

Our Ref: 12032/VR-PHASE 3 (N)

Your Ref:

Contact: Ruth Howells

6<sup>th</sup> October 2023

Equans Regeneration Limited  
Equinox North  
Great Park Road  
Almondsbury  
Bristol  
BS32 4QL

For the attn. of Richard Mackin

Dear Richard

**CAPPING VALIDATION REPORT: HERBERT ROAD, PHASE 3 PLOTS 127-137 & 150-160  
THE ISLAND)**

**Section 1 Introduction**

Equans is currently completing the residential development of Phase 3 of the Herbert Road development, Newport, on behalf of Pobl Group.

Terra Firma previously completed an investigation of the Phase 3 area of the development north of the drainage reën, as detailed in Geotechnical and Geo-environmental Report 12032/P3, dated July 2018.

This report identified contamination in the underlying made ground soils. It was recommended that all garden and soft landscaped areas should be capped with 600mm of clean imported soils, and a no-dig barrier be placed at the base of the capping layer.

Terra Firma letter report 'Phase 3 Piling Mat', dated 8<sup>th</sup> September 2023 covers the placement of a piling mat across the site prior to development. Sampling and analysis of this material concluded that a no-dig barrier was no longer required below the capping horizon for plots belonging to The Island.

TFW Group Limited have been commissioned by Equans to validate the thickness of the capping soil, and its suitability to be used in residential gardens with plant uptake based upon their chemical concentrations.

## Section 2 Capping Soils

Equans confirmed that the subsoil imported to date for Phase 3 is from two sources.

One source of topsoil was used.

Subsoil amounting to 900m<sup>3</sup> was imported for use from Neal Soils. This soil was used in Plots 167 – 195.

Subsoil from a source in Tranch was used in the remaining plots (Plots 49-55, 120-126 and Plots 133-166. This source was 700m<sup>3</sup> in volume.

Topsoil was imported from Bristol and Avon Group. The volume of topsoil will not exceed 500m<sup>3</sup>.

Chemical test data provided for the capping soils from their respective sources are provided in **Annex A**.

In accordance with publication 'Requirements for the Chemical testing of Imported Materials for Various End Uses and Validation of Cover Systems' a sampling regime to test 16 representative samples of the Neal Soils subsoil, 12 samples of the Tranch subsoil and 8 samples of the topsoil was determined. The capping soil thickness should be confirmed in 1 in 4 gardens and in landscaped areas.

The validation regime is summarised in the Drawing in **Annex B**.

**At this time the Client wishes to confirm satisfactory capping of the gardens and landscaped areas for Plots 127-137 & 150-160 (known as The Island).**

### 3.0 Verification of Capping Thickness and Soil Sampling

A Terra Firma Engineer visited the site on 31<sup>st</sup> July 2023.

Validation soil samples were taken from prepared plots, and the capping thickness verified.

It can be confirmed that a minimum 600mm capping thickness was present in the gardens of Plots 127, 131, 133, 153 and 157. Other plots inspected at this time (Plots 167 – 172) also had adequate capping at this time.

Photographs of the capping thickness validation may be found in **Annex C**.

Based on initial subsoil test results, Terra Firma returned to site on the 21<sup>st</sup> September to retrieve additional samples of subsoil.

### 4.0 Soil Test Results

Representative samples from The Island comprise topsoil samples from Plots 131 and 157 and subsoil samples from Plots 127, 131, 133, 153 and 157.

Samples were despatched to the laboratories of Eurofins Chemtest Ltd or Derwentside Environmental testing Services for chemical testing for a broad pathfinder suite of metals, inorganics, speciated polycyclic aromatic hydrocarbons and petroleum hydrocarbons. The samples were also screened for asbestos.

Additional subsoil samples were also retrieved from Plots 130, 132, 137, 150, 151, 154, 155, 160 for speciated PAH analysis.

Comparison of the analytical results has been made with the 2015 Suitable 4 Use Levels (S4UL) provided by Land Quality Management (LQM) Limited and the Chartered Institute of Environmental Health (CIEH) or provisional Category 4 Screening Levels (pC4SL).

The soil test certificates may be found in **Annex D**.

Results for topsoil samples taken on plots not included in The island have been included, five sets of results in total, to confirm its overall suitability.

A summary of the topsoil and subsoil chemical test results, which include the regulatory soil guideline values used in the Tier 1 assessment are given in Tables 3.1 to 3.3.

**Table 3.1 Summary of Soil Chemical Test Results – Inorganics & Miscellaneous**

Substance	Threshold Value (mg/kg)	Source	Measured Concentrations (mg/kg)		Number of Exceedances
			Minimum	Maximum	
Arsenic	37	LQM/CIEH	7.3	25	0
Cadmium	11	LQM/CIEH	0.37	17	1
Chromium III	910	LQM/CIEH	0.51	46	0
Chromium VI	6	LQM/CIEH	<0.5	<0.5	0
Copper	2400	LQM/CIEH	19	180	0
Lead	200	pC4SL	26	240	1
Mercury (inorganic)	40	LQM/CIEH	11	46	0
Nickel	180	LQM/CIEH	18	36	0
Selenium	250	LQM/CIEH	0.51	1.7	0
Zinc	3700	LQM/CIEH	96	920	0
Cyanide	-	-	<0.5	<0.5	0
Phenols	120	LQM/CIEH	<0.1	0.13	0
Boron	290	LQM/CIEH	<0.4	2.6	0
Organic Matter (%)	-	-	0.9	5.6	-
pH	-	-	6.8	8.9	-
Asbestos	-	-	Not detected		
Notes:					
- No available guideline					

