terra firma
Geotechnical & Geoenvironmental Specialists
www.terrafirmawales.co.uk

Our Ref: RH/12032/VP1-38

Your Ref:

Contact: Ruth Howells

29th October 2020

NHBC

For the attn. of Mr Steve Moreby

Dear Steve

PLOTS 1-38, PHASE 2, HERBERT ROAD NEWPORT: CAPPING VALIDATION

I confirm that the required remedial capping has now been imported and validated within the landscaped and garden areas of Plots 1 – 38.

The required remedial measures were:

- Plots 1 – 36 600mm imported soil capping with underlying no-dig barrier
- Plots 37 & 38 600mm imported soil capping only

Both subsoil and topsoil have been imported. The volume imported for both the topsoil and subsoil did not exceed 250m^2.

It is understood that the subsoil has been provided by Shadow Civils, sourced from Neal Soils. The topsoil has been sourced by Engie from another development site at Curtis Lane, Stoke Gifford. Test certificates provided by Neal Soils and from the Curtis Lane site may be found in **Annex A**.

A visit was made to site on Thursday 17th September 2020 to sample the imported soils and to confirm the capping thickness and presence of the no-dig barrier.

Sample/validation hole locations are illustrated in **Figure 1** on the following page.

Visual inspection of the capping at the trial holes confirmed the capping layer to be 600mm. Please see **Annex B** for photographs of the trial holes.

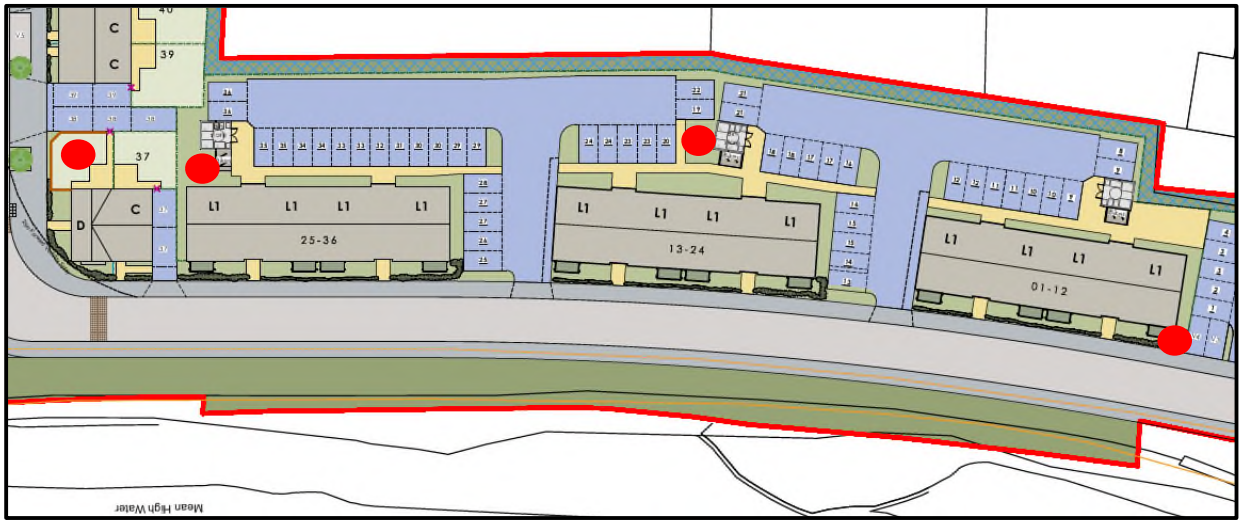

Figure 1: Validation Locations

The samples were submitted for laboratory analysis at the laboratory of Eurofins Chemtest. The chemical test certificate may be found in **Annex C**.

Comparison of the analytical results has been made with residential (including plant uptake) Suitable 4 Use Levels (S4ULs) provided by Land Quality Management Limited and the Chartered Institute of Environmental Health (CIEH). Suitable 4 Use Levels (S4ULs) provided by Land Quality Management Limited and the Chartered Institute of Environmental Health (CIEH). Where

Results are summarised in the following tables.

Table 1 Summary of Soil Chemical Test Results Imported Subsoil					
Substance	**SGV/GAC** (mg/kg)	**Source**	**Measured Concentrations of Tested Substances** (mg/kg)		**Number of Exceedances**
			Minimum	**Maximum**	
Arsenic	37	CIEH	9.7	11	0
Boron	290	CIEH	0.72	0.97	0
Cadmium	11	CIEH	0.51	0.8	0
Chromium III	910	CIEH	20	25	0
Chromium VI	6	CIEH	<0.5	<0.5	0
Copper	2400	CIEH	20	37	0
Lead	200	C4SL	41	78	0
Mercury	40	CIEH	0.07	0.1	0
Nickel	130	CIEH	21	28	0
Selenium	250	CIEH	<0.2	0.22	0
Zinc	3700	CIEH	91	140	0
Cyanide	8	CLEA	<0.5	<0.5	0
Phenols	120	CIEH	<0.3	<0.3	0
Organic Matter	-	-	0.2	1.4	-
pH	-	-	8.7	9.1	-
Asbestos	-	-	Not detected	Not detected	-
Naphthalene	2.3	CIEH	<0.1	<0.1	0
Acenaphthylene	170	CIEH	<0.1	<0.1	0
Acenaphthene	210	CIEH	<0.1	<0.1	0
Fluorene	170	CIEH	<0.1	<0.1	0
Phenanthrene	95	CIEH	<0.1	<0.1	0
Anthracene	2400	CIEH	<0.1	<0.1	0
Fluoranthene	280	CIEH	<0.1	<0.1	0
Pyrene	620	CIEH	<0.1	<0.1	0
Benzo(a)anthracene	7.2	CIEH	<0.1	<0.1	0
Chrysene	15	CIEH	<0.1	<0.1	0
Benzo(b)fluoranthene	2.6	CIEH	<0.1	<0.1	0
Benzo(k)fluoranthene	77	CIEH	<0.1	<0.1	0
Benzo(a)pyrene	2.2	CIEH	<0.1	<0.1	0
Indeno(123cd)pyrene	27	CIEH	<0.1	<0.1	0
Dibenzo(ah)anthracene	0.24	CIEH	<0.1	<0.1	0
Benzo(ghi)perylene	320	CIEH	<0.1	<0.1	0

