

Our Ref: RH/12032/VP39-46/56-75

Your Ref:

Contact: Ruth Howells

8<sup>th</sup> January 2021

NHBC

For the attn. of Mr Steve Moreby

Dear Steve

**PLOTS 39-46 and 56-75 PHASE 2, HERBERT ROAD NEWPORT: CAPPING VALIDATION**

I confirm that the required 600mm of remedial capping has now been imported and validated within the gardens of Plots 39-46 and 56-75.



**Figure 1: Site Layout and Sampling Locations**

The topsoil and subsoil for Plots 39-46 was sourced from a development site in Bonvilston. Terra Firma (Wales) Limited sampled and tested these soils at source from stockpiles. Please refer to **Annex A** for the test results. A volume of <math><250\text{m}^3</math> of both the Bonvilston topsoil and subsoil was subsequently imported.

The topsoil and subsoil within Plots 56-75 was sourced from a development site known as Curtis Lane. Results of samples tested at source are provided in **Annex B**. The volume of the Curtis Lane topsoil and subsoil imported was <math><250\text{m}^3</math>, each.

A visit was made to site on 17<sup>th</sup> December 2020 to sample the imported soils and to confirm the capping thickness.

The capping thickness was found to be at 600mm, confirmed by hand dug pits. Please see **Annex C** for photographs of the pits.

Two samples of Bonvilston sourced topsoil and subsoil were taken. Four samples of each of the Curtis Lane sourced soils were taken.

Sample/validation hole locations are illustrated in **Figure 1** on the previous page. Those positions shown in red are the locations where soil samples were taken.

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

Comparison of the analytical results has been made residential (including plant uptake) Suitable 4 Use Levels (S4ULs) provided by Land Quality Management Limited and the Chartered Institute of Environmental Health (CIEH). Where CIEH thresholds are not available reference has been made to Category 4 Screening Levels (C4SLs).

Both subsoil and topsoil results from all sampling locations are summarised in the following table.

<b>Table 1 Summary of Soil Chemical Test Results Imported Soils</b>					
Substance	SGV/GAC (mg/kg)	Source	Measured Concentrations of Tested Substances (mg/kg)		Number of Exceedances
			Minimum	Maximum	
Arsenic	37	CIEH	10	16	0
Boron	290	CIEH	0.44	0.96	0
Cadmium	11	CIEH	0.37	1.1	0
Chromium III	910	CIEH	13	62	0
Chromium VI	6	CIEH	<0.5	<0.5	0
Copper	2400	CIEH	17	33	0
Lead	200	C4SL	43	81	0
Mercury	40	CIEH	0.06	0.15	0
Nickel	130	CIEH	13	28	0
Selenium	250	CIEH	<0.2	0.46	0
Zinc	3700	CIEH	91	190	0
Cyanide	8	-	<0.5	<0.5	0
Phenols	120	CIEH	<0.3	<0.3	0
Organic Matter	-	-	0.9	3.6	-
pH	-	-			-
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	1.6	0
Anthracene	2400	CIEH	<0.1	0.51	0
Fluoranthene	280	CIEH	<0.1	1.5	0
Pyrene	620	CIEH	<0.1	1.5	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

<b>Table 1 Summary of Soil Chemical Test Results (Continued)</b>					
<b>Imported Soils</b>					
Substance	GAC (mg/kg)	Source	Measured Concentrations of Tested Substances (mg/kg)		Number of Exceedances
			Minimum	Maximum	
<b>Aliphatic</b>					
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	670	1
PH C10 – C12 Ali	130	CIEH	<1.0	2400	1
PH C12 – C16 Ali	1100	CIEH	<1.0	5800	1
PH C16 – C21 Ali*	65000	CIEH	<1.0	<1.0	0
PH C21 – C35 Ali*	65000	CIEH	<1.0	24	0
PH C35 – C44 Ali	65000	CIEH	<1.0	<1.0	0
<b>Aromatic</b>					
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	430	1
PH C10 – C12 Arom	74	CIEH	<1.0	1600	1
PH C12 – C16 Arom	140	CIEH	<1.0	4300	1
PH C16 – C21 Arom	260	CIEH	<1.0	4400	1
PH C21 – C35 Arom	1100	CIEH	<1.0	2400	1
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 table it can be seen that all substances tested for are present at levels below their respective human health threshold levels with the exception of petroleum hydrocarbons in one sample.

This was identified in subsoil in Plot 74. Given the unusual results and no evidence of petroleum hydrocarbons in the soil during sampling this was anticipated to be an anomaly. Terra Firma (Wales) Limited therefore returned to site on the 6<sup>th</sup> January 2021. Three hand dug holes were excavated around the original sample location at Plot 74 and additional samples of the subsoil retrieved (S1-S3), please refer to **Figure 2** on the following page.

The three subsoil samples were submitted for laboratory analysis for TPHCWG. The test result certificate may be found in **Annex E**. Results are summarised in **Table 2**.

