Tier Environmental Ltd
Chadwick House, Warrington Road,
Birchwood, Warrington WA3 6AE
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TE1179GIRL1.0

Watkin Jones and Sons Ltd
3rd Floor,
7-9 Swallow Street,
London,
W1B 4DE

29th January 2021

RE: FREDERICK HOUSE, YORK – SUPPLEMENTARY GROUND INVESTIGATION LETTER REPORT

Tier Environmental was commissioned by Watkin Jones and Sons Ltd to undertake a supplementary ground investigation for a Site referred to as Frederick House, York located at Frederick House, Fulford Road, York, YO10 4EA for the proposed development of student accommodation comprising 7 No. buildings with associated areas of soft landscaping across the Site and a car parking area to the west of the Site.

A previous ground investigation report has been completed by Tier Environmental (Report Ref: TE1179GIR1.1. dated 27th September 2019) which comprised a pre-demolition investigation (prior to the demolition of the Frederick House building). This letter report comprises the post-demolition investigation, as the existing Frederick House has now been demolished and has targeted this previously inaccessible area of the Site. The objectives of this ground investigation were to determine the shallow ground conditions on Site and determine whether significant contamination could have resulted from past land use(s).

Previous Site Investigation findings:

A previous Site Investigation was conducted by Tier Environmental 18th March and 25th March 2019 and comprised:

- Drilling of 4 no. cable percussive boreholes to depths between 18.80m bgl and 19.70m bgl.
- Drilling of 15 No. window sample boreholes to depths between 1.20m bgl and 5.45m bgl.
- Installation of 12 No. groundwater and ground gas monitoring wells.
- Reference to this previous report should be made for full details; however, a summary of the human health and controlled waters risk assessment conclusions is provided below: PAHs were found to exceed their relevant GAC and present a potential risk to human health locally in 1 No of the 13 No. samples tested. Provenance analysis indicated the source of the PAH as being derived from the presence of coal ash within an area of existing soft landscaping in the western area of the Site.
- A single concentration of aromatics >E21-35 was reported in the Made Ground within the northwestern area of the Site that exceeded the respective GAC protective of the proposed residential without homegrown produce land use.
- A total of 2 No. of the 18 No. samples tested for asbestos were found to contain less than 0.1% fibre bundles of Chrysotile.
- A controlled waters risk assessment has demonstrated that the Site does not present a risk to controlled waters.
- In accordance with CIRIA C665, the assessment of the ground gas monitoring data demonstrated a maximum Gas Screening Value of 0.0484l/hr, derived using the carbon dioxide concentration of 4.4%v/v and the flow rate of 1.1l/hr. This placed the Site in a Characteristic Situation 1 – A very low risk scenario in accordance with CIRIA C665 for which ground gas protection measures will not be required.

The remediation strategy conclusions were:

The localised areas of Made Ground soils containing asbestos not proposed to be covered by hardstanding may require either removal from Site or use of a clean cover system to break the dust inhalation pathways. Areas of soils around WS10 which was found to exceed the GAC for dibenzo(ah)anthracene may require either removal from Site or use of a clean cover system. See section 9.2 of the original Ground Investigation report for justifications on why other PAH exceedances (CP2 at 0.40m bgl, WS14 at 0.50m bgl and WS13 at 0.30m bgl) are likely to not pose a potential risk to human health. Active pathways assocated with a localised area of elevated TPH will be broken via the development, under current proposals; however, this should be reassessed if the proposed development layout is amended.

Site Works conducted 11/01/2021

Please find below a summary of the ground conditions encountered during the Site investigation works undertaken on 11th January 2021 along with supplementary risk assessments.

Site investigation works were supervised by a suitably qualified engineer and comprised:

- The excavation of 5 No. machine excavated trial pits (TP101 to TP105) to depths between 3.00m bgl (TP103) and 3.35m bgl (TP102) to determine shallow ground conditions and to obtain samples for geoenvironmental laboratory analysis.

All trial pits were backfilled in reverse order and left slightly mounded to accommodate for any settlement at a later date.