Notes:

- PAH thresholds based on 1.0% SOM

Table 1 Summary of Soil Chemical Test Results (Continued) Imported Subsoil					
Substance	**SGV/GAC** (mg/kg)	**Source**	**Measured Concentrations of Tested Substances** (mg/kg)		**Number of Exceedances**
			Minimum	**Maximum**	
Aliphatic					
PH C5 – C6 Ali	42	CIEH	<1.0	<1.0	0
PH C6 – C8 Ali	100	CIEH	<1.0	<1.0	0
PH C8 – C10 Ali	27	CIEH	<1.0	<1.0	0
PH C10 – C12 Ali	130	CIEH	<1.0	<1.0	0
PH C12 – C16 Ali	1100	CIEH	<1.0	<1.0	0
PH C16 – C21 Ali*	65000	CIEH	<1.0	<1.0	0
PH C21 – C35 Ali*	65000	CIEH	<1.0	<1.0	0
PH C35 – C44 Ali	65000	CIEH	<1.0	<1.0	0
Aromatic					
PH C5 – C7 Arom	70	CIEH	<1.0	<1.0	0
PH C7 – C8 Arom	130	CIEH	<1.0	<1.0	0
PH C8 – C10 Arom	34	CIEH	<1.0	<1.0	0
PH C10 – C12 Arom	74	CIEH	<1.0	<1.0	0
PH C12 – C16 Arom	140	CIEH	<1.0	<1.0	0
PH C16 – C21 Arom	260	CIEH	<1.0	<1.0	0
PH C21 – C35 Arom	1100	CIEH	<1.0	<1.0	0
PH C35 – C44 Arom	1100	CIEH	<1.0	<1.0	0

Notes

- Thresholds based on 1.0% SOM
- CIEH for Ali C16 - 21 and C21 - C35 based on CIEH for EC >16 – 35

Table 2 Summary of Soil Chemical Test Results Imported Topsoil					
Substance	**SGV/GAC** (mg/kg)	**Source**	**Measured Concentrations of Tested Substances** (mg/kg)		**Number of Exceedances**
			Minimum	**Maximum**	
Arsenic	37	CIEH	12	14	0
Boron	290	CIEH	0.65	0.96	0
Cadmium	11	CIEH	0.79	1.7	0
Chromium III	910	CIEH	20	41	0
Chromium VI	6	CIEH	<0.5	<0.5	0
Copper	2400	CIEH	27	43	0
Lead	200	C4SL	72	180	0
Mercury	40	CIEH	0.13	0.18	0
Nickel	130	CIEH	22	32	0
Selenium	250	CIEH	<0.2	0.27	0
Zinc	3700	CIEH	170	210	0
Cyanide	8	CLEA	<0.5	<0.5	0
Phenols	120	CIEH	<0.3	<0.3	0
Organic Matter	-	-	3.5	3.9	-
pH	-	-	8.4	9.0	-
Asbestos	-	-	Not detected	Not detected	-
Naphthalene	2.3	CIEH	<0.1	<0.1	0
Acenaphthylene	170	CIEH	<0.1	<0.1	0
Acenaphthene	210	CIEH	<0.1	<0.1	0
Fluorene	170	CIEH	<0.1	<0.1	0
Phenanthrene	95	CIEH	<0.1	<0.1	0
Anthracene	2400	CIEH	<0.1	<0.1	0
Fluoranthene	280	CIEH	<0.1	1.5	0
Pyrene	620	CIEH	<0.1	1.2	0
Benzo(a)anthracene	7.2	CIEH	<0.1	<0.1	0
Chrysene	15	CIEH	<0.1	<0.1	0
Benzo(b)fluoranthene	2.6	CIEH	<0.1	<0.1	0
Benzo(k)fluoranthene	77	CIEH	<0.1	<0.1	0
Benzo(a)pyrene	2.2	CIEH	<0.1	<0.1	0
Indeno(123cd)pyrene	27	CIEH	<0.1	<0.1	0
Dibenzo(ah)anthracene	0.24	CIEH	<0.1	<0.1	0
Benzo(ghi)perylene	320	CIEH	<0.1	<0.1	0

Notes:

- PAH thresholds based on 1.0% SOM

Table 2 Summary of Soil Chemical Test Results (Continued) Imported Topsoil					
Substance	**SGV/GAC** (mg/kg)	**Source**	**Measured Concentrations of Tested Substances** (mg/kg)		**Number of Exceedances**
			Minimum	**Maximum**	
Aliphatic					
PH C5 – C6 Ali	42	CIEH	<1.0	<1.0	0
PH C6 – C8 Ali	100	CIEH	<1.0	<1.0	0
PH C8 – C10 Ali	27	CIEH	<1.0	<1.0	0
PH C10 – C12 Ali	130	CIEH	<1.0	<1.0	0
PH C12 – C16 Ali	1100	CIEH	<1.0	<1.0	0
PH C16 – C21 Ali*	65000	CIEH	<1.0	<1.0	0
PH C21 – C35 Ali*	65000	CIEH	<1.0	<1.0	0
PH C35 – C44 Ali	65000	CIEH	<1.0	<1.0	0
Aromatic					
PH C5 – C7 Arom	70	CIEH	<1.0	<1.0	0
PH C7 – C8 Arom	130	CIEH	<1.0	<1.0	0
PH C8 – C10 Arom	34	CIEH	<1.0	<1.0	0
PH C10 – C12 Arom	74	CIEH	<1.0	<1.0	0
PH C12 – C16 Arom	140	CIEH	<1.0	<1.0	0
PH C16 – C21 Arom	260	CIEH	<1.0	<1.0	0
PH C21 – C35 Arom	1100	CIEH	<1.0	<1.0	0
PH C35 – C44 Arom	1100	CIEH	<1.0	<1.0	0

Notes

- Thresholds based on 1.0% SOM
- CIEH for Ali C16 - 21 and C21 - C35 based on CIEH for EC >16 – 35

From the above tables is can be seen that all substances tested for are present at levels below their respective human health threshold levels. It is therefore confirmed that the imported subsoil and topsoil are uncontaminated and do not present a risk to the human health of future site residents.

I trust that the above is to your satisfaction, however, if you have any queries or require any further information please do not hesitate to contact me.

Yours sincerely
for: Terra Firma (Wales) Ltd

R. Howells.

Mrs Ruth Howells

Annex A
Soil test Certificates from Soil Suppliers

Terra Firma (Wales) Ltd. 5 Deryn Court, Wharfedale Road, Pentwyn, Cardiff CF23 7HA
Tel: 029 2073 5354 **Fax:** 029 2073 5433 **Email:** info@terrafirmawales.co.uk **www.terrafirmawales.co.uk**
Registered in Wales No. 4013230. VAT No: 753 2566 25. Registered Office: 5 Deryn Court, Wharfedale Road, Pentwyn, Cardiff CF23 7HA

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ANALYTICAL TEST REPORT

Contract no: 89658

Contract name: NS/HM

Client reference: NS/HM

Clients name: Neal Soil Suppliers

Clients address: Ty-To-Maen Farm
Newton Road
Rumney, Cardiff
CF3 2EJ

Samples received: 05 March 2020

Analysis started: 05 March 2020

Analysis completed: 12 March 2020

Report issued: 12 March 2020

Notes:
Opinions and interpretations expressed herein are outside the UKAS accreditation scope.
Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.
Methods, procedures and performance data are available on request.
Results reported herein relate only to the material supplied to the laboratory.
This report shall not be reproduced except in full, without prior written approval.
Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

Key:
U UKAS accredited test
M MCERTS & UKAS accredited test
$ Test carried out by an approved subcontractor
I/S Insufficient sample to carry out test
N/S Sample not suitable for testing
NAD No Asbestos Detected

Approved by:

Dave Bowerbank
Customer Services Co-ordinator

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

All results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.
Analytical results are inclusive of stones.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
89658-2	Residential Soil	-	Clayey Loam	-	-	20.7

Chemtech Environmental Limited

SOILS

Lab number			89658-2
Sample id			Residential Soil
Depth (m)			-
Date sampled			03/03/2020
Test	**Method**	**Units**	
Arsenic (total)	CE127 M	mg/kg As	7.8
Cadmium (total)	CE127 M	mg/kg Cd	0.9
Chromium (total)	CE127 M	mg/kg Cr	44
Chromium (VI)	CE146	mg/kg CrVI	<1
Copper (total)	CE127 M	mg/kg Cu	11
Lead (total)	CE127 M	mg/kg Pb	50
Mercury (total)	CE127 M	mg/kg Hg	<0.5
Nickel (total)	CE127 M	mg/kg Ni	24
Selenium (total)	CE127 M	mg/kg Se	0.7
Zinc (total)	CE127 M	mg/kg Zn	70
pH	CE004 M	units	7.5
PAH			
Naphthalene	CE087 M	mg/kg	<0.02
Acenaphthylene	CE087 M	mg/kg	<0.02
Acenaphthene	CE087 M	mg/kg	<0.02
Fluorene	CE087 U	mg/kg	<0.02
Phenanthrene	CE087 M	mg/kg	<0.01
Anthracene	CE087 U	mg/kg	<0.02
Fluoranthene	CE087 M	mg/kg	<0.01
Pyrene	CE087 M	mg/kg	<0.01
Benzo(a)anthracene	CE087 U	mg/kg	<0.01
Chrysene	CE087 M	mg/kg	<0.01
Benzo(b)fluoranthene	CE087 M	mg/kg	<0.01
Benzo(k)fluoranthene	CE087 M	mg/kg	<0.03
Benzo(a)pyrene	CE087 U	mg/kg	<0.02
Indeno(123cd)pyrene	CE087 M	mg/kg	<0.02
Dibenz(ah)anthracene	CE087 M	mg/kg	<0.02
Benzo(ghi)perylene	CE087 M	mg/kg	<0.02
PAH (total of USEPA 16)	CE087	mg/kg	< 2
TPH			
VPH Aromatic (>EC5-EC7)	CE067	mg/kg	<0.01
VPH Aromatic (>EC7-EC8)	CE067	mg/kg	0.05
VPH Aromatic (>EC8-EC10)	CE067	mg/kg	<0.01
EPH Aromatic (>EC10-EC12)	CE068	mg/kg	<1
EPH Aromatic (>EC12-EC16)	CE068	mg/kg	<1
EPH Aromatic (>EC16-EC21)	CE068	mg/kg	<1
EPH Aromatic (>EC21-EC35)	CE068	mg/kg	<1
EPH Aromatic (>EC35-EC44)	CE068	mg/kg	<1
VPH Aliphatic (>C5-C6)	CE067	mg/kg	<0.1
VPH Aliphatic (>C6-C8)	CE067	mg/kg	<0.1