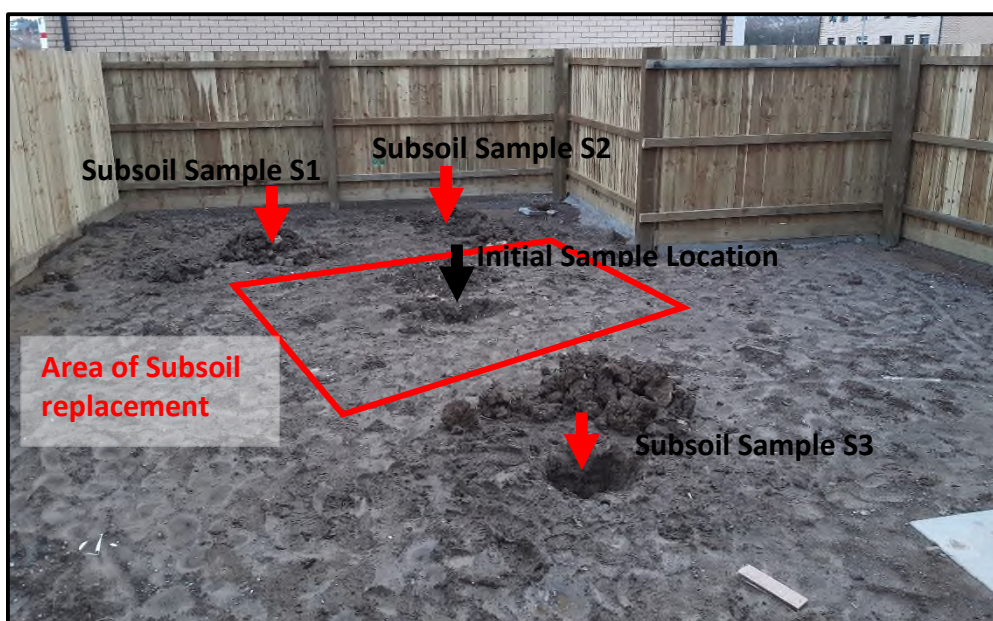


Figure 2: Plot 74 Subsoil Sampling Locations

Table 2 Additional Subsoil Test Results Plot 74					
Substance	GAC (mg/kg)	Source	Measured Concentrations of Tested Substances (mg/kg)		Number of Exceedances
			Minimum	Maximum	
<b>Aliphatic</b>					
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
<b>Aromatic</b>					
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

These results provide confidence that the original anomalous Plot 74 subsoil sample results were not representative of the subsoil as a whole and most likely caused by recent site activities.

It was therefore recommended that an area of subsoil roughly 2m by 2m be excavated out, removed from site, and replaced. The approximate dig area is illustrated in **Figure 2**. This was completed on 8<sup>th</sup> January 2020, with subsoil from the same Curtis Lane source used to replace that excavated.

It may now be confirmed that the imported subsoil and topsoil does 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**

A handwritten signature in black ink that reads "R. Howells." with a small flourish at the end.

**Mrs Ruth Howells**

**Annex A**  
**Bonvilston Soils Source Test Results**



# Final Report

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**Report No.:** 20-28927-1  
**Initial Date of Issue:** 02-Nov-2020  
**Client:** Terra Firma (Wales) Ltd  
**Client Address:** 5 Deryn Court  
Wharfedale Road  
Pentwyn  
Cardiff  
CF23 7HA  
**Contact(s):** ruth@terrafirmawales.co.uk  
**Project:** Bonvilston  
**Quotation No.:** **Date Received:** 27-Oct-2020  
**Order No.:** 13032/RH **Date Instructed:** 27-Oct-2020  
**No. of Samples:** 9  
**Turnaround (Wkdays):** 5 **Results Due:** 02-Nov-2020  
**Date Approved:** 02-Nov-2020

**Approved By:**

**Details:** Glynn Harvey, Technical Manager

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## Results - Soil

**Project: Bonvilston**

Client: Terra Firma (Wales) Ltd		Chemtest Job No.: 20-28927 20-28927 20-28927 20-28927 20-28927 20-28927 20-28927 20-28927 20-28927 20-28927 20-28927												
Quotation No.:		Chemtest Sample ID.: 1086797 1086798 1086799 1086800 1086801 1086802 1086803 1086804 1086805												
Order No.: 13032/RH		Client Sample Ref.: SS S1 SS S2 SS S3 SS S4 SS S5 SS S6 TS S1 TS S2 TS S3												
		Client Sample ID.: SS S1 SS S2 SS S3 SS S4 SS S5 SS S6 TS S1 TS S2 TS S3												
		Sample Type: SOIL SOIL SOIL SOIL SOIL SOIL SOIL SOIL SOIL SOIL SOIL												
		Date Sampled: 23-Oct-2020 23-Oct-2020 23-Oct-2020 23-Oct-2020 23-Oct-2020 23-Oct-2020 23-Oct-2020 23-Oct-2020 23-Oct-2020 23-Oct-2020 23-Oct-2020												
		Time Sampled: 12:00 12:00 12:00 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 DURHAM DURHAM DURHAM												
Determinand	Accred.	SOP	Units	LOD										
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	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	13	10	12	11	10	13	16	13	13	13
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones and Roots	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Sand	Sand	Sand	Sand	Sand	Sand	Sand
pH	M	2010		4.0	8.7	8.6	8.9	9.3	8.4	8.0	7.3	7.6	8.1	8.1
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40	< 0.40	< 0.40	0.47	< 0.40	< 0.40	0.47	0.51	< 0.40	< 0.40
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 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	0.022	0.036	0.048	0.042	< 0.010	0.022	0.054	0.051	0.036	0.036
Arsenic	M	2450	mg/kg	1.0	11	14	12	11	9.2	8.6	12	12	11	11
Cadmium	M	2450	mg/kg	0.10	0.24	0.36	0.28	0.29	0.28	0.17	0.34	0.34	0.32	0.32
Chromium	M	2450	mg/kg	1.0	20	21	20	17	17	17	14	15	13	13
Mercury Low Level	M	2450	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.06	0.13	0.12	0.12
Copper	M	2450	mg/kg	0.50	17	18	20	24	17	14	15	16	14	14
Nickel	M	2450	mg/kg	0.50	25	27	25	23	27	22	14	17	16	16
Lead	M	2450	mg/kg	0.50	32	33	33	28	41	34	47	52	43	43
Selenium	M	2450	mg/kg	0.20	0.28	< 0.20	< 0.20	< 0.20	0.32	0.42	0.37	0.37	0.40	0.40
Zinc	M	2450	mg/kg	0.50	83	89	90	79	89	80	72	75	71	71
Chromium (Trivalent)	N	2490	mg/kg	1.0	20	21	20	17	17	17	14	15	13	13
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 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	< 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	< 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	< 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	< 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	< 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	< 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	< 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	< 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	< 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	< 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	< 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	< 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	< 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	< 1.0	< 1.0