Tier Environmental's standard strata description criteria are compliant with BS EN ISO 14668:2002 and 2004 and BS EN 14689:2003.

Strata Profile

A summary of the strata profile is presented in the table below.

Table 1. Strata Profile.

Strata		Locations Recorded	Depths Recorded	Thickness	Description
Made Ground	Made Ground 1 – Concrete	TP103, TP104 and TP105.	From ground level to depths between 0.28m bgl (TP104) and 0.35m bgl (TP105).	Between 0.28m (TP104) and 0.35m (TP105).	Grey concrete.
	Made Ground 2 – Concrete sub-base	TP105.	0.35m bgl – 0.60m bgl (TP105).	0.25m (TP105).	Light grey, fine to coarse, angular gravel of limestone.
	Made Ground 3 – Cohesive	TP101 and TP102	From ground level to depths between 2.20m bgl (TP101) and 2.50m bgl (TP102).	Between 2.20m (TP101) and 2.50m (TP102).	Soft, dark brown, very sandy, very gravelly clay. Sand is fine to coarse, gravel is fie to coarse, angular to rounded of brick, concrete, sandstone and mudstone with a high cobble content of angular brick.
	Made Ground 4 – Granular	TP103, TP104 and TP105.	From minimum depths between 0.30m bgl (TP103) and 0.60m bgl (TP105) to maximum depths between 2.10m bgl (TP103) and 2.25m bgl (TP105).	Between 1.65m (TP105) and 1.87m (TP104).	Dark brown, clayey, very gravelly, fine to coarse sand. The gravel is fine to coarse, angular to subrounded of brick, concrete , coal, sandstone and mudstone with clods of clay. A moderate cobble content of angular brick and concrete **OR** Dark brown, clayey, sandy to very sandy, fine to coarse, angular to subangular gravel of brick, concrete, asphalt, mudstone, sandstone and clods of clay.
Natural soils - Cohesive		TP101, TP102, TP103 and TP104.	From minimum depths between 2.10m bgl (TP103) and 2.50m bgl (TP102) to maximum depths between 3.10m bgl (TP104) and 3.35m bgl (TP102). However, the base of this unit was not encountered.	Between 0.85m (TP102) and 1.00m (TP101).	Medium to firm consistency, orangish brown and grey, slightly sandy to sandy, slightly gravelly, occasionally silty clay. The sand is fine to coarse, gravel is fine to coarse, subangular to rounded of mudstone, sandstone, coal and clods of clay.

Natural soils – Granular	TP105	Between 2.25m bgl and 3.08m bgl.	0.83m	Orangish brown, slightly gravelly, very clayey dine to coarse sand, the gravel is subangular to rounded, fine to coarse, of coal, quartz, mudstone, sandstone and clods of clay.

Made Ground

Made Ground was encountered in all 5 No. exploratory trial pit locations. TP103 to TP105 had concrete at the surface to depths between 0.28m (TP104) and 0.35m (TP105). A further 3 No. Made Ground types were encountered; a concrete sub-base comprising a light grey, fine to coarse, angular gravel of limestone in TP105 at depths between 0.35m bgl and 0.60m bgl. Cohesive Made Ground encountered in TP101 and TP102 from ground level to depths between 2.20m bgl (TP101) and 2.50m bgl (TP102). Lastly granular Made Ground in TP103, TP104 and TP105 from minimum depths between 0.30m bgl (TP103) and 0.60m bgl (TP105) to maximum depths between 2.10m bgl (TP103) and 2.25m bgl (TP105).

Superficial Natural Soils – Cohesive

Cohesive clay was encountered in TP101 to TP104 From minimum depths between 2.10m bgl (TP103) and 2.50m bgl (TP102) to maximum depths between 3.10m bgl (TP104) and 3.35m bgl (TP102). However, the base of this unit was not encountered.

Superficial Natural Soils – Granular

Granular sand was encountered in TP105 between 2.25m bgl and 3.08m bgl.

