dichlorobenzene	0.004 mg/L	<0.004	<0.004	-	-
1,2-Dichloroethane	0.005 mg/L	<0.005	<0.005	-	-
1,1-Dichloroethylene	0.006 mg/L	<0.006	<0.006	-	-
Methyl Ethyl Ketone (2-Butanone)	0.30 mg/L	<0.30	<0.30	-	-
Methylene Chloride	0.04 mg/L	<0.04	<0.04	-	-
Tetrachloroethylene	0.005 mg/L	<0.005	<0.005	-	-
Trichloroethylene	0.004 mg/L	<0.004	<0.004	-	-
Vinyl chloride	0.005 mg/L	<0.005	<0.005	-	-
4-Bromofluorobenzene	Surrogate	105%	109%	-	-
Dibromofluoromethane	Surrogate	120%	119%	-	-
Toluene-d8	Surrogate	88.4%	86.9%	-	-
PCBs, total	0.003 mg/L	<0.003	<0.003	-	-
Decachlorobiphenyl	Surrogate	73.8%	74.3%	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
EPA 1311 - TCLP Leachate Inorganics									
Arsenic	ND	0.05	mg/L						
Barium	ND	0.05	mg/L						
Boron	ND	0.05	mg/L						
Cadmium	ND	0.01	mg/L						
Chromium	ND	0.05	mg/L						
Lead	ND	0.05	mg/L						
Mercury	ND	0.005	mg/L						
Selenium	ND	0.05	mg/L						
Silver	ND	0.05	mg/L						
Uranium	ND	0.05	mg/L						
Fluoride	ND	0.05	mg/L						
Nitrate as N	ND	1	mg/L						
Nitrite as N	ND	1	mg/L						
Cyanide, free	ND	0.02	mg/L						
EPA 1311 - TCLP Leachate Organics									
Benzene	ND	0.005	mg/L						
Carbon Tetrachloride	ND	0.005	mg/L						
Chlorobenzene	ND	0.004	mg/L						
Chloroform	ND	0.006	mg/L						
1,2-Dichlorobenzene	ND	0.004	mg/L						
1,4-Dichlorobenzene	ND	0.004	mg/L						
1,2-Dichloroethane	ND	0.005	mg/L						
1,1-Dichloroethylene	ND	0.006	mg/L						
Methyl Ethyl Ketone (2-Butanone)	ND	0.30	mg/L						
Methylene Chloride	ND	0.04	mg/L						
Tetrachloroethylene	ND	0.005	mg/L						
Trichloroethylene	ND	0.004	mg/L						
Vinyl chloride	ND	0.005	mg/L						
Surrogate: 4-Bromofluorobenzene	*0.732*		*mg/L*		*106*	*83-134*			
Surrogate: Dibromofluoromethane	*0.801*		*mg/L*		*116*	*78-124*			
Surrogate: Toluene-d8	*0.606*		*mg/L*		*88.1*	*76-118*			
PCBs, total	ND	0.003	mg/L						
Surrogate: Decachlorobiphenyl	*0.0152*		*mg/L*		*75.9*	*62-138*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
EPA 1311 - TCLP Leachate Inorganics									
Arsenic	ND	0.05	mg/L	ND			0.0	29	
Barium	0.415	0.05	mg/L	0.401			3.2	34	
Boron	0.057	0.05	mg/L	0.059			2.3	33	
Cadmium	ND	0.01	mg/L	ND			0.0	33	
Chromium	ND	0.05	mg/L	ND			0.0	32	
Lead	ND	0.05	mg/L	ND			0.0	32	
Mercury	ND	0.005	mg/L	ND			0.0	30	
Selenium	ND	0.05	mg/L	ND			0.0	28	
Silver	ND	0.05	mg/L	ND			0.0	28	
Uranium	ND	0.05	mg/L	ND			0.0	27	
Fluoride	0.41	0.05	mg/L	0.41			0.4	20	
Nitrate as N	ND	1	mg/L	ND				20	
Nitrite as N	ND	1	mg/L	ND				20	
Cyanide, free	ND	0.02	mg/L	ND				20	
EPA 1311 - TCLP Leachate Organics									
Benzene	ND	0.005	mg/L	ND				25	
Carbon Tetrachloride	ND	0.005	mg/L	ND				25	
Chlorobenzene	ND	0.004	mg/L	ND				25	
Chloroform	ND	0.006	mg/L	ND				25	
1,2-Dichlorobenzene	ND	0.004	mg/L	ND				25	
1,4-Dichlorobenzene	ND	0.004	mg/L	ND				25	
1,2-Dichloroethane	ND	0.005	mg/L	ND				25	
1,1-Dichloroethylene	ND	0.006	mg/L	ND				25	
Methyl Ethyl Ketone (2-Butanone)	ND	0.30	mg/L	ND				25	
Methylene Chloride	ND	0.04	mg/L	ND				25	
Tetrachloroethylene	ND	0.005	mg/L	ND				25	
Trichloroethylene	ND	0.004	mg/L	ND				25	
Vinyl chloride	ND	0.005	mg/L	ND				25	
Surrogate: 4-Bromofluorobenzene	*0.730*		*mg/L*		*106*	*83-134*			
Surrogate: Dibromofluoromethane	*0.808*		*mg/L*		*117*	*78-124*			
Surrogate: Toluene-d8	*0.595*		*mg/L*		*86.5*	*76-118*			
PCBs, total	ND	0.003	mg/L	ND				30	
Surrogate: Decachlorobiphenyl	*0.0148*		*mg/L*		*74.2*	*62-138*			
Physical Characteristics									
% Solids	88.3	0.1	% by Wt.	88.4			0.1	25	