## Results - Soil

**Project: Bonvilston**

Client: Terra Firma (Wales) Ltd		Chemtest Job No.: 20-28927 20-28927 20-28927 20-28927 20-28927 20-28927 20-28927 20-28927 20-28927 20-28927											
Quotation No.:		Chemtest Sample ID.: 1086797 1086798 1086799 1086800 1086801 1086802 1086803 1086804 1086805											
Order No.: 13032/RH		Client Sample Ref.: SS S1 SS S2 SS S3 SS S4 SS S5 SS S6 TS S1 TS S2 TS S3											
		Client Sample ID.: SS S1 SS S2 SS S3 SS S4 SS S5 SS S6 TS S1 TS S2 TS S3											
		Sample Type: SOIL SOIL SOIL SOIL SOIL SOIL SOIL SOIL SOIL SOIL											
		Date Sampled: 23-Oct-2020 23-Oct-2020 23-Oct-2020 23-Oct-2020 23-Oct-2020 23-Oct-2020 23-Oct-2020 23-Oct-2020 23-Oct-2020 23-Oct-2020											
		Time Sampled: 12:00 12:00 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 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	< 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	< 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	< 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	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 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	< 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	< 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	< 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	< 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	< 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	< 0.10
Fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.13	< 0.10	< 0.10	< 0.10	< 0.10	1.1
Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.12	< 0.10	< 0.10	< 0.10	< 0.10	1.0
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	< 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	< 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	< 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	< 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	< 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	< 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	< 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	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	2.1
Total Phenols	M	2920	mg/kg	0.30	< 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	0.80	0.60	0.60	0.80	0.30	1.4	3.1	2.6	2.5

# Results - Topsoil Report

BS3882:2015

**Chemtest Job No.:** 20-28927  
**Chemtest Sample ID.:** 1086803  
 Client Sample Ref.: TS S1  
 Sample Location:  
**Client Sample ID.:** TS S1  
 Top Depth (m):  
 Bottom Depth (m):  
 Date Sampled: 23-Oct-2020  
 Time Sampled:

Parameter	Units	Multipurpose Range	Result	Compliant with Multipurpose Range? (Y/N)	Compliant with Specific Purpose Range? (Y/N)		
					Acid	Low F	Calc.
<b>Texture</b>							
Clay content	%		21				
Silt content	%		27				
Sand content	%		52				
Soil texture class		See Attached Chart	Sandy Clay Loam	YES			
<b>Mass Loss on Ignition</b>							
Clay 5-20%		3.0-20	4.1	NO	NO	YES	NO
Clay 20-35%		5.0-20					
<b>Stone Content</b>	% m/m						
>2mm		0-30	28	YES			
>20mm		0-10	3.8	YES			
>50mm		0	< 0.020	YES			
Soil pH value		5.5-8.5	7.3	YES	NO	YES	NO
Carbonate (Calcareous only)	%		5.3				YES
Electrical Conductivity	µS/cm	If >3300 do ESP	2200	YES			
<b>Available Nutrient Content</b>							
Nitrogen %		>0.15	0.23	YES	YES		YES
Extractable phosphorus	mg/l	16-140	6.5	NO	NO	YES	NO
Extractable potassium	mg/l	121-1500	75	NO	NO		NO
Extractable magnesium	mg/l	51-600	120	YES	YES		YES
<b>Carbon : Nitrogen Ratio</b>		<20:1	10.4/1	YES	YES	YES	YES
<b>Exchangeable sodium</b>	%	<15	0.95				
Available Calcium	mg/l		1900				
Available Sodium	mg/l		24				
<b>Phytotoxic Contaminants (by soil pH)</b>		<b>&lt; 6.0</b> <b>6.0-7.0</b> <b>&gt; 7.0</b>					
Zinc (Nitric Acid extract)	mg/kg	<200 <200 <300	57	YES			
Copper (Nitric Acid extract)	mg/kg	<100 <135 <200	14	YES			
Nickel (Nitric Acid extract)	mg/kg	<60 <75 <110	12	YES			
<b>Visible Contaminants</b>	% mm						
>2mm		<0.5	0.000	YES			
..... of which plastics		<0.25	0.000	YES			
..... man-made sharps		zero in 1kg	0.000	YES			