Made Ground Contamination (2021 Site Investigation)

Made Ground samples were obtained from all 5 No. trial pits and 5 No. were sent for geoenvironmental analysis at Element Materials Technology (UKAS/MCerts accredited). Samples at 0.60m bgl in TP101, 0.25m bgl in TP102, 1.00m bgl in TP03, 0.50m bgl in TP104 and 1.10mbgl in TP105 were all tested for speciated TPH, asbestos and the standard Tier Environmental Soil Suite (as outlined below):

- Metals and metalloids: Arsenic, cadmium, chromium, mercury, lead, selenium, copper, nickel, and zinc.
- Other inorganics: Ammonia, total sulphate, water soluble sulphate and hardness (as $CaCO_3$).
- Others: Electrical conductivity and pH.

After screening against the relevant generic assessment criteria (LQM Screening Criteria 2014)for the proposed land use (residential without home grown produce), no samples exceeded the GACs with respect to Tier Environmental standard soil suite, Speciated TPH, PAHs. All 5 No. samples were submitted for asbestos screening, of which no asbestos was detected in any of the samples.

Conclusions

The supplementary site investigation has not identified any *additional* areas beneath the former Frederick House that present a potential risk to human health. No significant or gross contamination has been identified that would suggest an increased risk to the controlled waters environment.

As such, the remediation strategy described in the Tier Environmental Ground Investigation Report (Report Ref: TE1179GIR1.1. dated 27th September 2019) remains unchanged as summarised below

- The localised areas of Made Ground soils containing asbestos not proposed to be covered by hardstanding may require either removal from Site or use of a clean cover system to break the dust inhalation pathways. Areas of soils around WS10 which was found to exceed the GAC for dibenzo(ah)anthracene may require either removal from Site or use of a clean cover system. See section 9.2 of the original Ground Investigation report for justifications on why other PAH exceedances (CP2 at 0.40m bgl, WS14 at 0.50m bgl and WS13 at 0.30m bgl) are likely to not pose a potential risk to human health. Active pathways assocated with a localised area of elevated TPH will be broken via the development, under current proposals; however, this should be reassessed if the proposed development layout is amended.

Kind Regards,

For and on behalf of
TIER ENVIRONMENTAL LTD

[redacted]

Eve Rowland MESci (Hons)