**Table 3.2 Summary of Soil Chemical Test Results – Speciated PAH**

Substance	Threshold Value (mg/kg)	Source	Measured Concentrations (mg/kg)		Number of Exceedances
			Minimum	Maximum	
Naphthalene	2.3	LQM/CIEH	< 0.10	0.53	0
Acenaphthylene	170	LQM/CIEH	< 0.10	<0.1	0
Acenaphthene	210	LQM/CIEH	< 0.10	0.14	0
Fluorene	170	LQM/CIEH	< 0.10	0.12	0
Phenanthrene	95	LQM/CIEH	< 0.10	1.1	0
Anthracene	2400	LQM/CIEH	< 0.10	0.32	0
Fluoranthene	280	LQM/CIEH	< 0.10	1.7	0
Pyrene	620	LQM/CIEH	< 0.10	1.3	0
Benzo(a)anthracene	7.2	LQM/CIEH	< 0.10	0.91	0
Chrysene	15	LQM/CIEH	< 0.10	1.0	0
Benzo(b)fluoranthene	2.6	LQM/CIEH	< 0.10	1.1	0
Benzo(k)fluoranthene	77	LQM/CIEH	< 0.10	0.62	0
Benzo(a)pyrene	2.2	LQM/CIEH	< 0.10	0.76	0
Indeno(123cd)pyrene	27	LQM/CIEH	< 0.10	0.88	0
Dibenzo(ah)anthracene	0.24	LQM/CIEH	< 0.10	0.6	1
Benzo(ghi)perylene	320	LQM/CIEH	< 0.10	9.9	0
Total PAH	-	-	<2.0		-

Notes:  
 Thresholds based on 1.0% soil organic matter  
 - No available guidelines

**Table 3.3 Summary of Soil Chemical Test Results – Petroleum Hydrocarbons**

Substance	Threshold Value (mg/kg)	Source	Measured Concentrations (mg/kg)		Number of Exceedances
			Min	Max	
<b>Aliphatic</b>					
VPH C5 – C6 Ali	42	LQM/CIEH	<0.05	<0.05	0
VPH C6 – C7 Ali	100 <sup>^</sup>	LQM/CIEH	<0.05	<0.05	0
VPH C7 – C8 Ali	100 <sup>^</sup>	LQM/CIEH	<0.05	<0.05	0
VPH C8 – C10 Ali	27	LQM/CIEH	<0.05	<0.05	0
EPH C10 – C12 Ali	130	LQM/CIEH	<2.0	3.8	0
EPH C12 – C16 Ali	1100	LQM/CIEH	<1.0	1.4	0
EPH C16 – C21 Ali	65000 <sup>*</sup>	LQM/CIEH	<2.0	3.6	0
EPH C21 – C35 Ali	65000 <sup>*</sup>	LQM/CIEH	<3.0	43	0
EPH C35 – C40 Ali	65000	LQM/CIEH	<10	<10	0
<b>Aromatic</b>					
VPH C5 – C7 Arom	70	LQM/CIEH	<0.05	<0.05	0
VPH C7 – C8 Arom	130	LQM/CIEH	<0.05	<0.05	0
VPH C8 – C10 Arom	34	LQM/CIEH	<0.05	<0.05	0
EPH C10 – C12 Arom	74	LQM/CIEH	<0.25	<0.25	0
EPH C12 – C16 Arom	140	LQM/CIEH	<1.0	<1.0	0
EPH C16 – C21 Arom	260	LQM/CIEH	<1.0	13	0
EPH C21 – C35 Arom	1100	LQM/CIEH	9.4	71	0
EPH C35 – C40 Arom	1100	LQM/CIEH	<1.0	9.0	0
Notes:					
VPH – Volatile Petroleum Hydrocarbon					
EPH – Extractable Petroleum Hydrocarbon					
Ali – Aliphatic					
Arom – Aromatic					
Thresholds based on 1.0% soil organic matter					
<sup>^</sup> – Ali C6-C7 and C7-C8 based on criteria for Ali EC >6-8					
<sup>*</sup> – Ali C16-21 and C21-C35 based on criteria for Ali EC >16-35					

#### **Section 4     Conclusions**

Two layers of subsoil were encountered in Plot 133. The lower layer of subsoil in Plot 133 (0.4 – 0.6m) was found to have an elevated concentration of both lead and cadmium. This garden is isolated from neighbouring gardens, and these two layers of subsoil in the rear garden of this plot differed to soils found elsewhere. This may be to the fact that this garden is retained to the south by a wall.

It is recommended that the subsoil and topsoil in Plot 133 be removed and replaced. The replacement soils should be sampled and tested in due course.

An exceedance of dibenz(a,h)anthracene was recorded in the subsoil of Plot 131. No other exceedances were identified in the subsoil. It is therefore recommended that the subsoil in Plot 131 be removed and replaced.

We 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 us.

Yours sincerely

**for: TFW Group Limited**



**Mrs Ruth Howells**

Enc.

**ANNEX A**

## **APPENDIX G**

### **LABORATORY CHEMICAL TEST RESULTS (SOILS)**



**Jack Jones**  
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7 Beddau Way  
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e: [REDACTED]

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e: [REDACTED]

## **Analytical Report Number : 20-80658**

<b>Project / Site name:</b>	Penywain Ln	<b>Samples received on:</b>	14/01/2020
<b>Your job number:</b>	12582	<b>Samples instructed on:</b>	14/01/2020
<b>Your order number:</b>		<b>Analysis completed by:</b>	21/01/2020
<b>Report Issue Number:</b>	1	<b>Report issued on:</b>	21/01/2020
<b>Samples Analysed:</b>	6 soil samples		

**Signed:** [REDACTED]

Agnieszka Czerwińska

Technical Reviewer (Reporting Team)  
**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 20-80658-1 Penywain Ln 12582

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.

