

Our Ref: AC/16306/Plot 1-25

Your Ref:

Contact: Aaron Case

6th December 2023

CJ Construction (Wales) Ltd
The Builders Yard,
Somerset Lane,
Taibach,
Port Talbot
SA13 1UA

For the Attention of: Mr Lee Bamford

Dear Lee,

CAPPING LAYER VALIDATION REPORT: PLOTS 1-25, LAND ADJACENT TO PANT CELYDD, MARGAM, PORT TALBOT, SA13 2DA

Section 1 Introduction

CJ Construction (Wales) Ltd (the Client) are developing land adjacent to Pant Celydd, Margam, Port Talbot, SA13 2DA, for residential purposes.

TFW Group Ltd completed a Geo-environmental and Geotechnical Site Investigation in December 2020 (Our Ref: Geotechnical/Geoenvironmental-030322-16303-3). TFW Group Ltd completed a Supplementary Geotechnical and Geo-environmental Site Investigation Report in July 2021. TFW Group Ltd also completed a Remediation Strategy (Our Ref: Remediation Strategy-030322-16303-3) for the site.

The Remediation Strategy made recommendations for mitigation measures in areas of soft surfacing. The recommendation was to place 600mm of clean inert soils.

TFW Group Limited have been commissioned by the Client to validate the thickness of the capping soil, and the soil's suitability to be used in residential gardens with plant uptake based upon their chemical composition in the gardens of Plots 1-25.

Capping soils comprise a layer of dark brown, organic-rich silty slightly sandy slightly gravelly **CLAY** with occasional fine roots.

Section 2 Soil Chemical Testing of Soils – Imported Soil Certification from Supplier

In April 2023, Freeland Horticulture Ltd were commissioned by the Client to test a soil stockpile for its suitability for use at the Pant Celydd site as capping soil in residential gardens.

These tests were conducted off-site and prior to importation on this site.

The soil examination, according to Freeland Horticulture Ltd, confirmed a consistent topsoil composition and therefore all samples taken were combined together to form one composite sample for analysis purposes.

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).

A summary of the chemical test results which include the regulatory soil guideline values used in the Tier 1 assessment are given in **Tables 2.1 to 2.3** and can be found in **Annex A**.

Table 2.1 Summary of Soil Chemical Test Results – Inorganics & Miscellaneous

Substance	Threshold Value (mg/kg)	Source	Measured Concentrations (mg/kg)	Number of Exceedances
Arsenic	37	LQM/CIEH	7.6	0
Cadmium	11	LQM/CIEH	0.13	0
Chromium III	910	LQM/CIEH	<0.2	0
Chromium VI	6	LQM/CIEH	<0.2	0
Copper	2400	LQM/CIEH	15.3	0
Lead	200	pC4SL	16.3	0
Mercury (inorganic)	40	LQM/CIEH	<0.2	0
Nickel	180	LQM/CIEH	34.5	0
Selenium	250	LQM/CIEH	0.16	0
Zinc	3700	LQM/CIEH	78.3	0
Cyanide*	-	-	<1.0	0
Phenols	120	LQM/CIEH	<1.0	0
Boron	290	LQM/CIEH	1.8	0
Organic Matter (%)	-	-	7.2	-
pH	-	-	8.5	-
Asbestos	-	-	None Detected	0
Notes: - No available guideline *Free Cyanide for Topsoil				

Table 2.2 Summary of Soil Chemical Test Results – Speciated PAH

Substance	Threshold Value (mg/kg)	Source	Measured Concentrations (mg/kg)	Number of Exceedances
Naphthalene	2.3	LQM/CIEH	<0.05	0
Acenaphthylene	170	LQM/CIEH	<0.05	0
Acenaphthene	210	LQM/CIEH	<0.05	0
Fluorene	170	LQM/CIEH	<0.05	0
Phenanthrene	95	LQM/CIEH	<0.1	0
Anthracene	2400	LQM/CIEH	<0.05	0
Fluoranthene	280	LQM/CIEH	<0.1	0
Pyrene	620	LQM/CIEH	<0.1	0
Benzo(a)anthracene	7.2	LQM/CIEH	<0.1	0
Chrysene	15	LQM/CIEH	<0.1	0
Benzo(b)fluoranthene	2.6	LQM/CIEH	<0.1	0
Benzo(k)fluoranthene	77	LQM/CIEH	<0.1	0
Benzo(a)pyrene	2.2	LQM/CIEH	<0.1	0
Indeno(123cd)pyrene	27	LQM/CIEH	<0.1	0
Dibenzo(ah)anthracene	0.24	LQM/CIEH	<0.1	0
Benzo(ghi)perylene	320	LQM/CIEH	<0.1	0
Total PAH	-	-	<1.0	-
Notes: Thresholds based on 1.0% soil organic matter - No available guidelines				