Chemtech Environmental Limited

SOILS

Lab number			89658-2
Sample id			Residential Soil
Depth (m)			-
Date sampled			03/03/2020
Test	**Method**	**Units**	
VPH Aliphatic (>C8-C10)	CE067	mg/kg	<0.1
EPH Aliphatic (>C10-C12)	CE068	mg/kg	<4
EPH Aliphatic (>C12-C16)	CE068	mg/kg	<4
EPH Aliphatic (>C16-C35)	CE068	mg/kg	60
EPH Aliphatic (>C35-C44)	CE068	mg/kg	35
Subcontracted analysis			
Asbestos (qualitative)	$	-	NAD

Chemtech Environmental Limited

SOILS

METHOD	SOLIDS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry		1	mg/kg As
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry		0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry		1	mg/kg Cr
CE146	Chromium (VI)	Acid extraction, Colorimetry	Dry		1	mg/kg CrVI
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry		1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry		1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry		0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry		1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry		0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry		5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	As received		-	units
CE087	Naphthalene	Solvent extraction, GC-MS	As received		0.02	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	As received		0.02	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	As received		0.02	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	As received		0.02	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	As received		0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	As received		0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	As received		0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	As received		0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	As received		0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	As received		0.03	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	As received		0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	As received		0.03	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	As received		0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	As received		0.02	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	As received		0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	As received		0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	As received		0.34	mg/kg
CE067	VPH Aromatic (>EC5-EC7)	Headspace GC-FID	As received		0.01	mg/kg
CE067	VPH Aromatic (>EC7-EC8)	Headspace GC-FID	As received		0.01	mg/kg
CE067	VPH Aromatic (>EC8-EC10)	Headspace GC-FID	As received		0.01	mg/kg
CE068	EPH Aromatic (>EC10-EC12)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC12-EC16)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC16-EC21)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC21-EC35)	Solvent extraction, GC-FID	As received		1	mg/kg
CE068	EPH Aromatic (>EC35-EC44)	Solvent extraction, GC-FID	As received		1	mg/kg
CE067	VPH Aliphatic (>C5-C6)	Headspace GC-FID	As received		0.1	mg/kg
CE067	VPH Aliphatic (>C6-C8)	Headspace GC-FID	As received		0.1	mg/kg
CE067	VPH Aliphatic (>C8-C10)	Headspace GC-FID	As received		0.1	mg/kg
CE068	EPH Aliphatic (>C10-C12)	Solvent extraction, GC-FID	As received		4	mg/kg
CE068	EPH Aliphatic (>C12-C16)	Solvent extraction, GC-FID	As received		4	mg/kg
CE068	EPH Aliphatic (>C16-C35)	Solvent extraction, GC-FID	As received		4	mg/kg
CE068	EPH Aliphatic (>C35-C44)	Solvent extraction, GC-FID	As received		10	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

89658
NS/HM
NS/HM

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments
Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
89658-2	Residential Soil	-	N	

Intégral Géotechnique

Intégral House
7 Beddau Way
Castlegate Business Park
Caerphilly
CF83 2AX
Tel: 029 2080 7991
mail@integralgeotec.com

11810/LW

8 July 2019

Engie UK Places & Communities
2nd Floor
31 Bocam Park
Oakfield Road
Bridgend CF35 5LJ

For the attention of Mr Dylan Hammett

Dear Sirs,

Curtis Lane, Stoke Gifford – Supplementary Topsoil Sampling

We have now completed the supplementary topsoil sampling at the above site and report as follows.

The site was previously investigated by Intégral Géotechnique in June 2016 and reported in Site Investigation Report, Ref: 11810/LW/16/SI dated June 2016.

Intégral Géotechnique have been commissioned to undertake further topsoil sampling, followed by laboratory chemical testing and risk assessment to inform the suitability of the topsoil for re-use.

This report is supplemental to the above site investigation report and should be read in conjunction with it.

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Introduction

The site is located in Stoke Gifford, approximately 7km north east of Bristol, at a National Grid Reference of 363250, 179540.

The site consisted of a green field, lined with hedgerows and mature trees. The field was previously used for grazing of livestock.

A residential property exists in the southern part of the site. The property consists of a house and garages with areas of hardstanding and gardens. During the supplementary site works, the property was vacant and access was available.

Two above ground storage tanks are located to the north east of the property and were still present during the supplementary site investigation. The two rectangular oil tanks were located adjacent to each other and situated above a gravel base. No visual evidence of leakages from the tanks was observed, however, an olfactory evidence of petroleum hydrocarbons was noted.

In the eastern area of the site, a small stockpile was located with an area of dense vegetation.

Site Works

Site works were carried out on the 18th March 2019 to undertake the supplementary topsoil sampling.

The approximate location of the trial pits and sampling locations are shown on Figure 1 enclosed. The trial pits logs are included in Appendix A.

Representative samples were taken from the topsoil, encountered in the northern field. The topsoil samples were tested for a range of contaminants including petroleum hydrocarbons and asbestos.

The samples were sent to the UKAS accredited laboratories of i2 Analytical for testing. A copy of the results of the laboratory testing is presented in Appendix B.