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Project / Site name: Penywain Ln

Lab Sample Number	1409724				1409725		1409726		1409727		1409728	
Sample Reference	SA2				TP1		TP2		TP3		TP5	
Sample Number	None Supplied				None Supplied		None Supplied		None Supplied		None Supplied	
Depth (m)	0.20				0.20		0.20		0.30		0.50	
Date Sampled	10/01/2020				10/01/2020		10/01/2020		10/01/2020		10/01/2020	
Time Taken	0930				1000		1030		1100		1200	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status									
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	13	10	9.4	10	14				
Total mass of sample received	kg	0.001	NONE	0.60	0.60	0.80	0.60	0.60				

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected

#### General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7	7.6	7.9	8.0	8.0
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO <sub>4</sub>	mg/kg	50	MCERTS	350	180	970	1400	700
Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.010	0.0086	0.023	0.010	0.024
Sulphide	mg/kg	1	MCERTS	< 1.0	1.0	< 1.0	1.3	< 1.0
Total Sulphur	mg/kg	50	MCERTS	140	72	400	480	360
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.1	0.5	0.7	0.8	0.8
Loss on Ignition @ 450°C	%	0.2	MCERTS	4.2	2.2	3.3	3.5	4.0

#### Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

#### Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.31	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.42	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.29	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.24	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.22	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

#### Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	1.48	< 0.80	< 0.80

#### Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	4.6	5.2	6.4	9.1	6.7
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.96	0.65	0.75	0.77	1.0
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4	0.2	0.3	0.3	0.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4	< 0.2	4.1	8.0	5.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	17	12	17	17	17
Copper (aqua regia extractable)	mg/kg	1	MCERTS	23	21	20	22	25
Lead (aqua regia extractable)	mg/kg	1	MCERTS	25	31	64	30	24
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	31	20	25	25	24
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	1.9	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	19	16	18	19	22
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	96	35	170	340	250

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<b>Lab Sample Number</b>				1409729				
<b>Sample Reference</b>				TP7				
<b>Sample Number</b>				None Supplied				
<b>Depth (m)</b>				0.40				
<b>Date Sampled</b>				10/01/2020				
<b>Time Taken</b>				1300				
<b>Analytical Parameter (Soil Analysis)</b>	<b>Units</b>	<b>Limit of detection</b>	<b>Accreditation Status</b>					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	15				
Total mass of sample received	kg	0.001	NONE	0.60				

<b>Asbestos in Soil</b>	Type	N/A	ISO 17025	Not-detected				
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**General Inorganics**

pH - Automated	pH Units	N/A	MCERTS	7.7				
Total Cyanide	mg/kg	1	MCERTS	< 1				
Total Sulphate as SO <sub>4</sub>	mg/kg	50	MCERTS	420				
Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.040				
Sulphide	mg/kg	1	MCERTS	< 1.0				
Total Sulphur	mg/kg	50	MCERTS	190				
Total Organic Carbon (TOC)	%	0.1	MCERTS	2.1				
Loss on Ignition @ 450°C	%	0.2	MCERTS	6.2				

**Total Phenols**

<b>Total Phenols (monohydric)</b>	mg/kg	1	MCERTS	< 1.0				
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**Speciated PAHs**

Naphthalene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05				
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05				
Fluorene	mg/kg	0.05	MCERTS	< 0.05				
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05				
Anthracene	mg/kg	0.05	MCERTS	< 0.05				
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Pyrene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Chrysene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05				
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05				
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05				
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05				

**Total PAH**

<b>Speciated Total EPA-16 PAHs</b>	mg/kg	0.8	MCERTS	< 0.80				
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**Heavy Metals / Metalloids**

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	9.0				
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.2				
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4				
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4				
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	19				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	31				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	30				
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3				
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	29				
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	1.5				
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	24				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	97				



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\* 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 *
1409724	SA2	None Supplied	0.20	Brown loam and clay with gravel and vegetation.
1409725	TP1	None Supplied	0.20	Brown loam and clay with gravel and vegetation.
1409726	TP2	None Supplied	0.20	Brown loam and clay with gravel and vegetation.
1409727	TP3	None Supplied	0.30	Brown loam and clay with gravel and vegetation.
1409728	TP5	None Supplied	0.50	Brown loam and clay with gravel and vegetation.
1409729	TP7	None Supplied	0.40	Brown loam and clay with gravel and vegetation.



**Analytical Report Number : 20-80658**

**Project / Site name: Penywain Ln**

**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. (30 oC)	In-house method based on BS1377 Part 2, 1990, Classification 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