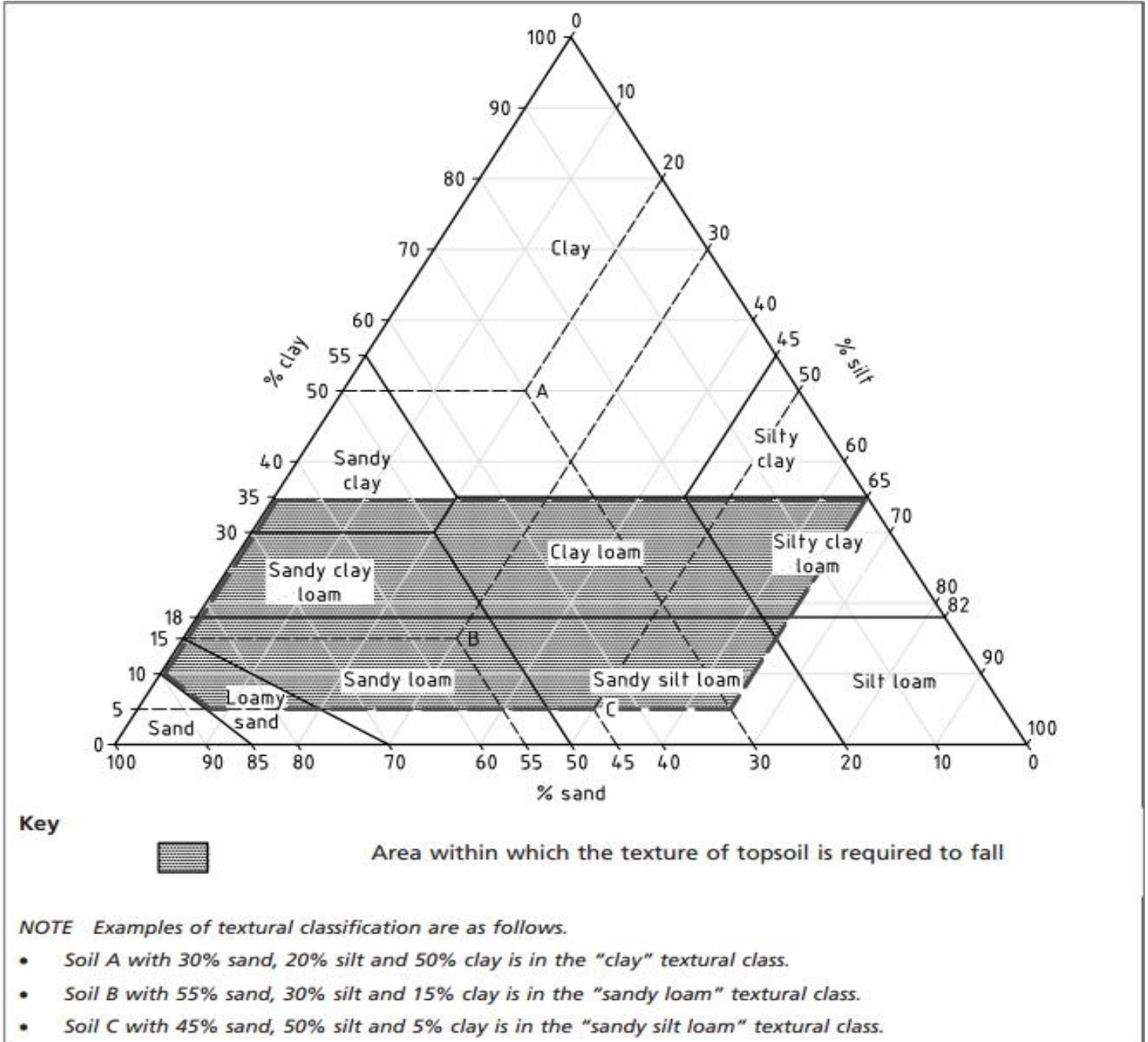
# Results - Topsoil Report

BS3882:2015

Chemtest Job No.: 20-28927  
 Chemtest Sample ID.: 1086804  
 Client Sample Ref.: TS S2  
 Sample Location:  
 Client Sample ID.: TS S2  
 Top Depth (m):  
 Bottom Depth (m):  
 Date Sampled: 23-Oct-2020  
 Time Sampled:

Parameter	Units	Multipurpose Range	Result	Compliant with Multipurpose Range? (Y/N)	Compliant with Specific Purpose Range? (Y/N)		
					Acid	Low F	Calc.
<b>Texture</b>							
Clay content	%		19				
Silt content	%		24				
Sand content	%		56				
Soil texture class		See Attached Chart	Sandy Clay Loam	YES			
<b>Mass Loss on Ignition</b>							
Clay 5-20%		3.0-20	3.5	YES	YES	YES	YES
Clay 20-35%		5.0-20					
<b>Stone Content</b>	% m/m						
>2mm		0-30	23	YES			
>20mm		0-10	9.7	YES			
>50mm		0	< 0.020	YES			
Soil pH value		5.5-8.5	7.6	YES	NO	YES	YES
Carbonate (Calcareous only)	%		4.0				YES
Electrical Conductivity	µS/cm	If >3300 do ESP	2200	YES			
<b>Available Nutrient Content</b>							
Nitrogen %		>0.15	0.21	YES	YES		YES
Extractable phosphorus	mg/l	16-140	7.2	NO	NO	YES	NO
Extractable potassium	mg/l	121-1500	85	NO	NO		NO
Extractable magnesium	mg/l	51-600	130	YES	YES		YES
<b>Carbon : Nitrogen Ratio</b>		<20:1	9.9/1	YES	YES	YES	YES
<b>Exchangeable sodium</b>	%	<15	0.87				
Available Calcium	mg/l		1600				
Available Sodium	mg/l		19				
<b>Phytotoxic Contaminants (by soil pH)</b>		<b>&lt; 6.0</b> <b>6.0-7.0</b> <b>&gt; 7.0</b>					
Zinc (Nitric Acid extract)	mg/kg	<200 <200 <300	59	YES			
Copper (Nitric Acid extract)	mg/kg	<100 <135 <200	16	YES			
Nickel (Nitric Acid extract)	mg/kg	<60 <75 <110	14	YES			
<b>Visible Contaminants</b>	% mm						
>2mm		<0.5	0.000	YES			
..... of which plastics		<0.25	0.000	YES			
..... man-made sharps		zero in 1kg	0.000	YES			

**Texture Classification Chart**



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British Standards can be obtained in PDF or hard copy formats from the BSI online shop: [www.bsigroup.com/Shop](http://www.bsigroup.com/Shop) or by contacting BSI Customer Services for hardcopies only: Tel: +44 (0)20 8996 9001, Email: [cservices@bsigroup.com](mailto:cservices@bsigroup.com).

## Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2020	Electrical Conductivity	Electrical conductivity (EC) of aqueous extract or calcium sulphate solution for topsoil	Measurement of the electrical resistance of a 2:1 water/soil extract.
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
2115	Total Nitrogen in Soils	Nitrogen	Determination by elemental analyser
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2260	Carbonate	Carbonate	Titration
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Alkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2400	Cations	Cations	ICP-MS
2420	Phosphate	Phosphate	Spectrophotometry - Discrete 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.
2620	LOI 440	LOI 440 Trommel Fines	Determination of the proportion by mass that is lost from a soil by ignition at 440°C.
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](mailto:customerservices@chemtest.com)

**Annex B**  
**Curtis Lane Soils Source Test Results**

11810/LW

8 July 2019

Engie UK Places & Communities  
2<sup>nd</sup> 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.

This report (including all appendices to it and any subsequent addendums or correspondence) has been prepared for the sole benefit, use and information of Engie UK Places & Communities and no third party is entitled or permitted to rely on it. This report may not be used, reproduced or circulated (in whole or part) for any purpose without the written consent of Intégral Géotechnique (Wales) Limited. Intégral Géotechnique (Wales) Limited shall not be liable to any third party who does not have such express written permission to rely on the report for any losses they may suffer.

### ***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 18<sup>th</sup> 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.



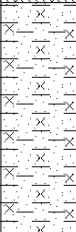
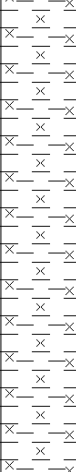


Yours faithfully,



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

## **APPENDIX A**

### **TRIAL PIT LOGS**

 Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: <b>Curtis Lane, Stoke Gifford</b>		Project No.: <b>11810</b>	Trial Pit No.: <b>TP101</b> Sheet 1 of 1	
		Location: <b>Bristol</b>		Client: <b>Engie UK Places &amp; Communities</b>	Logged By: <b>LW</b>	Scale <b>1:25</b>
Equipment: <b>JCB 3CX</b>		Coordinates:		<b>Dimensions</b> 3.00m Depth : 2.60m 0.70m		
Date Excavated: <b>18/03/2019</b>		Level:				
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.
						Firm, locally soft to firm brown becoming red brown slightly sandy silty CLAY.
			1.00			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.
			2.60			End of Trialpit at 2.60 m
<b>Remarks:</b> 1. Trial pit terminated at 2.6m bgl.			Groundwater: <b>Groundwater not encountered</b>		<b>Key:</b> D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample	
			Stability: <b>Stable</b>			



<b>Location:</b> Bristol	<b>Client:</b> Engie UK Places & Communities	<b>Logged By:</b> LW	<b>Scale:</b> 1:25
-----------------------------	--	-------------------------	-----------------------

<b>Equipment:</b> JCB 3CX	<b>Coordinates:</b>	<b>Dimensions:</b> 2.80m
---------------------------	---------------------	-----------------------------

<b>Date Excavated:</b> 18/03/2019	<b>Level:</b>	<b>Depth:</b> 2.60m
-----------------------------------	---------------	---------------------

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.
			0.60			Firm brown to red brown silty CLAY.
			2.20			Firm to stiff red brown slightly silty CLAY with frequent extremely weak weathered mudstone lithorelicts.  ... Mudstone cobbles from 2m.
			2.60			Extremely weak thinly bedded highly weathered MUDSTONE. Excavated as fine to coarse angular to subangular mudstone gravel with some cobbles in a clayey matrix.
						End of Trialpit at 2.60 m

<b>Remarks:</b> 1. Trial pit terminated at 2.6m bgl.	<b>Groundwater:</b> Groundwater not encountered.	<b>Key:</b> D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample
	<b>Stability:</b> Stable	

 Intégral House, 7 Beddau Way Castlegate Business Park Caerphilly CF83 2AX Tel. 029 20807991 Fax. 029 20862176 mail@integralgeotec.com		Project Name: <b>Curtis Lane, Stoke Gifford</b>		Project No.: <b>11810</b>	Trial Pit No.: <b>TP103</b> Sheet 1 of 1	
		Location: <b>Bristol</b>		Client: <b>Engie UK Places &amp; Communities</b>	Logged By: <b>LW</b>	Scale <b>1:25</b>
Equipment: <b>JCB 3CX</b>		Coordinates:		<b>Dimensions</b> 3.00m Depth : 2.30m 0.70m		
Date Excavated: <b>18/03/2019</b>		Level:				
Samples & In-situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results	0.10			Topsoil: Grass onto brown slightly gravelly silty clay with rootlets. Gravel is fine to medium angular of mudstone.
	ES		0.15			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
<b>Remarks:</b> 1. Trial pit terminated at 2.3m bgl.			Groundwater: <b>Groundwater not encountered.</b>		<b>Key:</b> D - Small disturbed sample B - Bulk disturbed sample ES - Environmental soil sample W - Water sample	
			Stability: <b>Stable</b>			

## **APPENDIX B**

### **LABORATORY CHEMICAL TEST RESULTS**



**Lowri Williams**

Integral Geotechnique  
Integral House  
7 Beddau Way  
Castlegate Business Park  
CF83 2AX

i2 Analytical Ltd.  
7 Woodshots Meadow,  
Croxley Green  
Business Park,  
Watford,  
Herts,  
WD18 8YS

**t:** 02920807991  
**f:** 02920862176  
**e:** Lowri@integralgeotec.com

**t:** 01923 225404  
**f:** 01923 237404  
**e:** reception@i2analytical.com

## **Analytical Report Number : 19-33901-A**

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

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

Excel copies of reports are only valid when accompanied by this PDF certificate.