The results of the chemical testing have been summarised and compared against the appropriate soils screening values of the proposed residential with home grown produce end use. A copy of the summary is presented in Appendix C.

Ground Conditions

The ground conditions encountered within the trial pits consisted of a veneer of topsoil overlying the weathered strata of the Mercia Mudstone Formation.

A veneer of topsoil was encountered within trial pits TP101 to TP103 and typically consisted of silty slightly gravelly clay. The topsoil was encountered at a thickness of between 0.10m and 0.20m.

The topsoil was overlying the weathered strata of the Mercia Mudstone Formation. The weathered strata consisted of firm, locally soft to firm brown to red brown slightly sandy silty clay, grading into firm, firm to stiff red brown silty clay with mudstone lithorelicts. The firm or firm to stiff clays were encountered at depths of between 0.6m and 1.0m below existing ground level.

The weathered clay strata further graded into mudstone bedrock within trial pits TP102 at depths of 2.2m.

Groundwater was not encountered within the trial pits.

Chemical Assessment

The results of the laboratory testing of representative topsoil samples from TP101 to TP103 at depths of 0.10m, indicate that the analysed chemical elements or compounds are present at concentrations below the appropriate threshold for residential with home grown produce end use.

Asbestos was not detected within the screened samples.

Based on these results, it is considered that the topsoil does not present a potential risk to residential end users, and it is considered that the topsoil, located within the zone indicated on Figure 1, to be suitable for re-use on or off site.

We trust the above and enclosed are to your satisfaction. However, if you have any queries, or require further information, please do not hesitate to contact us.

Yours faithfully,

PP **Lowri Williams**
For
Intégral Géotechnique (Wales) Limited

APPENDIX A

TRIAL PIT LOGS

Intégral Géotechnique
Intégral House, 7 Beddau Way
Castlegate Business Park
Caerphilly CF83 2AX
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Project Name:	Project No.:	Trial Pit No.:
Curtis Lane, Stoke Gifford	**11810**	**TP101** Sheet 1 of 1

Location:	Client:	Logged By:	Scale
Bristol	Engie UK Places & Communities	LW	1:25

Equipment: JCB 3CX

Coordinates:

Date Excavated: 18/03/2019

Level:

Dimensions

3.00m

Depth : 2.60m

0.70m

Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.20			Topsoil: Grass onto brown slightly sandy slightly gravelly silty clay with rootlets. Gravel is fine to medium angular of mudstone.
			1.00			Firm, locally soft to firm brown becoming red brown slightly sandy silty CLAY.
			2.60			Firm, firm to stiff red brown silty CLAY with very weak weathered mudstone lithorelicts. ... becoming locally mottled green grey with increase in mudstone fabric from 1.9m. End of Trialpit at 2.60 m

Remarks:

1. Trial pit terminated at 2.6m bgl.

Groundwater: Groundwater not encountered

Stability: Stable

Key:

D - Small disturbed sample
B - Bulk disturbed sample
ES - Environmental soil sample
W - Water sample

AGS

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Project Name:	Project No.:	Trial Pit No.:
Curtis Lane, Stoke Gifford	**11810**	**TP102** Sheet 1 of 1

Location:	Client:	Logged By:	Scale
Bristol	Engie UK Places & Communities	LW	1:25

Equipment: JCB 3CX

Coordinates:

Date Excavated: 18/03/2019

Level:

Dimensions

2.80m

Depth : 2.60m

0.70m

Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.10	ES		0.15			Topsoil: Grass onto brown slightly gravelly silty clay with rootlets. Gravel is fine to medium angular of mudstone.
						Firm brown to red brown silty CLAY.
			0.60			Firm to stiff red brown slightly silty CLAY with frequent extremely weak weathered mudstone lithorelicts. ... Mudstone cobbles from 2m.
			2.20			Extremely weak thinly bedded highly weathered MUDSTONE. Excavated as fine to coarse angular to subangular mudstone gravel with some cobbles in a clayey matrix.
			2.60			End of Trialpit at 2.60 m

1 2 3 4 5

Remarks:

1. Trial pit terminated at 2.6m bgl.

Groundwater: Groundwater not encountered.

Stability: Stable

Key:

D - Small disturbed sample
B - Bulk disturbed sample
ES - Environmental soil sample
W - Water sample

AGS

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Project Name:	Project No.:	Trial Pit No.:
Curtis Lane, Stoke Gifford	**11810**	**TP103** Sheet 1 of 1

Location:	Client:	Logged By:	Scale
Bristol	Engie UK Places & Communities	LW	1:25

Equipment: JCB 3CX

Coordinates:

Date Excavated: 18/03/2019

Level:

Dimensions

3.00m

Depth : 2.30m

0.70m

Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.10	ES		0.15			Topsoil: Grass onto brown slightly gravelly silty clay with rootlets. Gravel is fine to medium angular of mudstone.
						Soft to firm, firm red brown slightly gravelly silty CLAY.
			0.60			Firm, firm to stiff red brown slightly silty CLAY with very weak frequent mudstone lithorelicts.
			2.30			End of Trialpit at 2.30 m

Remarks:

1. Trial pit terminated at 2.3m bgl.

Groundwater: Groundwater not encountered.