**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.**

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

Page 5 of 5

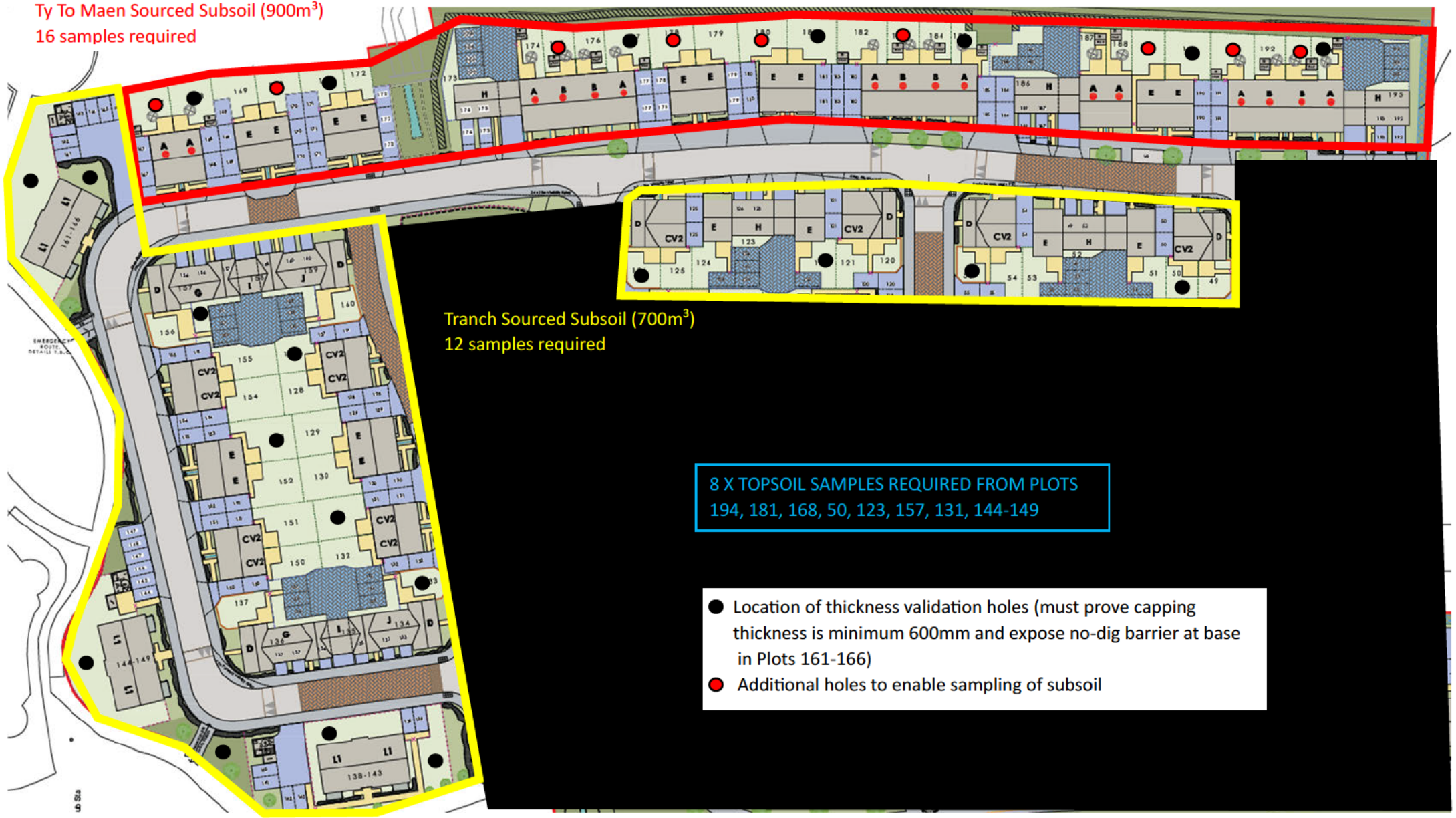
**ANNEX B**

Ty To Maen Sourced Subsoil (900m<sup>3</sup>)  
16 samples required

Tranch Sourced Subsoil (700m<sup>3</sup>)  
12 samples required

8 X TOPSOIL SAMPLES REQUIRED FROM PLOTS  
194, 181, 168, 50, 123, 157, 131, 144-149

- Location of thickness validation holes (must prove capping thickness is minimum 600mm and expose no-dig barrier at base in Plots 161-166)
- Additional holes to enable sampling of subsoil