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.

Iss No 19-33901-2A Curtis Lane, Stoke Gifford 11810

This certificate should not be reproduced, except in full, without the express permission of the laboratory.

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

Page 1 of 6

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 <sub>4</sub>	mg/kg	50	MCERTS	770	1100	1200			
Water Soluble SO <sub>4</sub> 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			
Dibenzo(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		
<b>TPH-CWG - Aliphatic (EC5 - EC35)</b>	mg/kg	10	MCERTS	< 10	< 10	< 10		
<b>TPH-CWG - Aliphatic (EC5 - EC44)</b>	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		
<b>TPH-CWG - Aromatic (EC5 - EC35)</b>	mg/kg	10	MCERTS	< 10	< 10	20		
<b>TPH-CWG - Aromatic (EC5 - EC44)</b>	mg/kg	10	NONE	< 10	< 10	20		

<b>TPH Total C5 - C44</b>	mg/kg	10	NONE	< 10	< 10	20		
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**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 diphenylcarbazine 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

Iss No 19-33901-2A Curtis Lane, Stoke Gifford 11810

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

Page 5 of 6



**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.**

## **APPENDIX C**

### **SUMMARY OF CHEMICAL RESULTS**

## SUMMARY OF LABORATORY SOIL TEST RESULTS

### METALS AND SEMI-METALS

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

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			<b>37.0</b>	<b>290.0</b>	<b>1.7</b>	<b>11.0</b>	-	<b>6.0</b>	<b>2400.0</b>	<b>200.0</b>	<b>1.2</b>	<b>130.0</b>	<b>250.0</b>	<b>410.0</b>	<b>3700.0</b>
Source of Screening Criteria Value			S4UL	S4UL	S4UL	S4UL	-	S4UL	S4UL	C4SL	S4UL	S4UL	S4UL	S4UL	S4UL

## SUMMARY OF LABORATORY SOIL TEST RESULTS

### INORGANIC CHEMICALS & OTHERS

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

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

## SUMMARY OF LABORATORY SOIL TEST RESULTS

### POLYAROMATIC HYDROCARBONS (PAH)

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

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

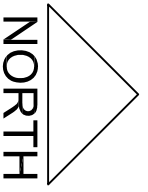
## SUMMARY OF LABORATORY SOIL TEST RESULTS

### PETROLEUM HYDROCARBONS



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

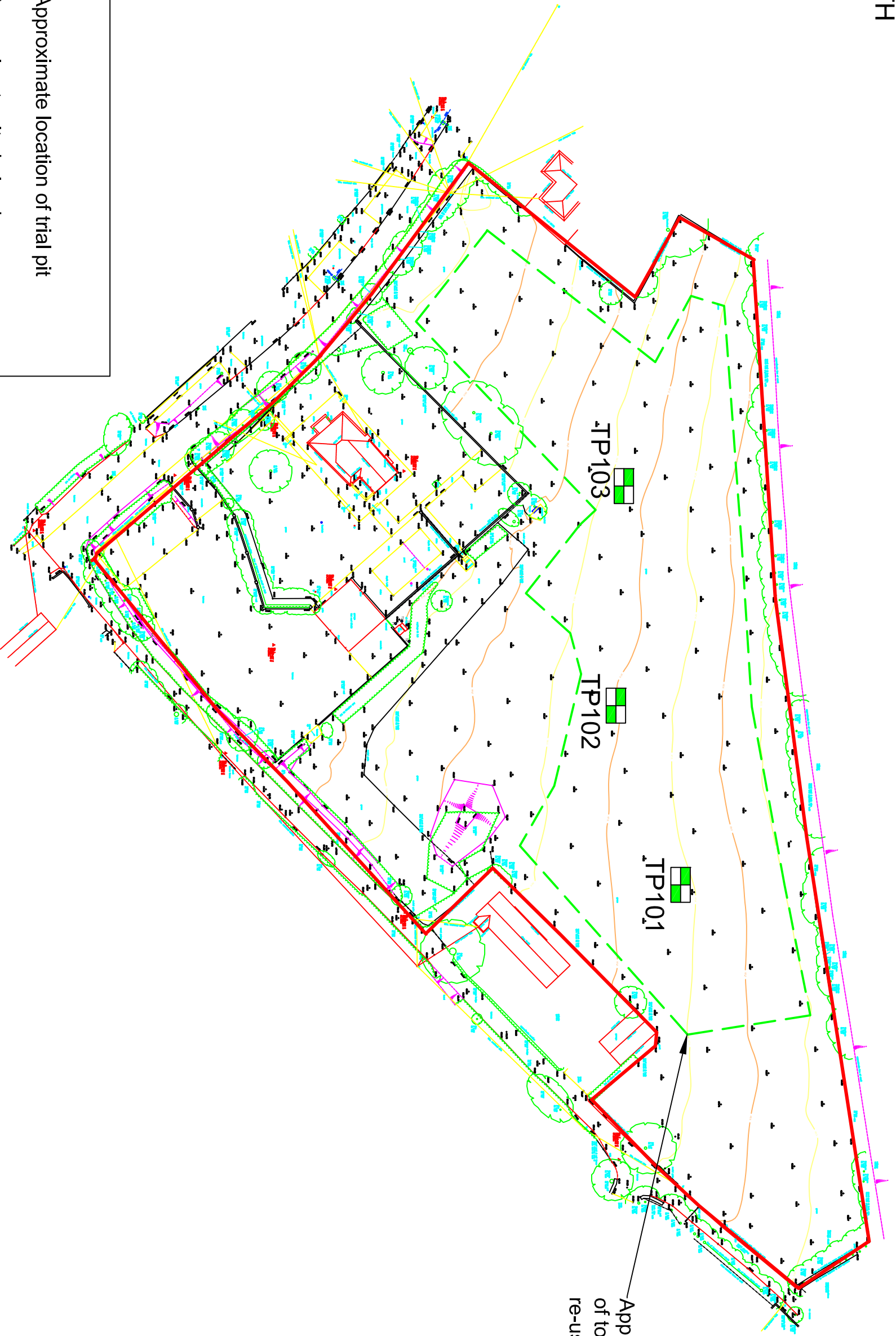
No.	Location	Depth (m)	Aliphatic C5-C6 (mg/kg)	Aliphatic C6-C8 (mg/kg)	Aliphatic C8-C10 (mg/kg)	Aliphatic C10- C12 EPH (mg/kg)	Aliphatic C12- C16 EPH (mg/kg)	Aliphatic C16-C35 EPH (mg/kg)	Aliphatic C35- C44 EPH (mg/kg)	Aromatic C5-C7 (mg/kg)	Aromatic C7-C8 (mg/kg)	Aromatic C8-C10 (mg/kg)	Aromatic C10- 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