Table 2.3 Summary of Soil Chemical Test Results – Petroleum Hydrocarbons

Substance	Threshold Value (mg/kg)	Source	Measured Concentrations (mg/kg)	Number of Exceedances
Aliphatic				
VPH C5 – C6 Ali	42	LQM/CIEH	<0.05	0
VPH C6 – C7 Ali	100^	LQM/CIEH	<0.05	0
VPH C7 -C8 Ali	100^	LQM/CIEH	<0.05	0
VPH C8 – C10 Ali	27	LQM/CIEH	<0.05	0
EPH C10 – C12 Ali	130	LQM/CIEH	<10	0
EPH C12 – C16 Ali	1100	LQM/CIEH	<10	0
EPH C16 – C21 Ali	65000*	LQM/CIEH	<10	0
EPH C21 – C35 Ali	65000*	LQM/CIEH	30.0	0
EPH C35 – C44 Ali	65000	LQM/CIEH	19.0	0
Aromatic				

VPH C5 – C7 Arom	70	LQM/CIEH	<0.05	0
VPH C7 – C8 Arom	130	LQM/CIEH	<0.05	0
VPH C8 – C10 Arom	34	LQM/CIEH	<0.05	0
EPH C10 – C12 Arom	74	LQM/CIEH	<10	0
EPH C12 – C16 Arom	140	LQM/CIEH	<10	0
EPH C16 – C21 Arom	260	LQM/CIEH	<10	0
EPH C21 – C35 Arom	1100	LQM/CIEH	<10	0
EPH C35 – C44 Arom	1100	LQM/CIEH	<12	0
1 - LQM/CIEH Suitable For Use Level (S4UL) 2015 2 - Defra Category 4 Screening Level (Provisional value) 3 - Environment Agency CLEA v1.06 Derived Value (Now withdrawn) 4 - S4UL threshold based on 1% soil organic matter PH – Petroleum Hydrocarbon Ali – Aliphatic Arom – Aromatic Thresholds based on 1.0% soil organic matter * – Ali C16-21 and C21-C35 based on criteria for Ali EC >16-35				

Section 3 Soil Chemical Testing of Imported Soils

A TFW Group Limited engineer visited the site on the 4th October and 14th November 2023 to collect samples for chemical analysis. Eight samples from a 480m³ stockpile of topsoil were taken as per the guidance 'Requirements for the Chemical Testing of Imported Materials for Various End Uses and Validation of Cover Systems' prepared by the Welsh Land Contamination Working Group.

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

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).

A summary of the 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 and can be found in Annex B.**

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

Substance	Threshold Value (mg/kg)	Source	Measured Concentrations (mg/kg)		Number of Exceedances
			Min	Max	
Arsenic	37	LQM/CIEH	2.2	12	0
Cadmium	11	LQM/CIEH	<0.10	0.20	0
Chromium III	910	LQM/CIEH	3.6	26	0

Chromium VI	6	LQM/CIEH	<0.50	<0.50	0
Copper	2400	LQM/CIEH	3.4	22	0
Lead	200	pC4SL	5.2	36	0
Mercury (inorganic)	40	LQM/CIEH	<0.05	0.06	0
Nickel	180	LQM/CIEH	8.0	31	0
Selenium	250	LQM/CIEH	0.27	0.84	0
Zinc	3700	LQM/CIEH	19	100	0
Cyanide*	-	-	<0.50	<0.50	0
Phenols	120	LQM/CIEH	0.47	1.7	0
Boron	290	LQM/CIEH	1.0	2.5	0
Organic Matter (%)	-	-	3.3	4.1	-
pH	-	-	8.2	8.8	-
Asbestos	-	-	None Detected		0
Notes:					
- No available guideline					
*Free Cyanide for Topsoil					