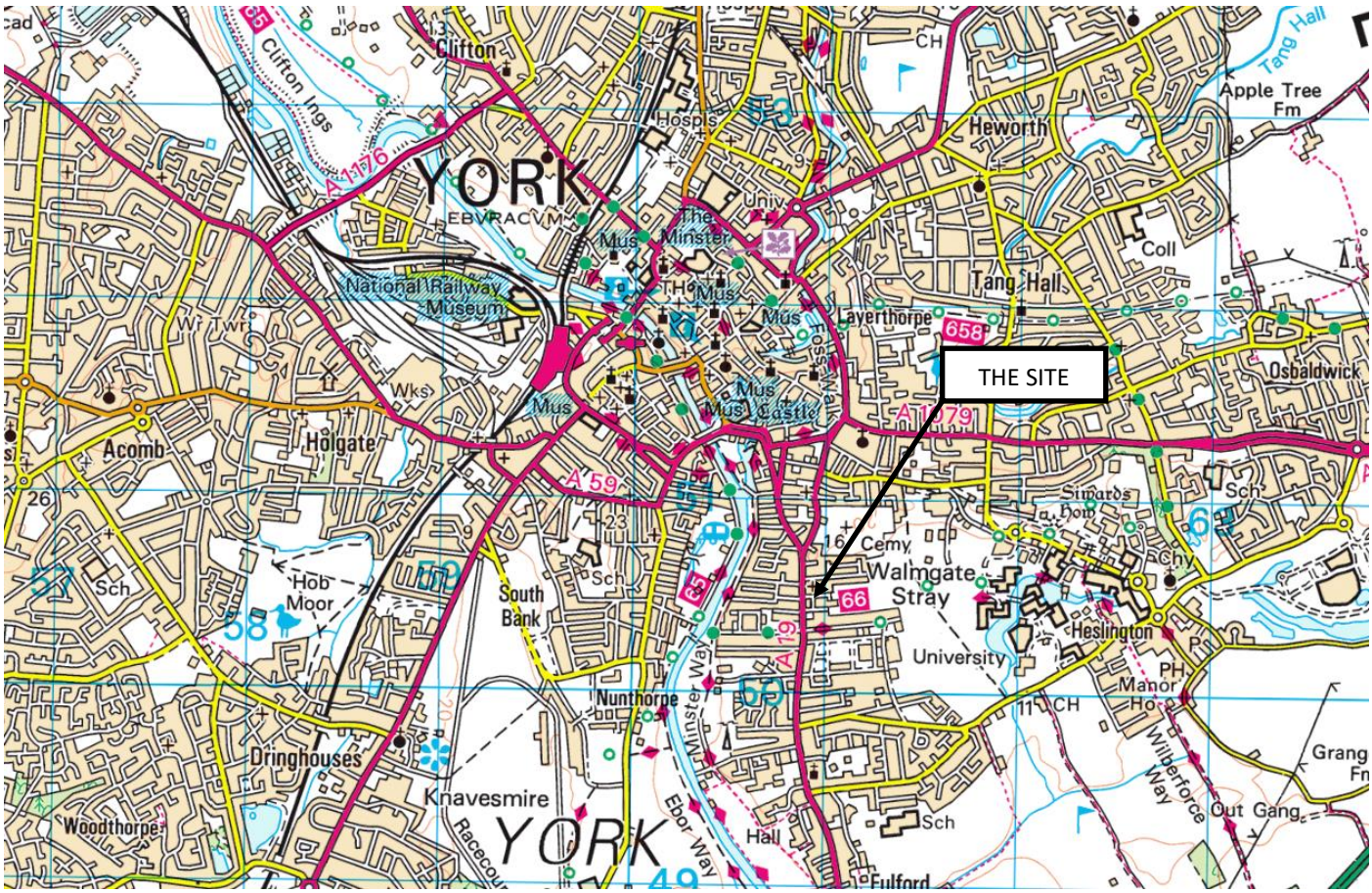
Assistant Geoenvironmental Engineer

Encs.

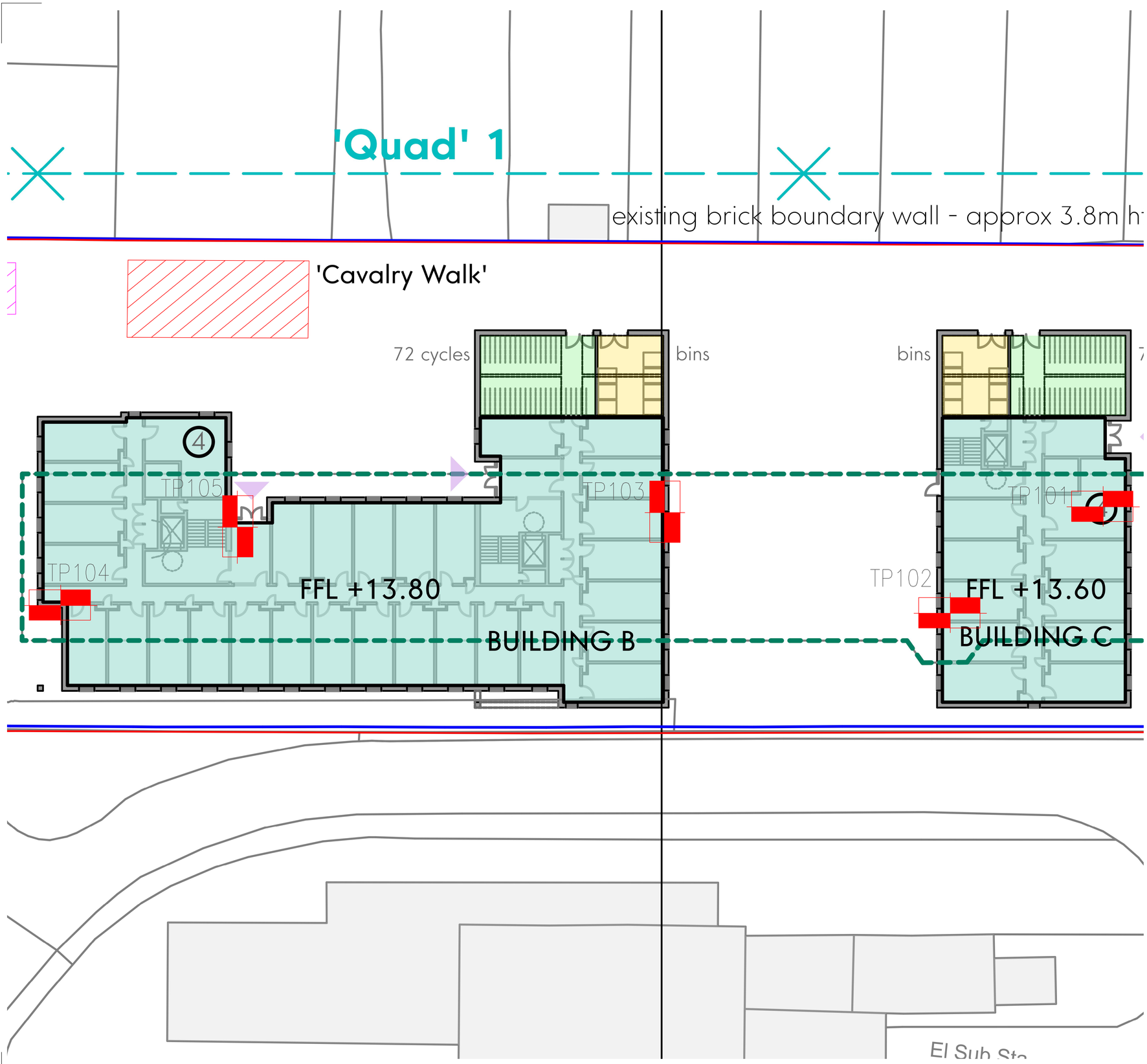
- Site Location Plan.
- Exploratory Hole Location Plan.
- Exploratory Hole Logs.
- Results of Geoenvironmental Laboratory Testing