**ANNEX C**

**Plot 127**



**Plot 133**



**Plot 131**



**Plot 153**



Plot 157



**ANNEX D**



# Final Report

**Report No.:** 23-25654-1

**Initial Date of Issue:** 07-Aug-2023

**Re-Issue Details:**

**Client** Terra Firma (Wales) Ltd

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

**Contact(s):** [REDACTED]

**Project** Herbert Road (H.Road) North of Reen

**Quotation No.:** **Date Received:** 31-Jul-2023

**Order No.:** 12032 - P3N - RH **Date Instructed:** 31-Jul-2023

**No. of Samples:** 26

**Turnaround (Wkdays):** 5 **Results Due:** 04-Aug-2023

**Date Approved:** 07-Aug-2023

**Approved By:**  
[REDACTED]

**Details:** Stuart Henderson, Technical Manager

## Results - Soil

**Project: Herbert Road (H.Road) North of Reen**

Client: Terra Firma (Wales) Ltd		Chemtest Job No.:		23-25654	23-25654	23-25654	23-25654	23-25654	23-25654	23-25654	23-25654	23-25654	23-25654
Quotation No.:		Chemtest Sample ID.:		1681219	1681220	1681223	1681224	1681228	1681232	1681235	1681237	1681240	
Order No.: 12032 - P3N - RH		Client Sample Ref.:		PLOT 157 TS	PLOT 157 SS	PLOT 131 TS	PLOT 131 SS	PLOT 127 SS	PLOT 171 TS	PLOT 153 SS	PLOTS 144-149 TS	PLOTS 133 SS	
		Client Sample ID.:		PLOT 157 TS	PLOT 157 SS	PLOT 131 TS	PLOT 131 SS	PLOT 127 SS	PLOT 171 TS	PLOT 153 SS	PLOTS 144-149 TS	133 SS	
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
		Top Depth (m):											0.25
		Date Sampled:		28-Jul-2023	28-Jul-2023	28-Jul-2023	28-Jul-2023	28-Jul-2023	28-Jul-2023	28-Jul-2023	28-Jul-2023	28-Jul-2023	28-Jul-2023
		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									
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	30	17	23	17	20	30	18	29	17
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Black	Brown
Other Material	N	2040		N/A	Stones and Roots	Stones and Roots	Stones and Roots	Stones and Roots	Stones	Stones and Roots	Stones and Roots	Stones and Roots	Stones
Soil Texture	N	2040		N/A	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay	Clay
pH	M	2010		4.0	7.3	8.2	6.8	7.8	8.5	6.9	8.1	6.8	8.1
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	1.9	0.71	1.1	< 0.40	0.63	4.7	0.40	2.3	< 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
Sulphate (Acid Soluble)	U	2430	%	0.010	0.095	0.056	0.051	0.023	0.10	0.17	0.042	0.14	0.056
Arsenic	M	2455	mg/kg	0.5	16	9.1	22	7.3	11	13	7.7	12	7.3
Cadmium	M	2455	mg/kg	0.10	2.3	0.82	0.37	0.70	0.77	2.7	1.1	2.1	0.77
Chromium	M	2455	mg/kg	0.5	41	25	20	11	24	37	15	30	14
Mercury Low Level	M	2450	mg/kg	0.05	0.10	0.10	0.87	0.09	0.08	0.08	0.10	0.08	0.11
Copper	M	2455	mg/kg	0.50	22	26	55	19	22	21	23	17	26
Nickel	M	2455	mg/kg	0.50	31	24	22	18	24	27	22	23	28
Lead	M	2455	mg/kg	0.50	72	51	100	26	48	73	34	69	33
Selenium	M	2455	mg/kg	0.25	1.1	0.75	1.7	0.51	0.72	0.85	0.51	0.66	0.51
Zinc	M	2455	mg/kg	0.50	260	140	130	96	120	250	110	220	120
Chromium (Trivalent)	N	2490	mg/kg	1.0	41	25	20	11	24	37	15	30	14
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 VPH >C5-C6	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C6-C7	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aliphatic VPH >C6-C8 (Sum)	N	2780	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic VPH >C8-C10	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total Aliphatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
Aliphatic EPH >C10-C12	M	2690	mg/kg	2.00	3.7	3.7	3.5	3.1	< 2.0	< 2.0	< 2.0	2.5	< 2.0
Aliphatic EPH >C12-C16	M	2690	mg/kg	1.00	1.1	1.0	1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.2	1.1
Aliphatic EPH >C16-C21	M	2690	mg/kg	2.00	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	2.8	< 2.0
Aliphatic EPH >C21-C35	M	2690	mg/kg	3.00	6.3	< 3.0	4.3	3.5	7.6	4.9	< 3.0	20	14
Aliphatic EPH >C35-C40	N	2690	mg/kg	10.00	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

## Results - Soil

**Project: Herbert Road (H.Road) North of Reen**

Client: Terra Firma (Wales) Ltd		Chemtest Job No.:		23-25654	23-25654	23-25654	23-25654	23-25654	23-25654	23-25654	23-25654	23-25654	23-25654
Quotation No.:		Chemtest Sample ID.:		1681219	1681220	1681223	1681224	1681228	1681232	1681235	1681237	1681240	
Order No.: 12032 - P3N - RH		Client Sample Ref.:		PLOT 157 TS	PLOT 157 SS	PLOT 131 TS	PLOT 131 SS	PLOT 127 SS	PLOT 171 TS	PLOT 153 SS	PLOTS 144-149 TS	PLOTS 133 SS	
		Client Sample ID.:		PLOT 157 TS	PLOT 157 SS	PLOT 131 TS	PLOT 131 SS	PLOT 127 SS	PLOT 171 TS	PLOT 153 SS	PLOTS 144-149 TS	133 SS	
		Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
		Top Depth (m):											0.25
		Date Sampled:		28-Jul-2023	28-Jul-2023	28-Jul-2023	28-Jul-2023	28-Jul-2023	28-Jul-2023	28-Jul-2023	28-Jul-2023	28-Jul-2023	28-Jul-2023
		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									
Total Aliphatic EPH >C10-C35	M	2690	mg/kg	5.00	12	7.1	10	7.7	10	7.2	< 5.0	26	18
Aromatic VPH >C5-C7	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Aromatic VPH >C8-C10	U	2780	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total Aromatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
Aromatic EPH >C10-C12	U	2690	mg/kg	1.00	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic EPH >C12-C16	U	2690	mg/kg	1.00	< 1.0	< 1.0	< 1.0	13	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic EPH >C16-C21	U	2690	mg/kg	2.00	< 2.0	2.2	6.1	2.3	20	23	20	6.6	3.3
Aromatic EPH >C21-C35	U	2690	mg/kg	2.00	43	11	32	20	9.4	53	31	120	26
Aromatic EPH >C35-C40	N	2690	mg/kg	1.00	9.0	2.6	1.8	2.0	< 1.0	4.5	< 1.0	13	1.2
Total Aromatic EPH >C10-C35	U	2690	mg/kg	5.00	45	13	39	36	29	76	51	120	30
Total VPH >C5-C10	U	2780	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Total EPH >C10-C35	U	2690	mg/kg	10.00	57	21	49	43	40	83	53	150	47
Naphthalene	M	2800	mg/kg	0.10	0.22	0.17	0.53	< 0.10	0.24	0.19	0.11	0.24	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10	0.14	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10	0.12	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	0.14	1.1	0.61	< 0.10	0.32	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	M	2800	mg/kg	0.10	< 0.10	0.32	< 0.10	< 0.10	0.11	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	0.21	1.7	1.3	0.63	0.52	0.16	< 0.10	0.13	< 0.10
Pyrene	M	2800	mg/kg	0.10	0.17	1.3	1.0	0.61	0.40	0.13	< 0.10	0.11	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10	0.11	0.91	0.78	0.59	0.38	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	M	2800	mg/kg	0.10	< 0.10	1.0	0.82	0.61	0.33	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10	1.1	1.1	0.74	0.46	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10	0.29	0.33	0.62	0.11	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10	0.76	0.75	0.60	0.28	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10	0.59	0.65	0.88	0.28	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	0.19	0.60	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10	0.43	0.72	0.90	0.22	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0	9.9	8.8	6.8	3.7	< 2.0	< 2.0	< 2.0	< 2.0
Total Phenols	M	2920	mg/kg	0.10	0.13	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Organic Matter BS1377	N	2930	%	0.10	5.6	1.5	5.1	1.3	2.1	4.8	0.90	4.5	1.1