Table 3.2 Summary of Soil Chemical Test Results – Speciated PAH

Substance	Threshold Value (mg/kg)	Source	Measured Concentrations (mg/kg)		Number of Exceedances
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Acenaphthylene	170	LQM/CIEH	<0.10	<0.10	0
Acenaphthene	210	LQM/CIEH	<0.10	<0.10	0
Fluorene	170	LQM/CIEH	<0.10	<0.10	0
Phenanthrene	95	LQM/CIEH	<0.10	<0.10	0
Anthracene	2400	LQM/CIEH	<0.10	<0.10	0
Fluoranthene	280	LQM/CIEH	<0.10	<0.10	0
Pyrene	620	LQM/CIEH	<0.10	<0.10	0
Benzo(a)anthracene	7.2	LQM/CIEH	<0.10	<0.10	0
Chrysene	15	LQM/CIEH	<0.10	<0.10	0
Benzo(b)fluoranthene	2.6	LQM/CIEH	<0.10	<0.10	0
Benzo(k)fluoranthene	77	LQM/CIEH	<0.10	<0.10	0
Benzo(a)pyrene	2.2	LQM/CIEH	<0.10	<0.10	0
Indeno(123cd)pyrene	27	LQM/CIEH	<0.10	<0.10	0
Dibenzo(ah)anthracene	0.24	LQM/CIEH	<0.10	<0.10	0
Benzo(ghi)perylene	320	LQM/CIEH	<0.10	<0.10	0
Total PAH	-	-	<2.0	<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	
Aliphatic					
VPH C5 – C6 Ali	42	LQM/CIEH	<0.05	<0.05	0
VPH C6 – C8 Ali	100	LQM/CIEH	<0.05	<0.05	0
		LQM/CIEH			
VPH C8 – C10 Ali	27	LQM/CIEH	<0.05	<0.05	0
EPH C10 – C12 Ali	130	LQM/CIEH	2.7	8.4	0
EPH C12 – C16 Ali	1100	LQM/CIEH	1.2	8.8	0
EPH C16 – C21 Ali	65000*	LQM/CIEH	6.0	20	0
EPH C21 – C35 Ali	65000*	LQM/CIEH	10	33	0
EPH C35 – C40 Ali	65000	LQM/CIEH	<10	<10	0
Aromatic					
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	1.2	3.8	0
EPH C12 – C16 Arom	140	LQM/CIEH	<1.0	4.6	0
EPH C16 – C21 Arom	260	LQM/CIEH	6.6	40	0
EPH C21 – C35 Arom	1100	LQM/CIEH	130	380	0
EPH C35 – C40 Arom	1100	LQM/CIEH	20	64	0
1 - LQM/CIEH Suitable For Use Level (S4UL) 2015 2 - Defra Category 4 Screening Level (Provisional value) 3 - Environment Agency CLEA v1.06 Derived Value (Now withdrawn) 4 - S4UL threshold based on 1% soil organic matter PH – Petroleum Hydrocarbon Ali – Aliphatic Arom – Aromatic Thresholds based on 1.0% soil organic matter * – Ali C16-21 and C21-C35 based on criteria for Ali EC >16-35					

Section 4 Verification of Capping Thickness and No Dig Barrier

A TFW Group Limited engineer visited the site on the 4th October and 14th November 2023 to confirm the capping thickness. In accordance with WLGA document 'Requirements for the Chemical Testing of Imported Materials for Various End Uses and Validation of Cover Systems' and as per the Remediation Strategy, one in every two plots require validation across the site.

Seven and nine hand dug inspection pits were excavated, inspected, and photographed in the front and back gardens, respectively, of Plot 1-25 inclusive as indicated in **Figure 4.1**.