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
EPA 1311 - TCLP Leachate Inorganics									
Arsenic	42.7		ug/L	0.352	84.7	83-119			
Barium	82.0		ug/L	40.1	83.7	83-116			
Boron	53.4		ug/L	5.86	95.0	71-128			
Cadmium	39.0		ug/L	ND	78.0	78-119			
Chromium	48.2		ug/L	2.41	91.5	80-124			
Lead	46.1		ug/L	0.963	90.2	77-126			
Selenium	40.7		ug/L	0.697	79.9	81-125			QM-07
Silver	38.0		ug/L	ND	75.8	70-128			
Uranium	49.1		ug/L	0.174	97.8	70-131			
Fluoride	0.95	0.05	mg/L	0.41	108	70-130			
Nitrate as N	9	1	mg/L	ND	89.0	81-112			
Nitrite as N	10	1	mg/L	ND	95.1	76-107			
Cyanide, free	0.032	0.02	mg/L		106	60-136			
EPA 1311 - TCLP Leachate Organics									
Benzene	0.035	0.005	mg/L		88.6	55-141			
Carbon Tetrachloride	0.050	0.005	mg/L		124	49-149			
Chlorobenzene	0.029	0.004	mg/L		72.9	64-137			
Chloroform	0.038	0.006	mg/L		94.7	58-138			
1,2-Dichlorobenzene	0.031	0.004	mg/L		77.9	60-150			
1,4-Dichlorobenzene	0.029	0.004	mg/L		72.6	63-132			
1,2-Dichloroethane	0.037	0.005	mg/L		92.7	50-140			
1,1-Dichloroethylene	0.035	0.006	mg/L		88.1	43-153			
Methyl Ethyl Ketone (2-Butanone)	0.090	0.30	mg/L		90.0	26-153			
Methylene Chloride	0.029	0.04	mg/L		72.8	58-149			
Tetrachloroethylene	0.027	0.005	mg/L		67.8	51-145			
Trichloroethylene	0.040	0.004	mg/L		100	52-135			
Vinyl chloride	0.031	0.005	mg/L		78.7	31-159			
Surrogate: 4-Bromofluorobenzene	*0.0871*		*mg/L*		*109*	*83-134*			
PCBs, total	0.038	0.003	mg/L	ND	94.0	86-145			

Qualifier Notes:

QC Qualifiers :

QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

PARACEL LABORATORIES LTD. | TRUSTED . RESPONSIVE . RELIABLE .