## Results - Soil

**Project: Herbert Road (H.Road) North of Reen**

<b>Client: Terra Firma (Wales) Ltd</b>		<b>Chemtest Job No.:</b>		23-25654	
Quotation No.:		<b>Chemtest Sample ID.:</b>		1681241	
Order No.: 12032 - P3N - RH		Client Sample Ref.:		PLOTS 133 SS	
		Client Sample ID.:		133 SS	
		Sample Type:		SOIL	
		Top Depth (m):		0.5	
		Date Sampled:		28-Jul-2023	
		Time Sampled:		12:00	
		Asbestos Lab:		DURHAM	
Determinand	Accred.	SOP	Units	LOD	
ACM Type	U	2192		N/A	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-
Moisture	N	2030	%	0.020	19
Soil Colour	N	2040		N/A	Brown
Other Material	N	2040		N/A	Stones
Soil Texture	N	2040		N/A	Clay
pH	M	2010		4.0	8.9
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	2.6
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50
Sulphate (Acid Soluble)	U	2430	%	0.010	0.85
Arsenic	M	2455	mg/kg	0.5	25
Cadmium	M	2455	mg/kg	0.10	17
Chromium	M	2455	mg/kg	0.5	46
Mercury Low Level	M	2450	mg/kg	0.05	0.76
Copper	M	2455	mg/kg	0.50	180
Nickel	M	2455	mg/kg	0.50	36
Lead	M	2455	mg/kg	0.50	240
Selenium	M	2455	mg/kg	0.25	0.96
Zinc	M	2455	mg/kg	0.50	920
Chromium (Trivalent)	N	2490	mg/kg	1.0	46
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Aliphatic VPH >C5-C6	U	2780	mg/kg	0.05	< 0.05
Aliphatic VPH >C6-C7	U	2780	mg/kg	0.05	< 0.05
Aliphatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05
Aliphatic VPH >C6-C8 (Sum)	N	2780	mg/kg	0.10	< 0.10
Aliphatic VPH >C8-C10	U	2780	mg/kg	0.05	< 0.05
Total Aliphatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25
Aliphatic EPH >C10-C12	M	2690	mg/kg	2.00	< 2.0
Aliphatic EPH >C12-C16	M	2690	mg/kg	1.00	1.4
Aliphatic EPH >C16-C21	M	2690	mg/kg	2.00	3.6
Aliphatic EPH >C21-C35	M	2690	mg/kg	3.00	43
Aliphatic EPH >C35-C40	N	2690	mg/kg	10.00	< 10

## Results - Soil

**Project: Herbert Road (H.Road) North of Reen**

<b>Client: Terra Firma (Wales) Ltd</b>		<b>Chemtest Job No.:</b>		23-25654	
Quotation No.:		<b>Chemtest Sample ID.:</b>		1681241	
Order No.: 12032 - P3N - RH		Client Sample Ref.:		PLOTS 133 SS	
		Client Sample ID.:		133 SS	
		Sample Type:		SOIL	
		Top Depth (m):		0.5	
		Date Sampled:		28-Jul-2023	
		Time Sampled:		12:00	
		Asbestos Lab:		DURHAM	
Determinand	Accred.	SOP	Units	LOD	
Total Aliphatic EPH >C10-C35	M	2690	mg/kg	5.00	49
Aromatic VPH >C5-C7	U	2780	mg/kg	0.05	< 0.05
Aromatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05
Aromatic VPH >C8-C10	U	2780	mg/kg	0.05	< 0.05
Total Aromatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25
Aromatic EPH >C10-C12	U	2690	mg/kg	1.00	< 1.0
Aromatic EPH >C12-C16	U	2690	mg/kg	1.00	< 1.0
Aromatic EPH >C16-C21	U	2690	mg/kg	2.00	6.4
Aromatic EPH >C21-C35	U	2690	mg/kg	2.00	71
Aromatic EPH >C35-C40	N	2690	mg/kg	1.00	4.5
Total Aromatic EPH >C10-C35	U	2690	mg/kg	5.00	77
Total VPH >C5-C10	U	2780	mg/kg	0.50	< 0.50
Total EPH >C10-C35	U	2690	mg/kg	10.00	130
Naphthalene	M	2800	mg/kg	0.10	0.30
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	0.58
Anthracene	M	2800	mg/kg	0.10	0.15
Fluoranthene	M	2800	mg/kg	0.10	1.2
Pyrene	M	2800	mg/kg	0.10	0.93
Benzo[a]anthracene	M	2800	mg/kg	0.10	0.65
Chrysene	M	2800	mg/kg	0.10	0.69
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	1.1
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	0.39
Benzo[a]pyrene	M	2800	mg/kg	0.10	0.62
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	0.60
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	0.14
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	0.56
Total Of 16 PAH's	N	2800	mg/kg	2.0	7.9
Total Phenols	M	2920	mg/kg	0.10	< 0.10
Organic Matter BS1377	N	2930	%	0.10	1.6