## FIGURES



**KEY**

-  Approximate location of trial pit
-  Approximate site boundary



Approximate extent of topsoil suitable for re-use onsite or offsite

Figure 1: Site Plan

Project: Curtis Lane, Stoke Gifford

Client: Engle UK Places & Communities

Job No.: 11810

Scale: 1:800 at A3

**Integral**  
Géotechnique

Integral House,  
7 Beddau Way,  
Castlegate Business Park,  
Caerphilly,  
CF83 2AX  
Tel: 029 2080 7991

**Annex C**  
**Capping Thickness Validation Photos**

Plot 56



Plot 62



Plot 65



Plot 68



Plot 74



Plot 39



**Plot 41**



**Adjacent to Plot 45**



**Annex D**  
**Laboratory Soil Test Results**



# Final Report

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**Report No.:** 20-34859-1  
**Initial Date of Issue:** 24-Dec-2020  
**Client:** Terra Firma (Wales) Ltd  
**Client Address:** 5 Deryn Court  
Wharfedale Road  
Pentwyn  
Cardiff  
CF23 7HA  
**Contact(s):** ruth@terrafirmawales.co.uk  
**Project:** H. Road  
**Quotation No.:** **Date Received:** 18-Dec-2020  
**Order No.:** 12032RH **Date Instructed:** 18-Dec-2020  
**No. of Samples:** 12  
**Turnaround (Wkdays):** 5 **Results Due:** 24-Dec-2020  
**Date Approved:** 24-Dec-2020

**Approved By:**

**Details:** Glynn Harvey, Technical Manager

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## Results - Soil

**Project: H. Road**

Client: Terra Firma (Wales) Ltd		Chemtest Job No.:											
Quotation No.:	Chemtest Sample ID.:												
Order No.: 12032RH	Client Sample Ref.:												
	Client Sample ID.:												
	Sample Type:												
	Date Sampled:												
	Time Sampled:												
	Asbestos Lab:												
Determinand	Accred.	SOP	Units	LOD									
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	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	23	19	26	17	27	18	31	15	27
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	None	None	None	None	None	None	None	None	None
Soil Texture	N	2040		N/A	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay
pH	M	2010		4.0	7.9	8.3	8.0	9.3	8.2	8.4	8.4	8.4	8.4
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	0.59	0.96	0.53	0.82	0.51	0.50	0.59	0.44	0.66
Cyanide (Total)	M	2300	mg/kg	0.50	< 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	0.10	0.089	0.056	0.15	0.053	0.058	0.057	0.055	0.080
Arsenic	M	2450	mg/kg	1.0	10	11	14	13	12	16	13	11	13
Cadmium	M	2450	mg/kg	0.10	0.68	0.83	0.49	1.1	0.41	0.84	0.37	0.39	0.93
Chromium	M	2450	mg/kg	1.0	13	18	21	62	16	22	16	18	26
Mercury Low Level	M	2450	mg/kg	0.05	0.09	0.09	0.12	0.14	0.08	0.09	0.08	0.06	0.15
Copper	M	2450	mg/kg	0.50	17	32	19	33	19	26	17	18	30
Nickel	M	2450	mg/kg	0.50	13	19	18	27	16	27	16	22	28
Lead	M	2450	mg/kg	0.50	46	65	59	55	50	81	52	43	83
Selenium	M	2450	mg/kg	0.20	0.31	0.21	0.46	< 0.20	0.25	0.20	0.43	0.23	0.26
Zinc	M	2450	mg/kg	0.50	91	170	110	140	96	140	89	94	190
Chromium (Trivalent)	N	2490	mg/kg	1.0	13	18	21	62	16	22	16	18	26
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 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	< 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	< 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	< 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	< 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	< 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	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	24	< 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	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	24	< 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	< 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	< 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	< 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	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	7.9	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	21	< 1.0	< 1.0	< 1.0