Contract Number: TE1179
Contract: Frederick House, York
Client: Watkin Jones & Son Limited

Site Location Plan



Scale: NTS	
Drawn by: ER	**Approved: AR**
Drawing Number: TE1179GIRL1.0	



Notes

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTS, ENGINEERS AND SPECIALISTS DRAWINGS TOGETHER WITH THE APPROPRIATE SPECIFICATIONS.
- IT IS THE CONTRACTORS RESPONSIBILITY TO CHECK ALL DIMENSIONS ON SITE. DIMENSIONS MUST NOT BE SCALED FROM THIS DRAWING. ANY DISCREPANCIES TO BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE ARCHITECT IN WRITING.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
- ALL LEVELS ARE IN METRES, UNLESS NOTED OTHERWISE

Trial Pit Location

A	26.01.21	ER EHLP	Appd: AR

Revisions

Status

FINAL

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t: 01925 818388

Client

WATKIN_JONES_AND_SONS_LTD

Project

FREDERICK_HOUSE–YORK

Title

TE1179GIRL2.0

Scale
DNS

Drawn
ER

Revision
A

Date
26.01.2021

Checked
AR

Drawing Ref

TE1179 GIRL2.0

A1

Trial Pit Log

Trialpit No **TP101**

Sheet 1 of 1

Project Name: Frederick House	Project No. TE1179	Co-ords: - Level:	Date 11/01/2021
Location: York		Dimensions (m): Depth 3.20	Scale 1:25
Client: Summix Limited / Watkin Jones and Son			Logged ER

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.60	ES					MADE GROUND: Soft, dark brown, sandy, very gravelly CLAY. Sand is fine to coarse, gravel is fine to coarse, angular to rounded of brick, concrete, sandstone and mudstone with a high cobble content of angular bricks MADE GROUND
	1.55	ES					
	2.30	ES		2.20			Firm, orangish brown, very sandy, slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse, subangular to rounded of coal, sandstone, mudstone and quartz
				3.20			End of pit at 3.20 m

Remarks: 1) Trial pit for geoenvironmental purposes 2) No groundwater encountered 3) Terminated at target depth