## 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
2185	Asbestos	Asbestos	Polarised light microscopy
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.
2455	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 'Aquamem 600' Discrete Analyser using 1,5-diphenylcarbazine.
2690	EPH A/A Split	Aliphatics: >C10–C12, >C12–C16, >C16–C21, >C21– C35, >C35– C40 Aromatics: >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C40	Acetone/Heptane extraction / GCxGC FID detection
2780	VPH A/A Split	Aliphatics: >C5–C6, >C6–C7,>C7–C8,>C8–C10 Aromatics: >C5–C7,>C7-C8,>C8–C10	Water extraction / Headspace GCxGC FID detection
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	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-MS
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"
SOP	Standard operating procedure
LOD	Limit of detection

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 30 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)

## Results - Soil

**Project: Herbert Road (H.Road)**

<b>Client: Terra Firma (Wales) Ltd</b>		<b>Chemtest Job No.:</b>		23-25652	
Quotation No.:		<b>Chemtest Sample ID.:</b>		1681217	
Order No.: 12032-P3S - RH		Client Sample Ref.:		PLOT 122 TS	
		Client Sample ID.:		PLOT 122 TS	
		Sample Type:		SOIL	
		Date Sampled:		28-Jul-2023	
		Time Sampled:		12:00	
		Asbestos Lab:		DURHAM	
Determinand	Accred.	SOP	Units	LOD	
ACM Type	U	2192		N/A	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-
Moisture	N	2030	%	0.020	26
Soil Colour	N	2040		N/A	Brown
Other Material	N	2040		N/A	Stones and Roots
Soil Texture	N	2040		N/A	Clay
pH	M	2010		4.0	7.8
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	2.0
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50
Sulphate (Acid Soluble)	U	2430	%	0.010	0.080
Arsenic	M	2455	mg/kg	0.5	14
Cadmium	M	2455	mg/kg	0.10	1.3
Chromium	M	2455	mg/kg	0.5	36
Mercury Low Level	M	2450	mg/kg	0.05	< 0.05
Copper	M	2455	mg/kg	0.50	16
Nickel	M	2455	mg/kg	0.50	30
Lead	M	2455	mg/kg	0.50	41
Selenium	M	2455	mg/kg	0.25	0.80
Zinc	M	2455	mg/kg	0.50	170
Chromium (Trivalent)	N	2490	mg/kg	1.0	36
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50
Aliphatic VPH >C5-C6	U	2780	mg/kg	0.05	< 0.05
Aliphatic VPH >C6-C7	U	2780	mg/kg	0.05	< 0.05
Aliphatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05
Aliphatic VPH >C6-C8 (Sum)	N	2780	mg/kg	0.10	< 0.10
Aliphatic VPH >C8-C10	U	2780	mg/kg	0.05	< 0.05
Total Aliphatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25
Aliphatic EPH >C10-C12	M	2690	mg/kg	2.00	3.8
Aliphatic EPH >C12-C16	M	2690	mg/kg	1.00	< 1.0
Aliphatic EPH >C16-C21	M	2690	mg/kg	2.00	< 2.0
Aliphatic EPH >C21-C35	M	2690	mg/kg	3.00	< 3.0
Aliphatic EPH >C35-C40	N	2690	mg/kg	10.00	< 10
Total Aliphatic EPH >C10-C35	M	2690	mg/kg	5.00	6.2
Aromatic VPH >C5-C7	U	2780	mg/kg	0.05	< 0.05
Aromatic VPH >C7-C8	U	2780	mg/kg	0.05	< 0.05

## Results - Soil

**Project: Herbert Road (H.Road)**

<b>Client: Terra Firma (Wales) Ltd</b>		<b>Chemtest Job No.:</b>		23-25652	
Quotation No.:		<b>Chemtest Sample ID.:</b>		1681217	
Order No.: 12032-P3S - RH		Client Sample Ref.:		PLOT 122 TS	
		Client Sample ID.:		PLOT 122 TS	
		Sample Type:		SOIL	
		Date Sampled:		28-Jul-2023	
		Time Sampled:		12:00	
		Asbestos Lab:		DURHAM	
Determinand	Accred.	SOP	Units	LOD	
Aromatic VPH >C8-C10	U	2780	mg/kg	0.05	< 0.05
Total Aromatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25
Aromatic EPH >C10-C12	U	2690	mg/kg	1.00	< 1.0
Aromatic EPH >C12-C16	U	2690	mg/kg	1.00	< 1.0
Aromatic EPH >C16-C21	U	2690	mg/kg	2.00	< 2.0
Aromatic EPH >C21-C35	U	2690	mg/kg	2.00	9.5
Aromatic EPH >C35-C40	N	2690	mg/kg	1.00	2.3
Total Aromatic EPH >C10-C35	U	2690	mg/kg	5.00	10
Total VPH >C5-C10	U	2780	mg/kg	0.50	< 0.50
Total EPH >C10-C35	U	2690	mg/kg	10.00	16
Naphthalene	M	2800	mg/kg	0.10	0.13
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	< 0.10
Anthracene	M	2800	mg/kg	0.10	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	< 0.10
Pyrene	M	2800	mg/kg	0.10	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10
Chrysene	M	2800	mg/kg	0.10	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	< 2.0
Total Phenols	M	2920	mg/kg	0.10	< 0.10
Organic Matter BS1377	N	2930	%	0.10	3.3



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t: 01622 850410

## **DETS Report No: 23-12112**

**Site Reference:** Herbert Road

**Project / Job Ref:** 12032

**Order No:** 12032RH

**Sample Receipt Date:** 25/09/2023

**Sample Scheduled Date:** 27/09/2023

**Report Issue Number:** 1

**Reporting Date:** 04/10/2023

**Authorised by:**

[REDACTED]

Dave Ashworth  
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.