## Results - Soil

**Project: H. Road**

Client: Terra Firma (Wales) Ltd		Chemtest Job No.:											
Quotation No.:	Chemtest Sample ID.:												
Order No.: 12032RH	Client Sample Ref.:												
	Client Sample ID.:												
	Sample Type:												
	Date Sampled:												
	Time Sampled:												
	Asbestos Lab:												
Determinand	Accred.	SOP	Units	LOD									
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	180	< 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	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	210	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10	< 10	< 10	240	< 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	< 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	< 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	< 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	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	0.14	0.36	< 0.10	0.47	< 0.10	1.6	< 0.10	< 0.10	< 0.10
Anthracene	M	2700	mg/kg	0.10	< 0.10	0.19	< 0.10	0.16	< 0.10	0.51	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.10	0.28	0.34	0.79	0.83	0.72	1.5	0.91	< 0.10	< 0.10
Pyrene	M	2700	mg/kg	0.10	0.33	0.48	0.76	0.94	0.67	1.5	0.61	< 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	< 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	< 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	< 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	< 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	< 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	< 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	< 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	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0	< 2.0	< 2.0	2.4	< 2.0	5.1	< 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	< 0.30
Organic Matter BS1377	N	2930	%	0.10	3.1	1.7	3.6	1.3	3.1	1.7	3.5	1.4	4.4

## Results - Soil

**Project: H. Road**

Client: Terra Firma (Wales) Ltd		Chemtest Job No.:		20-34859	20-34859	20-34859	
Quotation No.:		Chemtest Sample ID.:		1116037	1116038	1116039	
Order No.: 12032RH		Client Sample Ref.:		PLOT 68 SS	PLOT 74 TS	PLOT 74 SS	
		Client Sample ID.:		PLOT 68 SS	PLOT 74 TS	PLOT 74 SS	
		Sample Type:		SOIL	SOIL	SOIL	
		Date Sampled:		17-Dec-2020	17-Dec-2020	17-Dec-2020	
		Time Sampled:		12:00	12:00	12:00	
		Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	
Determinand	Accred.	SOP	Units	LOD			
ACM Type	U	2192		N/A	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-	-	-
Moisture	N	2030	%	0.020	16	28	22
Soil Colour	N	2040		N/A	Brown	Brown	Brown
Other Material	N	2040		N/A	Roots	None	None
Soil Texture	N	2040		N/A	Clay	Clay	Clay
pH	M	2010		4.0	8.5	8.2	8.3
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	0.44	0.51	0.66
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Sulphate (Acid Soluble)	M	2430	%	0.010	0.041	0.064	0.079
Arsenic	M	2450	mg/kg	1.0	14	16	15
Cadmium	M	2450	mg/kg	0.10	0.54	0.47	1.1
Chromium	M	2450	mg/kg	1.0	20	23	20
Mercury Low Level	M	2450	mg/kg	0.05	0.07	0.08	0.11
Copper	M	2450	mg/kg	0.50	23	19	29
Nickel	M	2450	mg/kg	0.50	24	23	21
Lead	M	2450	mg/kg	0.50	46	51	60
Selenium	M	2450	mg/kg	0.20	< 0.20	0.46	0.24
Zinc	M	2450	mg/kg	0.50	110	100	150
Chromium (Trivalent)	N	2490	mg/kg	1.0	20	23	20
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	670
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	2400
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	5800
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0	5500
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	2400
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	17000
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	430
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	1600
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	4300
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	4400

## Results - Soil

**Project: H. Road**

Client: Terra Firma (Wales) Ltd		Chemtest Job No.:		20-34859	20-34859	20-34859
Quotation No.:		Chemtest Sample ID.:		1116037	1116038	1116039
Order No.: 12032RH		Client Sample Ref.:		PLOT 68 SS	PLOT 74 TS	PLOT 74 SS
		Client Sample ID.:		PLOT 68 SS	PLOT 74 TS	PLOT 74 SS
		Sample Type:		SOIL	SOIL	SOIL
		Date Sampled:		17-Dec-2020	17-Dec-2020	17-Dec-2020
		Time Sampled:		12:00	12:00	12:00
		Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD		
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	2400
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	120
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	13000
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	30000
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Chrysene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0	< 2.0
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30
Organic Matter BS1377	N	2930	%	0.10	0.90	3.2

## 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	Alkaline 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**

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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**

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- 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**

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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](mailto:customerservices@chemtest.com)

**Annex E**  
**Curtis Lane Soils Source Test Results – Plot 74 Subsoil Additional Samples**



# Final Report

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**Report No.:** 21-00132-1

**Initial Date of Issue:** 08-Jan-2021

**Client:** Terra Firma (Wales) Ltd

**Client Address:** 5 Deryn Court  
Wharfedale Road  
Pentwyn  
Cardiff  
CF23 7HA

**Contact(s):** ruth@terrafirmawales.co.uk

**Project:** H. Road

**Quotation No.:** **Date Received:** 07-Jan-2021

**Order No.:** 12032RH **Date Instructed:** 07-Jan-2021

**No. of Samples:** 3

**Turnaround (Wkdays):** 5 **Results Due:** 13-Jan-2021

**Date Approved:** 08-Jan-2021

**Approved By:**  


**Details:** Glynn Harvey, Technical Manager

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## Results - Soil

**Project: H. Road**

<b>Client: Terra Firma (Wales) Ltd</b>		<b>Chemtest Job No.:</b>		21-00132	21-00132	21-00132	
Quotation No.:		<b>Chemtest Sample ID.:</b>		1120990	1120991	1120992	
Order No.: 12032RH		Client Sample Ref.:		PLOT 74 SS-S1	PLOT 74 SS-S2	PLOT 71 SS-S3	
		Client Sample ID.:		PLOT 74 SS-S1	PLOT 74 SS-S2	PLOT 74 SS-S3	
		Sample Type:		SOIL	SOIL	SOIL	
		Date Sampled:		06-Jan-2021	06-Jan-2021	06-Jan-2021	
		Time Sampled:		12:00	12:00	12:00	
<b>Determinand</b>	<b>Accred.</b>	<b>SOP</b>	<b>Units</b>	<b>LOD</b>			
Moisture	N	2030	%	0.020	16	15	14
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10

## Test Methods

SOP	Title	Parameters included	Method summary
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
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

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