Paracel ID: 1725375

Chain of Custody (Lab Use Only)
№ 113765

Page 2 of 4

Client Name: Arrec FW	Project Reference: TB113112	**Turnaround Time:**
Contact Name: Kelly Patterson	Quote #: TIER 2	☐ 1 Day ☐ 3 Day
Address: 3300 Hurontario Hwy. Mississauga, ON, L5V 4Y6	PO #:	☐ 2 Day ☒ Regular
Telephone: (905) 567-4444	Email Address: kelly.patterson@arrecfw.com	Date Required:

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 1 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: ☐ Other:

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Required Analyses

Paracel Order Number: 1725375 - YCV

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4 + BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	EC	SAR	pH				
1	TP5-1	S		1	3/Jun/17	12:30				X				X	X	X	- 28	mL	-	1
2	5-2			↓		12:40														
3	TP6-1					1:55				X				X	X	X	- 28	mL	-	1
4	6-2			↓		2:00														
5	TP7-1			2		3:25	X			X				X	X	X	- 28	mL + vial	-	✓
6	7-2			1		3:30														
7	TP8-1			1		1:05	X			X				X	X	X	- 28	mL + vial	-	✓
8	8-2			↓		1:10														
9	TP9-1			↓		3:40	X			X				X	X	X	- 28	mL + vial	-	✓
10	TP10-1					1:30	X			X				X	X	X		↓		✓

Comments: See pg 1
→ Vial reads on TP8-1. KV

Method of Delivery: PU

Relinquished By (Sign):	Received by Driver/Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Dean Gemmell	Date/Time: Jun 2/17 3:05pm	Date/Time: 06/02/17 10:50	Date/Time: 06/02/17 4:26
Date/Time: June 2/17	Temperature: 13°C	Temperature: 6.8 °C	pH Verified ☐ By:

Chain of Custody (Env) - Rev 0.7 Feb. 2016

PARACEL LABORATORIES LTD.

TRUSTED . RESPONSIVE . RELIABLE .

Paracel ID: 1725375

Chain of Custody (Lab Use Only)
№ 113766

Page 3 of 4

Client Name: Arrow Foster Limited	Project Reference: TP11312
Contact Name: Kelly Patterson	Quote #: Tier 2
Address: 3500 Merritville Hwy, Thorold, ON L2V 4Y6	PO #:
Telephone: (905) 687-1101	Email Address: Kelly.patterson@arrowfw.com

Turnaround Time:
☐ 1 Day ☐ 3 Day
☐ 2 Day ☑ Regular
Date Required:

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 1 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: ☐ Other:

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Required Analyses

Paracel Order Number: 1725375

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4 + BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	EC	SAR	pH	
1	TP10-2	S		2	June 2017	1:40											(Vial marked BH 10-3)
2	10-3					1:50											
3	TP11-1					3:00	X			X				X	X	X	250 mL total
4	11-2					3:10											
5	TP12-1					2:10	X			X				X	X	X	250 mL total
6	TP13-1					2:40	X			X				X	X	X	250 mL total
7	13-2					2:45											
8	TP14-1					2:50	X			X				X	X	X	250 mL total
9	14-2			↓		3:00											
10	DUP-1	↓		1	↓	—											

Comments: See page 1

Method of Delivery: PUL

Relinquished By (Sign):	Received by Driver/Depot: D. Dec	Received at Lab:	Verified By:
Relinquished By (Print): Dave Gerrell	Date/Time: June 21/17 3:25pm	Date/Time: 06/22/17 10:8m	Date/Time: 06/22/17 11:16
Date/Time: June 21/17 13:00	Temperature: 13°C.	Temperature: 6.8	pH Verified: ☐ By:

PARACEL LABORATORIES LTD.

TRUSTED . RESPONSIVE . RELIABLE .

Paracel ID: 1725375

Chain of Custody
(Lab Use Only)
№ 110791

Page 4 of 4

Client Name: Aaron Foster Wheeler	Project Reference: TP113112	**Turnaround Time:**
Contact Name: Kelly Patterson	Quote #: Tier 2	☐ 1 Day ☐ 3 Day
Address: 3300 Merritville Hwy Unit 6, Unit 6, L8V 4Y6	PO #	☐ 2 Day ☐ Regular
Telephone: (905) 687-6616	Email Address: kelly.patterson@aecom.com	Date Required:

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 1 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: ☐ Other:

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Paracel Order Number: 1725375