Stability: Stable

Key:

D - Small disturbed sample
B - Bulk disturbed sample
ES - Environmental soil sample
W - Water sample

AGS

APPENDIX B

LABORATORY CHEMICAL TEST RESULTS

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Analytical Report Number : 19-33901-A

Replaces Analytical Report Number : 19-33901, issue no. 1

Project / Site name:	Curtis Lane, Stoke Gifford	**Samples received on:**	20/03/2019
Your job number:	11810	**Samples instructed on:**	20/03/2019
Your order number:		**Analysis completed by:**	29/03/2019
Report Issue Number:	2	**Report issued on:**	15/07/2019
Samples Analysed:	3 soil samples		

Signed:

Zina Abdul Razzak
Senior Quality Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 19-33901-A

Project / Site name: Curtis Lane, Stoke Gifford

Lab Sample Number				1182518	1182519	1182520		
Sample Reference				TP101	TP102	TP103		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.10	0.10	0.10		
Date Sampled				18/03/2019	18/03/2019	18/03/2019		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1		
Moisture Content	%	N/A	NONE	16	17	20		
Total mass of sample received	kg	0.001	NONE	1.0	1.1	1.1		
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected		
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.5	8.0	7.8		
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1		
Total Sulphate as SO_4	mg/kg	50	MCERTS	770	1100	1200		
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.013	0.017	0.015		
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Total Sulphur	mg/kg	50	MCERTS	440	520	550		
Total Organic Carbon (TOC)	%	0.1	MCERTS	2.7	1.4	3.0		
Loss on Ignition @ 450°C	%	0.2	MCERTS	6.1	3.9	7.9		
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Phenanthrene	mg/kg	0.05	MCERTS	0.23	0.30	0.94		
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.29		
Fluoranthene	mg/kg	0.05	MCERTS	0.37	0.52	1.8		
Pyrene	mg/kg	0.05	MCERTS	0.30	0.48	1.5		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.28	0.98		
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.29	0.78		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.29	1.2		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.21	0.53		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.27	0.96		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.63		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.75		
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	0.90	2.64	10.3		
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.5	11	14		
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.76	0.68	1.1		
Boron (water soluble)	mg/kg	0.2	MCERTS	1.8	0.9	2.1		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.5	0.5	1.1		
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	20	19	30		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	30	25	31		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	70	44	60		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	18	15	27		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	25	25	39		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	160	390	180		

Analytical Report Number: 19-33901-A

Project / Site name: Curtis Lane, Stoke Gifford

Lab Sample Number				1182518	1182519	1182520		
Sample Reference				TP101	TP102	TP103		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.10	0.10	0.10		
Date Sampled				18/03/2019	18/03/2019	18/03/2019		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Petroleum Hydrocarbons								
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0		
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0		
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0		
TPH-CWG - Aliphatic >EC16 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10		
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4		
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10		
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0		
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10		
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	16		
TPH-CWG - Aromatic >EC35 - EC40	mg/kg	10	NONE	< 10	< 10	< 10		
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4		
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	20		
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10	20		
TPH Total C5 - C44	mg/kg	10	NONE	< 10	< 10	20		

Analytical Report Number : 19-33901-A

Project / Site name: Curtis Lane, Stoke Gifford

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1182518	TP101	None Supplied	0.10	Brown loam and clay with gravel and vegetation.
1182519	TP102	None Supplied	0.10	Brown loam and clay with brick and vegetation.
1182520	TP103	None Supplied	0.10	Brown clay and loam with gravel and vegetation.

Analytical Report Number : 19-33901-A

Project / Site name: Curtis Lane, Stoke Gifford

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L047-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil	L038-PL	D	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE

Analytical Report Number : 19-33901-A

Project / Site name: Curtis Lane, Stoke Gifford

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

The results included within the report are representative of the samples submitted for analysis.

APPENDIX C

SUMMARY OF CHEMICAL RESULTS

SUMMARY OF LABORATORY SOIL TEST RESULTS

Job No.: 11810
Site: Curtis Lane, Stoke Gifford
Soil Type: Topsoil
Soil Organic Matter: 1%

METALS AND SEMI-METALS

No.	Location	Depth (m)	Arsenic (mg/kg)	Boron (mg/kg)	Beryllium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Chromium (VI) (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Mercury (Elemental) (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)
1	TP101	0.10	9.5	1.8	0.76	0.5	20	< 4.0	30	70	< 0.3	18	< 1.0	25	160
2	TP102	0.10	11	0.9	0.68	0.5	19	< 4.0	25	44	< 0.3	15	< 1.0	25	390
3	TP103	0.10	14	2.1	1.1	1.1	30	< 4.0	31	60	< 0.3	27	< 1.0	39	180
	Screening Criteria Value		37.0	290.0	1.7	11.0	-	6.0	2400.0	200.0	1.2	130.0	250.0	410.0	3700.0
	Source of Screening Criteria Value		S4UL	S4UL	S4UL	S4UL	-	S4UL	S4UL	C4SL	S4UL	S4UL	S4UL	S4UL	S4UL

Intégral Géotechnique

SUMMARY OF LABORATORY SOIL TEST RESULTS

Job No.: 11810

Site: Curtis Lane, Stoke Gifford

Soil Type: Topsoil

Soil Organic Matter: 1%

INORGANIC CHEMICALS & OTHERS

No.	Location	Depth (m)	Cyanide (mg/kg)	Loss on ignition, dried solids (%)	Moisture content at 30 C (%)	Phenol (mg/kg)	pH (pH units)	Water Soluble Sulphate (g/l)	Sulphate Total as SO4 (mg/kg)	Sulphide (mg/kg)	Total Sulphur (mg/kg)	TOC by Ignition in O2 (%)	Equivalent SOM (%)	Asbestos in Soil	Asbestos Quantification (%)
1	TP101	0.10	< 1	6.1	16	< 1.0	7.5	0.013	770	< 1.0	440	2.7	4.64	Not-detected	#N/A
2	TP102	0.10	< 1	3.9	17	< 1.0	8.0	0.017	1100	< 1.0	520	1.4	2.41	Not-detected	#N/A
3	TP103	0.10	< 1	7.9	20	< 1.0	7.8	0.015	1200	< 1.0	550	3.0	5.16	Not-detected	#N/A
	Screening Criteria Value		**34.0**	-	-	**280.0**	-	-	-	-	-	-	-	-	**0.001**
	Source of Screening Criteria Value		ATRISK	-	-	S4UL	-	-	-	-	-	-	-	-	IOM