Stability: Stable

Trial Pit Log

Trialpit No **TP102**

Sheet 1 of 1

Project Name: Frederick House	Project No. TE1179	Co-ords: - Level:	Date 11/01/2021
Location: York		Dimensions (m): Depth 3.35	Scale 1:25
Client: Summix Limited / Watkin Jones and Son			Logged ER

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.25	ES					MADE GROUND: Soft, dark brown, very sandy, very gravelly CLAY. Sand is fine to coarse, gravely is fine to coarse of subangular brick, ceramic, concrete and mixed natural lithologies with a high cobble content MADE GROUND
	1.80	ES		2.50			Medium consistency, grey, silty, sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to rounded of mudstone, coal, sandstone and clods of clay
	2.70	ES		3.35			End of pit at 3.35 m

1 2 3 4 5

Remarks: 1) Trial pit for geoenvironmental purposes 2) No groundwater encountered 3) Terminated at target depth

Stability: Stable

Trial Pit Log

Trialpit No **TP103**

Sheet 1 of 1

Project Name: Frederick House	Project No. TE1179	Co-ords: - Level:	Date 11/01/2021
Location: York		Dimensions (m): Depth 3.00	Scale 1:25
Client: Summix Limited / Watkin Jones and Son			Logged ER

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
							MADE GROUND: Concrete MADE GROUND
				0.30			MADE GROUND: Dark brown, clayey, sandy to very sandy, fine to coarse, angular to subangular GRAVEL of brick, concrete, asphalt, mudstone, sandstone and clods of clay MADE GROUND *frequent concrete slab sections, metal and whole bricks. Relic services in made ground*
	1.75	ES					
				2.10			Firm, orangish brown, very sandy, slightly gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse, subangular to rounded of coal, sandstone, mudstone and quartz
	2.50	ES					
				3.00			End of pit at 3.00 m

Remarks: 1) Trial pit for geoenvironmental purposes 2) No groundwater encountered 3) Terminated at target depth

Stability: Stable

Trial Pit Log

Trialpit No
TP104
Sheet 1 of 1

Project Name: Frederick House	Project No. TE1179	Co-ords: - Level:	Date 11/01/2021
Location: York		Dimensions (m): Depth 3.10	Scale 1:25
Client: Summix Limited / Watkin Jones and Son			Logged ER

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
							MADE GROUND: Concrete MADE GROUND
				0.28			MADE GROUND: Dark brown, clayey, very sandy, fine to coarse, angular to subangular GRAVEL of brick, concrete, ceramic, sandstone, mudstone and clods of clay. A high cobble content of angular brick and concrete MADE GROUND
	1.00	ES					
				2.15			Medium consistency, grey, silty, sandy, slightly gravelly CLAY. Gravel is fine to coarse, subangular to rounded of mudstone, coal, sandstone and clods of clay
	2.40	ES					
				3.10			End of pit at 3.10 m

1
2
3
4
5

Remarks: 1) Trial pit for geoenvironmental purposes 2) No groundwater encountered 3) Terminated at target depth

Stability: Stable

Trial Pit Log

Trialpit No **TP105**

Sheet 1 of 1

Project Name: Frederick House	Project No. TE1179	Co-ords: - Level:	Date 11/01/2021
Location: York		Dimensions (m): Depth 3.08	Scale 1:25
Client: Summix Limited / Watkin Jones and Son			Logged ER

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.50	ES		0.35			MADE GROUND: Concrete MADE GROUND
				0.60			MADE GROUND: Concrete subbase MADE GROUND
	1.10	ES					MADE GROUND: Dark brown, clayey, very gravelly, fine to coarse SAND. Gravel is fine to coarse, angular to subrounded of brick, concrete, coal, sandstone and mudstone with clods of CLAY. A moderate cobble content of angular brick and concrete MADE GROUND
	2.30	ES		2.25			Orangish brown, slightly gravelly, very clayey SAND. Gravel is subangular to rounded, fine to coarse of coal, quartz, sandstone, mudstone and clods of clay
				3.08			End of pit at 3.08 m