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<b>Soil Analysis Certificate</b>						
<b>DETS Report No: 23-12112</b>	<b>Date Sampled</b>	22/09/23	21/09/23	22/09/23	21/09/23	21/09/23
<b>Terra Firma Wales Ltd</b>	<b>Time Sampled</b>	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
<b>Site Reference: Herbert Road</b>	<b>TP / BH No</b>	Plot 130	Plot 132	Plot 137	Plot 150	Plot 151
<b>Project / Job Ref: 12032</b>	<b>Additional Refs</b>	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
<b>Order No: 12032RH</b>	<b>Depth (m)</b>	0.30	0.30	0.30	0.30	0.30
<b>Reporting Date: 04/10/2023</b>	<b>DETS Sample No</b>	677177	677178	677179	677180	677181

<b>Determinand</b>	<b>Unit</b>	<b>RL</b>	<b>Accreditation</b>					
Organic Matter (SOM)	%	< 0.1	MCERTS	2.9	3.3	1.7	2.4	2.5

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion  
 Subcontracted analysis (S)



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Soil Analysis Certificate						
<b>DETS Report No: 23-12112</b>	<b>Date Sampled</b>	21/09/23	21/09/23	22/09/23		
<b>Terra Firma Wales Ltd</b>	<b>Time Sampled</b>	None Supplied	None Supplied	None Supplied		
<b>Site Reference: Herbert Road</b>	<b>TP / BH No</b>	Plot 154	Plot 155	Plot 160		
<b>Project / Job Ref: 12032</b>	<b>Additional Refs</b>	None Supplied	None Supplied	None Supplied		
<b>Order No: 12032RH</b>	<b>Depth (m)</b>	0.30	0.30	0.30		
<b>Reporting Date: 04/10/2023</b>	<b>DETS Sample No</b>	677182	677183	677184		

Determinand	Unit	RL	Accreditation			
Organic Matter (SOM)	%	< 0.1	MCERTS	2.3	5.4	3.6

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion  
 Subcontracted analysis (S)



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Soil Analysis Certificate - Speciated PAHs						
<b>DETS Report No: 23-12112</b>	<b>Date Sampled</b>	22/09/23	21/09/23	22/09/23	21/09/23	21/09/23
<b>Terra Firma Wales Ltd</b>	<b>Time Sampled</b>	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
<b>Site Reference: Herbert Road</b>	<b>TP / BH No</b>	Plot 130	Plot 132	Plot 137	Plot 150	Plot 151
<b>Project / Job Ref: 12032</b>	<b>Additional Refs</b>	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
<b>Order No: 12032RH</b>	<b>Depth (m)</b>	0.30	0.30	0.30	0.30	0.30
<b>Reporting Date: 04/10/2023</b>	<b>DETS Sample No</b>	677177	677178	677179	677180	677181

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6



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Soil Analysis Certificate - Speciated PAHs					
DETS Report No: 23-12112	Date Sampled	21/09/23	21/09/23	22/09/23	
Terra Firma Wales Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	
Site Reference: Herbert Road	TP / BH No	Plot 154	Plot 155	Plot 160	
Project / Job Ref: 12032	Additional Refs	None Supplied	None Supplied	None Supplied	
Order No: 12032RH	Depth (m)	0.30	0.30	0.30	
Reporting Date: 04/10/2023	DETS Sample No	677182	677183	677184	

Determinand	Unit	RL	Accreditation				
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	0.13	0.14	
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	0.30	0.30	
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	0.25	0.24	
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	0.14	0.14	
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	0.18	0.15	
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	0.17	0.20	
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1	
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6	



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**Soil Analysis Certificate - Sample Descriptions**

DETS Report No: 23-12112	
Terra Firma Wales Ltd	
Site Reference: Herbert Road	
Project / Job Ref: 12032	
Order No: 12032RH	
Reporting Date: 04/10/2023	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
677177	Plot 130	None Supplied	0.30	12.7	Brown sandy clay with stones
677178	Plot 132	None Supplied	0.30	15.8	Brown sandy clay with stones
677179	Plot 137	None Supplied	0.30	10	Brown sandy clay with stones
677180	Plot 150	None Supplied	0.30	11.6	Brown sandy clay with stones
677181	Plot 151	None Supplied	0.30	13.1	Brown sandy clay with stones
677182	Plot 154	None Supplied	0.30	12.8	Brown sandy clay with stones
677183	Plot 155	None Supplied	0.30	16.4	Brown sandy clay with stones
677184	Plot 160	None Supplied	0.30	13.5	Brown sandy clay with stones

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample <sup>U/S</sup>

Unsuitable Sample <sup>U/S</sup>

**Soil Analysis Certificate - Methodology & Miscellaneous Information**

<b>DETS Report No: 23-12112</b>
<b>Terra Firma Wales Ltd</b>
<b>Site Reference: Herbert Road</b>
<b>Project / Job Ref: 12032</b>
<b>Order No: 12032RH</b>
<b>Reporting Date: 04/10/2023</b>

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphénylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCS	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

**D Dried**  
**AR As Received**



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**List of HWOL Acronyms and Operators**

<b>DETS Report No: 23-12112</b>
<b>Terra Firma Wales Ltd</b>
<b>Site Reference: Herbert Road</b>
<b>Project / Job Ref: 12032</b>
<b>Order No: 12032RH</b>
<b>Reporting Date: 04/10/2023</b>

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
<u>  </u>	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det - Acronym