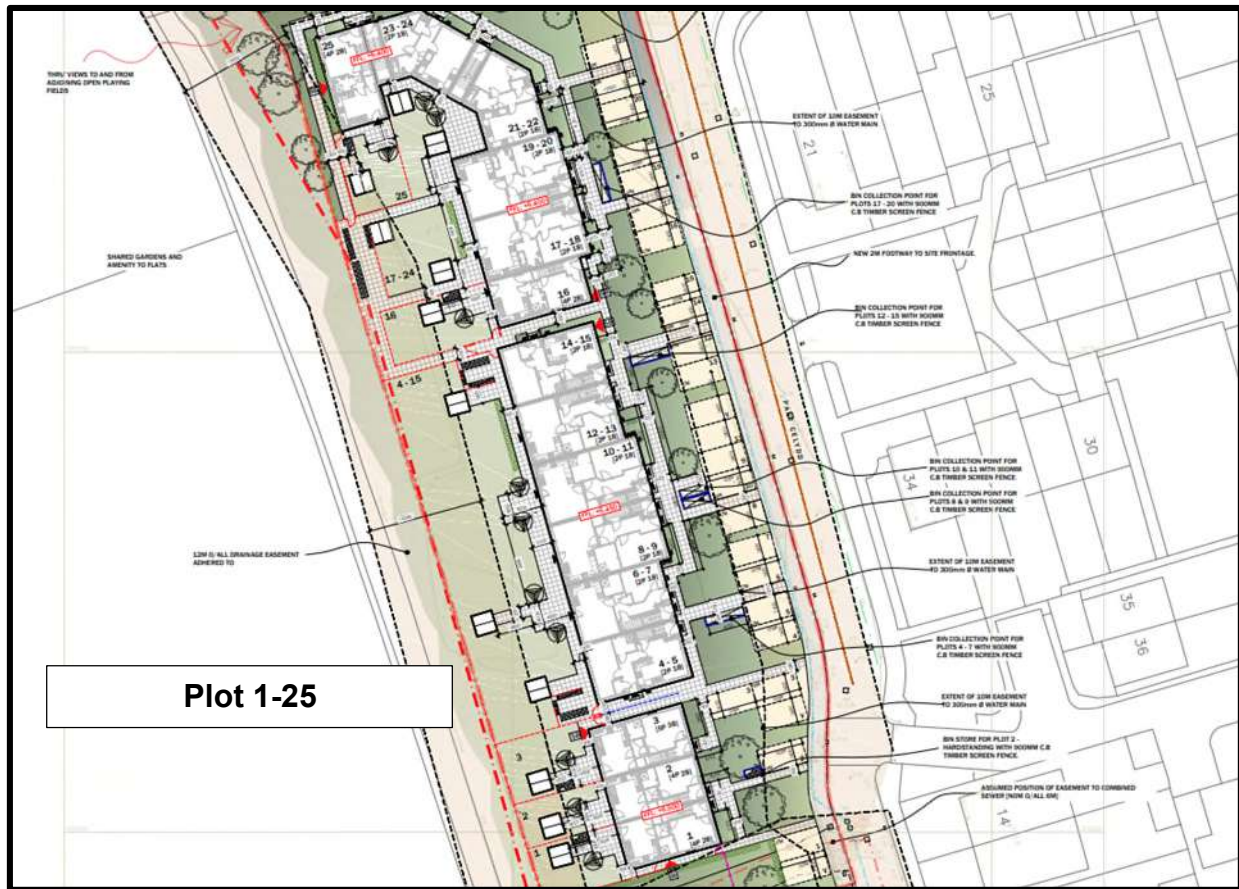


Figure 4.1: Location of Validation Plots and Pit Location

Table 4.1 and **Table 4.2** records the depth of the soil layer, and the presence of high visibility geotextile membrane.

Table 4.1 Summary of Capping Soil Thickness and Sample Depth (Front gardens)

Plot	Upper Soil Layer Depth (m)	Sample Depth (m)	Sample Depth (m)
Plot 1	0.70	-	-
Plot 2	0.60	-	-
Plot 3	0.60	-	-
Plot 4-15 (One communal garden)	0.65	-	-
Plot 16	0.60	-	-
Plot 17-24 (One communal garden)	0.60	-	-
Plot 25	0.60	-	-

Table 4.2 Summary of Capping Soil Thickness and Sample Depth (Back gardens)

Plot	Upper Soil Layer Depth (m)	Sample Depth (m)	Sample Depth (m)
Plot 1	0.65	-	-
Plot 2-3	0.60	-	-
Plot 4-5	0.60	-	-
Plot 4-15 (One communal garden)	0.70	-	-
Plot 6-8	0.60	-	-
Plot 9-13 (One communal garden)	0.60	-	-
Plot 14-17	0.60	-	-
Plot 19-21	0.70	-	-
Plot 23-25	0.70	-	-

Photographs of the inspection trial pit are presented in **Annex C**.