Intégral Géotechnique

SUMMARY OF LABORATORY SOIL TEST RESULTS

Job No.: 11810
Site: Curtis Lane, Stoke Gifford
Soil Type: Topsoil
Soil Organic Matter: 1%

POLYAROMATIC HYDROCARBONS (PAH)

No.	Location	Depth (m)	Acenaphthene (mg/kg)	Acenaphthylene (mg/kg)	Anthracene (mg/kg)	Benzo(a)anthracene (mg/kg)	Benzo(a)pyrene (mg/kg)	Benzo(b)fluoranthene (mg/kg)	Benzo(ghi)perylene (mg/kg)	Benzo(k)fluoranthene (mg/kg)	Chrysene (mg/kg)	Dibenzo(ah)anthracene (mg/kg)	Fluoranthene (mg/kg)	Fluorene (mg/kg)	Indeno(123cd)pyrene (mg/kg)	Naphthalene (mg/kg)	Phenanthrene (mg/kg)	Pyrene (mg/kg)
1	TP101	0.10	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.37	< 0.05	< 0.05	< 0.05	0.23	0.30
2	TP102	0.10	< 0.05	< 0.05	< 0.05	0.28	0.27	0.29	< 0.05	0.21	0.29	< 0.05	0.52	< 0.05	< 0.05	< 0.05	0.30	0.48
3	TP103	0.10	< 0.05	< 0.05	0.29	0.98	0.96	1.2	0.75	0.53	0.78	< 0.05	1.8	< 0.05	0.63	< 0.05	0.94	1.5
	Screening Criteria Value		210.0	170.0	2400.0	7.2	2.2	2.6	320.0	77.0	15.0	0.2	280.0	170.0	27.0	2.3	95.0	620.0
	Source of Screening Criteria Value		S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL

Intégral Géotechnique

SUMMARY OF LABORATORY SOIL TEST RESULTS

Job No.: 11810

Site: Curtis Lane, Stoke Gifford

Soil Type: Topsoil

Soil Organic Matter: 1%

PETROLEUM HYDROCARBONS

No.	Location	Depth (m)	Aliphatic C5-C6 (mg/kg)	Aliphatic C6-C8 (mg/kg)	Aliphatic C8-C10 (mg/kg)	Aliphatic C10-C12 EPH (mg/kg)	Aliphatic C12-C16 EPH (mg/kg)	Aliphatic C16-C35 EPH (mg/kg)	Aliphatic C35-C44 EPH (mg/kg)	Aromatic C5-C7 (mg/kg)	Aromatic C7-C8 (mg/kg)	Aromatic C8-C10 (mg/kg)	Aromatic C10-C12 EPH (mg/kg)	Aromatic C12-C16 EPH (mg/kg)	Aromatic C16-C21 EPH (mg/kg)	Aromatic C21-C35 EPH (mg/kg)	Aromatic C35-C40 EPH (mg/kg)
1	TP101	0.10	< 0.001	< 0.001	< 0.001	< 1.0	< 2.0	< 10	< 8.4	< 0.001	< 0.001	< 0.001	< 1.0	< 2.0	< 10	< 10	< 8.4
2	TP102	0.10	< 0.001	< 0.001	< 0.001	< 1.0	< 2.0	< 10	< 8.4	< 0.001	< 0.001	< 0.001	< 1.0	< 2.0	< 10	< 10	< 8.4
3	TP103	0.10	< 0.001	< 0.001	< 0.001	< 1.0	< 2.0	< 10	< 8.4	< 0.001	< 0.001	< 0.001	< 1.0	< 2.0	< 10	16	< 8.4
	Screening Criteria Value		42.0	100.0	27.0	130.0	1100.0	65000.0	65000.0	0.1	130.0	34.0	74.0	140.0	260.0	1100.0	1100.0
	Source of Screening Criteria Value		S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL	S4UL

Intégral Géotechnique

FIGURES

NORTH

KEY

Approximate location of trial pit

Approximate site boiundary

Figure 1: Site Plan

Project: Curtis Lane, Stoke Gifford	Job No.: 11810	Intégral Géotechnique
Client: Engie UK Places & Communities	Scale: 1:800 at A3	Integral House, 7 Beddau Way, Castlegate Business Park, Caerphilly, CF83 2AX. Tel: 029 2080 7991

Annex B
Photographs of Soil Sampling and Capping Thickness Validation

Terra Firma (Wales) Ltd. 5 Deryn Court, Wharfedale Road, Pentwyn, Cardiff CF23 7HA
Tel: 029 2073 5354 **Fax:** 029 2073 5433 **Email:** info@terrafirmawales.co.uk **www.terrafirmawales.co.uk**
Registered in Wales No. 4013230. VAT No: 753 2566 25. Registered Office: 5 Deryn Court, Wharfedale Road, Pentwyn, Cardiff CF23 7HA