Required Analyses

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	TCLP Inorganics	TCLP Metals	TCLP Hg	TCLP VOCs
1	Dup-2	S		1	Jan 21/17	—											
2	Dup-3	↓		2	↓	—											
3	~~Composite BH5-1 & BH6-1~~													X	X	X	X
4	Composite TP7-1 & TP10-1													X	X	X	X
5	Composite TP11-1 & TP14-1																
6																	
7																	
8																	
9																	
10																	

Comments: See page 1 - ~~Correct~~ Analyze samples from BH5-1 & BH6-1 for metals - Analyze TP7-1 and TP10-1 as indicated on page 2, then composite TP7-1 and TP10-1 for 1 TCLP analysis - Analyze TP11-1 and TP14-1 as indicated on page 3, then composite TP11-1 and TP14-1 for 1 TCLP analysis - TCLP analysis to meet MMSL requirements

Method of Delivery: [illegible]

Relinquished By (Sign):	Received by Driver/Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Aaron Connell	Date/Time: Jan 21/17 3:05pm	Date/Time: 01/22/17 10:50	Date/Time: 01/24/17 11:26
Date/Time: Jan 21/17	Temperature: 1.4 °C	Temperature: 6.5 °C	pH Verified [ ] By:

Appendix B: Limitations

Limitations

1. The work performed in the preparation of this report and the conclusions presented are subject to the following:

   (a) The Standard Terms and Conditions which form a part of Amec Foster Wheeler's proposal dated June 2, 2017 and authorization to proceed from the Client on June 15, 2017;

   (b) The Scope of Services;

   (c) Time and Budgetary limitations as described in our Contract; and,

   (d) The Limitations stated herein.

2. No other warranties or representations, either expressed or implied, are made as to the professional services provided under the terms of our Contract, or the conclusions presented.

3. The conclusions presented in this report were based, in part, on visual observations of the site and attendant structures. Our conclusions cannot and are not extended to include those portions of the site or structures which were not reasonably available, in Amec Foster Wheeler's opinion, for direct observation.

4. The environmental conditions at the site were assessed, within the limitations set out above, having due regard for applicable environmental regulations as of the date of the inspection. A review of compliance by past owners or occupants of the site with any applicable local, provincial or federal by-laws, orders-in-council, legislative enactments and regulations was not performed.

5. The site history research included obtaining information from third parties and employees or agents of the owner. No attempt has been made to verify the accuracy of any information provided, unless specifically noted in our report.

6. Where testing was performed, it was carried out in accordance with the terms of our contract providing for testing. Other substances, or different quantities of substances testing for, may be present on site and may be revealed by different of other testing not provided for in our contract.

7. Because of the limitations referred to above, different environmental conditions from those stated in our report may exist. Should such different conditions be encountered, Amec Foster Wheeler must be notified in order that it may determine if modifications to the conclusions in the report are necessary.

8. The utilization of Amec Foster Wheeler's services during the implementation of any remedial measures will allow Amec Foster Wheeler to observe compliance with the conclusions and recommendations contained in the report. Amec Foster Wheeler's involvement will also allow for changes to be made as necessary to suit field conditions as they are encountered.

9. This report is for the sole use of the party to whom it is addressed unless expressly stated otherwise in the report or contract. Any use which any third party makes of the report, in whole or in part, or any reliance thereon, or decisions made based on any information of conclusions in the report, is the sole responsibility of such third party. Amec Foster Wheeler accepts no responsibility whatsoever for damages or loss of any nature or kind suffered by any such third party as a result of actions taken or not taken or decisions made in reliance on the report or anything set out therein.

10. This report is not to be given over to any third party for any purpose whatsoever without the written permission of Amec Foster Wheeler.

11. Provided that the report is still reliable, and less than 12 months old, Amec Foster Wheeler will issue a third-party reliance letter to parties client identifies in writing, upon payment of the then current fee for such letters. All third parties relying on Amec Foster Wheeler's report, by such reliance agree to be bound by our proposal and Amec Foster Wheeler's standard reliance letter. Amec Foster Wheeler's standard reliance letter indicates that in no event shall Amec Foster Wheeler be liable for any damages, howsoever arising, relating to third-party reliance on Amec Foster Wheeler's report. No reliance by any party is permitted without such agreement.