Section 5 Conclusion

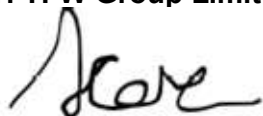
The above sections demonstrate that all substances tested for were below their respective Tier 1 threshold values, and that sufficient depth of capping soil has been placed.

It is therefore concluded that the hazard to receptor pathway has been successfully interrupted and, in relation to contamination only, and the garden areas of Plot 1-25 has been made suitable for their intended use.

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



Aaron Case BSc FGS

ANNEX A
Soil Stockpile Certificate



Freeland Horticulture Ltd
Rosedale Nursery
College Road
Hextable
Kent BR8 7LT

Attention: Philippa Lambourne

Our Ref: SLC-1155-SA

19 April 2023

Dear Philippa

Topsoil Analysis Report: Gilfach Topsoil – April 2023

We have completed the analysis of the topsoil sample recently taken from the above site and it has been forwarded to an approved laboratory for analysis and have the pleasure of reporting our findings. The purpose of the analysis was to determine the suitability of the topsoil for general landscaping purposes and its compliance with the current British Standard for topsoil (BS3882).

SOIL SAMPLING & EXAMINATION

At the time of our sampling visit the topsoil was stored in a stockpile. A series of 10 hand augered trial holes were constructed across the stockpile for the purpose of soil examination and sample collection. As the soil examination confirmed a consistent topsoil composition, the ten samples were combined together to form one composite sample for analysis purposes. The soil was described as dark brown, slightly moist and friable with a well-developed, fine to medium granular structure. The soil contained a low fraction of small stones and no deleterious materials (eg. building waste materials, glass, roots or rhizomes of pernicious weeds) or unusual odours (eg. hydrocarbons) were recorded.

LABORATORY ANALYSIS

The topsoil sample was submitted to a UKAS and MCERTS accredited laboratory for routine physical and chemical parameters to confirm the composition and fertility of the soil. The following parameters were determined:

- ⊕ pH & electrical conductivity values;
- ⊕ major plant nutrients (N, P, K, Mg) & organic matter content;
- ⊕ particle size distribution and stone content;
- ⊕ heavy metals & potentially toxic elements (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Zn, B);
- ⊕ sulphate, sulphur, sulphide;
- ⊕ total cyanide and total (mono) phenols;
- ⊕ speciated PAHs (US EPA16)
- ⊕ banded aromatic and aliphatic petroleum hydrocarbons (C₅-C₃₅).
- ⊕ Asbestos

The results are presented on the attached Certificate of Analysis and an interpretation of the results is given below.

Phone: 01322 619161;

***Freeland horticulture Ltd, Registered in England: Rosedale Nursery, College Road, Hextable, Kent BR8 7LT
Company Registration No: 04015968***

COMMENTS

pH & Electrical Conductivity (salinity) Values

The sample was alkaline in nature (pH 8.5) with a pH value that would be considered suitable for general landscaping purposes.

The electrical conductivity (salinity) value using the soil:water extract was (1130 μ S/cm) indicating that soluble salts are not present at levels that would be harmful to plants.

The electrical conductivity values by CaSO₄ extract (BS3882 requirement) fell below the maximum specified value (3300 μ S/cm) given in BS3882:2015.

Organic Matter & Nutrient Status

The sample was rich in organic matter and all major plant nutrients. No further additions of compost or fertiliser are required, or indeed recommended, for at least the first growing season.

The C:N ratio of the sample was acceptable for general landscape purposes

Particle Size Distribution & Stone Content

The sample contained 83% sand and fell into the loamy sand texture class. This particle size distribution is considered suitable for a broad range of landscape applications, including tree and shrub planting, turfing and seeding.

The sample was Virtually free from stones of 50 mm and upwards in diameter and only contained a slight fraction of smaller stones (1.0%). As such, stones will not restrict the use of the soil for landscaping purposes.