Remarks: 1) Trial pit for geoenvironmental purposes 2) No groundwater encountered 3) Terminated at target depth

Stability: Stable

Element Materials Technology
Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

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Tier Environmental
Suite 513, Chadwick House
Warrington Rd
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WA3 6AE

Attention :	Eve Rowland
Date :	19th January, 2021
Your reference :	TE1179
Our reference :	Test Report 21/398 Batch 1
Location :	Frederick House York
Date samples received :	14th January, 2021
Status :	Final report
Issue :	1

Thirteen samples were received for analysis on 14th January, 2021 of which five were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

[redacted]

Hayley Prowse
Project Manager

Element Materials Technology

Client Name: Tier Environmental
Reference: TE1179
Location: Frederick House York
Contact: Eve Rowland
EMT Job No: 21/398

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	10-12	24-26	29-30							LOD/LOR	Units	Method No.
Sample ID	TP101	TP102	TP104	TP105									
Depth	0.60	0.25	1.00	0.50									
COC No / misc													
Containers	V J	V J	V J	V J									
Sample Date	11/01/2021	11/01/2021	11/01/2021	11/01/2021									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	14/01/2021	14/01/2021	14/01/2021	14/01/2021									
Arsenic #	6.3	6.3	4.6	3.8							<0.5	mg/kg	TM30/PM15
Cadmium #	0.2	<0.1	0.1	<0.1							<0.1	mg/kg	TM30/PM15
Chromium #	42.5	68.4	46.7	373.2$_{AA}$							<0.5	mg/kg	TM30/PM15
Copper #	27	21	20	13							<1	mg/kg	TM30/PM15
Lead #	68	46	59	8							<5	mg/kg	TM30/PM15
Mercury #	0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM30/PM15
Nickel #	12.1	24.3	13.2	15.0							<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	<1	<1							<1	mg/kg	TM30/PM15
Total Sulphate as SO4 #	815	190	466	3093							<50	mg/kg	TM50/PM29
Zinc #	57	80	50	34							<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	0.06	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Acenaphthylene	0.07	<0.03	0.09	<0.03							<0.03	mg/kg	TM4/PM8
Acenaphthene #	0.07	<0.05	<0.05	<0.05							<0.05	mg/kg	TM4/PM8
Fluorene #	0.08	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.76	<0.03	0.55	0.05							<0.03	mg/kg	TM4/PM8
Anthracene #	0.24	<0.04	0.23	<0.04							<0.04	mg/kg	TM4/PM8
Fluoranthene #	1.24	<0.03	1.41	0.09							<0.03	mg/kg	TM4/PM8
Pyrene #	1.01	<0.03	1.16	0.08							<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.65	<0.06	0.97	0.06							<0.06	mg/kg	TM4/PM8
Chrysene #	0.53	<0.02	0.83	0.05							<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	1.10	<0.07	1.52	0.08							<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.62	<0.04	0.83	0.04							<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene	0.41	<0.04	0.45	<0.04							<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	0.08	<0.04	0.13	<0.04							<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.34	<0.04	0.40	<0.04							<0.04	mg/kg	TM4/PM8
PAH 16 Total	7.3	<0.6	8.6	<0.6							<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.79	<0.05	1.09	0.06							<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.31	<0.02	0.43	0.02							<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	97	80	87	75							<0	%	TM4/PM8
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	<0.1	<0.1	0.5	<0.1							<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	<0.2	<0.2	<0.2	<0.2							<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL) #	6	<4	<4	<4							<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL) #	18	<7	<7	<7							<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL) #	99	<7	<7	<7							<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35 (EH+HS_CU_1D_AL)	123	<19	<19	<19							<19	mg/kg	TM5/TM36/PM8/PM12/PM16

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Element Materials Technology

Client Name: Tier Environmental
Reference: TE1179
Location: Frederick House York
Contact: Eve Rowland
EMT Job No: 21/398