PLOTS 1 - 12

PLOTS 13 - 24

PLOTS 25 – 36

PLOTS 37 & 38

Annex C
Laboratory Soil Chemical Test Results

Terra Firma (Wales) Ltd. 5 Deryn Court, Wharfedale Road, Pentwyn, Cardiff CF23 7HA
Tel: 029 2073 5354 **Fax:** 029 2073 5433 **Email:** info@terrafirmawales.co.uk **www.terrafirmawales.co.uk**
Registered in Wales No. 4013230. VAT No: 753 2566 25. Registered Office: 5 Deryn Court, Wharfedale Road, Pentwyn, Cardiff CF23 7HA

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	20-25355-1
Initial Date of Issue:	28-Sep-2020
Client	Terra Firma (Wales) Ltd
Client Address:	5 Deryn Court Wharfedale Road Pentwyn Cardiff CF23 7HA
Contact(s):	ruth@terrafirmawales.co.uk
Project	Herbert Road

Quotation No.:		**Date Received:**	22-Sep-2020
Order No.:	12032RH	**Date Instructed:**	22-Sep-2020
No. of Samples:	8		
Turnaround (Wkdays):	5	**Results Due:**	28-Sep-2020
Date Approved:	28-Sep-2020		

Approved By:

Details: Glynn Harvey, Technical Manager

Results - Soil

Project: Herbert Road

Client: Terra Firma (Wales) Ltd				**Chemtest Job No.:**	20-25355	20-25355	20-25355	20-25355	20-25355	20-25355	20-25355	20-25355
Quotation No.:				**Chemtest Sample ID.:**	1068155	1068156	1068157	1068158	1068159	1068160	1068161	1068162
Order No.: 12032RH				Client Sample Ref.:	PLOTS 1 - 12	PLOTS 13 - 14	PLOTS 25 - 36	PLOTS 37-38	PLOTS 1 - 12	PLOTS 13 - 24	PLOTS 25 - 36	PLOTS 37-38
				Client Sample ID.:	S1 TS	S1 TS	S1 TS	S1 TS	S1 SS	S2 SS	S3 SS	S4 SS
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Date Sampled:	17-Sep-2020	17-Sep-2020	17-Sep-2020	17-Sep-2020	17-Sep-2020	17-Sep-2020	17-Sep-2020	17-Sep-2020
				Time Sampled:	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00
				Asbestos Lab:	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-	-	-	-	-	-	-	-
Moisture	N	2030	%	0.020	14	5.1	13	13	13	7.4	13	13
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	None	Stones	Stones	Stones	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Sand	Sand	Sand	Sand	Clay
pH	M	2010		4.0	8.4	8.4	9.0	8.7	9.1	8.7	9.1	8.8
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	0.70	0.85	0.65	0.96	0.97	0.72	0.86	0.81
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Sulphate (Acid Soluble)	M	2430	%	0.010	0.097	0.12	0.097	0.15	0.13	0.096	0.17	0.15
Arsenic	M	2450	mg/kg	1.0	12	13	12	14	9.9	11	9.7	9.8
Cadmium	M	2450	mg/kg	0.10	0.79	1.1	1.7	0.91	0.80	0.74	0.51	0.60
Chromium	M	2450	mg/kg	1.0	20	22	41	39	25	21	23	20
Mercury Low Level	M	2450	mg/kg	0.05	0.15	0.17	0.18	0.13	0.10	0.09	0.07	0.09
Copper	M	2450	mg/kg	0.50	27	42	32	43	37	29	27	20
Nickel	M	2450	mg/kg	0.50	23	26	22	32	28	23	24	21
Lead	M	2450	mg/kg	0.50	72	83	77	180	51	78	53	41
Selenium	M	2450	mg/kg	0.20	0.27	< 0.20	< 0.20	< 0.20	< 0.20	0.22	< 0.20	< 0.20
Zinc	M	2450	mg/kg	0.50	170	210	200	200	140	130	98	91
Chromium (Trivalent)	N	2490	mg/kg	1.0	20	22	41	39	25	21	23	20
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Soil

Project: Herbert Road

Client: Terra Firma (Wales) Ltd		**Chemtest Job No.:**			20-25355	20-25355	20-25355	20-25355	20-25355	20-25355	20-25355	20-25355
Quotation No.:		**Chemtest Sample ID.:**			1068155	1068156	1068157	1068158	1068159	1068160	1068161	1068162
Order No.: 12032RH		Client Sample Ref.:			PLOTS 1 - 12	PLOTS 13 - 14	PLOTS 25 - 36	PLOTS 37-38	PLOTS 1 - 12	PLOTS 13 - 24	PLOTS 25 - 36	PLOTS 37-38
		Client Sample ID.:			S1 TS	S1 TS	S1 TS	S1 TS	S1 SS	S2 SS	S3 SS	S4 SS
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Date Sampled:			17-Sep-2020	17-Sep-2020	17-Sep-2020	17-Sep-2020	17-Sep-2020	17-Sep-2020	17-Sep-2020	17-Sep-2020
		Time Sampled:			12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00
		Asbestos Lab:			DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	1.5	1.1	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	1.2	1.0	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0	< 2.0	2.7	2.1	< 2.0	< 2.0	< 2.0	< 2.0
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Organic Matter BS1377	N	2930	%	0.10	3.5	3.6	3.9	3.6	0.90	1.4	0.50	0.20

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID (GC-FID detection is non-selective and can be subject to interference from co-eluting compounds)
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
2930	Organic Matter	Organic Matter	Acid Dichromate digestion/Titration

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied

B - Sample age exceeds stability time (sampling to extraction)

C - Sample not received in appropriate containers

D - Broken Container

E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com