Potential Contaminants

We are not aware of any specified contaminant levels set for the proposed end-use of this topsoil. This includes human health, environmental protection and metals considered toxic to plants. In the absence of any site-specific assessment criteria, the concentrations that affect human health have been compared with the 'residential with homegrown produce' land use in the Suitable For Use Levels presented in 'The LQM/CIEH S4Uis' for Human Health Risk Assessment (2015) and DEFRA SP1010: 'Development of Category 4 Screening Levels' for Assessment of Land Affected by Contamination – Policy Companion Document (2014).

Of the potential contaminants determined, none was found at levels that would exceed their respective guideline values.

CONCLUSION

The purpose of the analysis was to determine the suitability of the topsoil for general landscaping purposes. From the soil examination and laboratory analysis, the soil is described as an alkaline, non-saline, loamy sand. The organic matter and nutrient levels are acceptable, and no significant contamination was found with respect to the parameters determined. This soil would adhere to the current BS3882 specification for 'multipurpose grade'.

To conclude, based on our findings, the topsoil would be considered well-suited to general landscaping purposes provided the physical condition of the soil is maintained.

We hope this report meets with your approval and provides the necessary information. Please do not hesitate to contact the undersigned if you have any queries or comments.

George Longmuir MSc Soil Sci. M.I Soil Sci.

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Gilfach, Neath
Month/Year	April 23
Our Ref	1155-SA
Date	19 April 2023

Composite sample

pH Value & Salinity

pH value (1:2.5 soil/water ext)	units	8.5
Electrical Conductivity (1:2.5 soil/water ext)	µS/cm	1130
Electrical Conductivity (1:2.5 soil/CaSO ₄ ext)	µS/cm	3276

Organic Matter & Nutrient Status

Organic Matter (LOI)	%	7.2
Organic Carbon (Derived)	%	4.2
Total Nitrogen	%	0.270
Carbon:Nitrogen Ratio	:1	15.5
Available Phosphorus	mg/l	42.6
Available Potassium	mg/l	1336
Available Magnesium	mg/l	225

Particle Size Analysis & Stones

Clay (<0.002mm)	%	6
Silt (0.063-0.002mm)	%	1
Sand (2.0-0.063mm)	%	83
Texture Class	UK Class	Sandy loam

Stones 2-20mm	% by DW	1.0
Stones 20-50mm	% by DW	0.0
Stones >50mm	% by DW	0.0

Potential Contaminants

Total Arsenic (As)	mg/kg	7.6
Total Cadmium (Cd)	mg/kg	0.13
Total Chromium (Cr)	mg/kg	29.7
Hexavalent Chromium (Cr ^{VI})	mg/kg	<0.2
Total Copper (Cu)	mg/kg	15.3
Total Lead (Pb)	mg/kg	16.3
Total Mercury (Hg)	mg/kg	<0.2
Total Nickel (Ni)	mg/kg	34.5
Total Selenium (Se)	mg/kg	0.16
Total Zinc (Zn)	mg/kg	78.3
Total Beryllium (Be)	mg/kg	<1
Total Barium (Ba)	mg/kg	49.0
Total Vanadium (V)	mg/kg	11.1
Hot Water Soluble Boron (B)	mg/kg	1.8
Total Cyanide (CN)	mg/kg	<1
Elemental Sulphur (S)	mg/kg	6.3
Easily Liberated Sulphide (S ²⁻)	mg/kg	<1
Water Soluble Sulphate (SO ₄ ²⁻)	mg/l	48.3
Total Phenols Index	mg/kg	<1
Asbestos Screen	-	N.D.

Client	Freeland Horticulture Ltd
Job Name	Topsoil Analysis
Site	Gilfach, Neath
Month/Year	April 23
Our Ref	1155-SA
Date	19 April 2023

Polyaromatic Hydrocarbons

Naphthalene	mg/kg	<0.05
Acenaphthylene	mg/kg	<0.05
Acenaphthene	mg/kg	<0.05
Fluorene	mg/kg	<0.05
Phenanthrene	mg/kg	<0.1
Anthracene	mg/kg	<0.05
Fluoranthene	mg/kg	<0.1
Pyrene	mg/kg	<0.1
Benzo[a]anthracene	mg/kg	<0.1
Chrysene	mg/kg	<0.1
Benzo[b]fluoranthene	mg/kg	<0.1
Benzo[k]fluoranthene	mg/kg	<0.1
Benzo[a]pyrene	mg/kg	<0.1
Indeno[1,2,3-cd]pyrene	mg/kg	<0.1
Dibenzo[a,h]anthracene	mg/kg	<0.1
Benzo[g,h,i]perylene	mg/kg	<0.1
Total PAHs sum US EPA 16	mg/kg	<1