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	10-12	24-26	29-30							LOD/LOR	Units	Method No.
Sample ID	TP101	TP102	TP104	TP105									
Depth	0.60	0.25	1.00	0.50									
COC No / misc													
Containers	V J	V J	V J	V J									
Sample Date	11/01/2021	11/01/2021	11/01/2021	11/01/2021									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	14/01/2021	14/01/2021	14/01/2021	14/01/2021									
TPH CWG													
Aromatics													
>C5-EC7 (HS_1D_AR) #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) #	<0.2	<0.2	<0.2	<0.2							<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR) #	<4	<4	<4	<4							<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR) #	9	<7	<7	<7							<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR) #	84	<7	<7	<7							<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 (EH+HS_CU_1D_AR) #	93	<19	<19	<19							<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35) (EH+HS_CU_1D_Total)	216	<38	<38	<38							<38	mg/kg	TM5/TM36/PM8/PM12/PM16
MTBE #	<5	<5	<5	<5							<5	ug/kg	TM36/PM12
Benzene #	<5	<5	<5	<5							<5	ug/kg	TM36/PM12
Toluene #	<5	<5	<5	<5							<5	ug/kg	TM36/PM12
Ethylbenzene #	<5	<5	<5	<5							<5	ug/kg	TM36/PM12
m/p-Xylene #	<5	<5	<5	<5							<5	ug/kg	TM36/PM12
o-Xylene #	<5	<5	<5	<5							<5	ug/kg	TM36/PM12
Total Phenols HPLC	<0.15	<0.15	<0.15	<0.15							<0.15	mg/kg	TM26/PM21B
Natural Moisture Content	18.3	23.7	22.4	<0.1							<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3							<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.1815	0.0182	0.1430	NDP							<0.0015	g/l	TM38/PM20
Total Organic Carbon #	2.77	0.84	1.14	0.08							<0.02	%	TM21/PM24
pH #	10.30	7.97	8.68	12.53							<0.01	pH units	TM73/PM11

Please see attached notes for all abbreviations and acronyms

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Tier Environmental
Reference: TE1179
Location: Frederick House York
Contact: Eve Rowland

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
21/398	1	TP101	0.60	3	15/01/2021	**General Description (Bulk Analysis)**	soil/stones
					15/01/2021	**Asbestos Fibres**	NAD
					15/01/2021	**Asbestos ACM**	NAD
					15/01/2021	**Asbestos Type**	NAD
					15/01/2021	**Asbestos Level Screen**	NAD
21/398	1	TP102	0.25	12	15/01/2021	**General Description (Bulk Analysis)**	soil.stones
					15/01/2021	**Asbestos Fibres**	NAD
					15/01/2021	**Asbestos ACM**	NAD
					15/01/2021	**Asbestos Type**	NAD
					15/01/2021	**Asbestos Level Screen**	NAD
21/398	1	TP104	1.00	26	15/01/2021	**General Description (Bulk Analysis)**	soil.stones
					15/01/2021	**Asbestos Fibres**	NAD
					15/01/2021	**Asbestos ACM**	NAD
					15/01/2021	**Asbestos Type**	NAD
					15/01/2021	**Asbestos Level Screen**	NAD
21/398	1	TP105	1.10	32	15/01/2021	**General Description (Bulk Analysis)**	soil.stones
					15/01/2021	**Asbestos Fibres**	NAD
					15/01/2021	**Asbestos ACM**	NAD
					15/01/2021	**Asbestos Type**	NAD
					15/01/2021	**Asbestos Level Screen**	NAD

Client Name: Tier Environmental

Reference: TE1179

Location: Frederick House York

Contact: Eve Rowland

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Method No.	NDP Reason
21/398	1	TP105	0.50	29-30	TM38/PM20	Insufficient sample for test

Client Name: Tier Environmental
Reference: TE1179
Location: Frederick House York
Contact: Eve Rowland

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 21/398						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 21/398

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

EMT Job No.: 21/398

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics extracted.
#2	EU_Total but with fatty acids extracted.
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 21/398

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21B	As Received samples are extracted in Methanol: Water (60:40) by reciprocal shaker.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes

EMT Job No: 21/398

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993 (comparabl	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	A hot hydrochloric acid digest is performed on a dried and ground sample, and the resulting liquor is analysed.	Yes		AD	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No