Banded Petroleum Hydrocarbons

Aliphatic TPH >C ₅ -C ₆	mg/kg	<0.05
Aliphatic TPH >C ₆ -C ₈	mg/kg	<0.05
Aliphatic TPH >C ₈ -C ₁₀	mg/kg	<0.05
Aliphatic TPH >C ₁₀ -C ₁₂	mg/kg	<10
Aliphatic TPH >C ₁₂ -C ₁₆	mg/kg	<10
Aliphatic TPH >C ₁₆ -C ₂₁	mg/kg	<10
Aliphatic TPH >C ₂₁ -C ₃₅	mg/kg	30.0
Aliphatic TPH >C ₃₅ -C ₄₄	mg/kg	19.0

Aromatic TPH >C ₅ -C ₇	mg/kg	<0.05
Aromatic TPH >C ₇ -C ₈	mg/kg	<0.05
Aromatic TPH >C ₈ -C ₁₀	mg/kg	<0.05
Aromatic TPH >C ₁₀ -C ₁₂	mg/kg	<10
Aromatic TPH >C ₁₂ -C ₁₆	mg/kg	<10
Aromatic TPH >C ₁₆ -C ₂₁	mg/kg	<10
Aromatic TPH >C ₂₁ -C ₃₅	mg/kg	<10
Aromatic TPH >C ₃₅ -C ₄₄	mg/kg	<12

Total Petroleum Hydrocarbons (C ₅ -C ₄₄)	mg/kg	49.0
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BTEX

Benzene	mg/kg	<0.02
Toluene	mg/kg	<0.2
Ethyl Benzene	mg/kg	<0.04
m- & p-Xylene	mg/kg	<0.2
o-Xylene	mg/kg	<0.1

ANNEX B
Soil Laboratory Chemical Test Results



Final Report

Report No.: 23-34723-1

Initial Date of Issue: 26-Oct-2023

Re-Issue Details:

Client Terra Firma (Wales) Ltd

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

Contact(s): aaron@terrafirmawales.co.uk

Project Pant Celydd - Capping System
Verification Works - First Roun

Quotation No.: Q20-21666

Date Received: 18-Oct-2023

Order No.: 16306-AC

Date Instructed: 18-Oct-2023

No. of Samples: 4

Turnaround (Wkdays): 5

Results Due: 24-Oct-2023

Date Approved: 26-Oct-2023

Approved By:

Details: Stuart Henderson, Technical
Manager

Results - Soil

Project: Pant Celydd - Capping System Verification Works - First Round

Client: Terra Firma (Wales) Ltd	Chemtest Job No.:				23-34723	23-34723	23-34723	23-34723
Quotation No.: Q20-21666	Chemtest Sample ID.:				1717823	1717824	1717825	1717826
Order No.: 16306-AC	Client Sample Ref.:				SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4
	Client Sample ID.:				SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4
	Sample Type:				SOIL	SOIL	SOIL	SOIL
	Date Sampled:				16-Oct-2023	16-Oct-2023	16-Oct-2023	16-Oct-2023
	Time Sampled:				12:00	12:00	12:00	12:00
	Asbestos Lab:				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
Moisture	N	2030	%	0.020	12	13	13	12
Soil Colour	N	2040		N/A	Black	Black	Black	Black
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Loam	Loam	Loam	Loam
pH at 20C	M	2010		4.0	8.8	8.8	8.6	8.8
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	1.2	1.0	1.0	1.1
Cyanide (Complex)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Sulphate (Acid Soluble)	U	2430	%	0.010	0.014	0.011	0.013	0.010
Arsenic	M	2455	mg/kg	0.5	5.5	3.9	5.8	5.8
Beryllium	U	2455	mg/kg	0.5	0.5	< 0.5	0.5	0.6
Cadmium	M	2455	mg/kg	0.10	0.15	0.11	0.14	0.20
Chromium	M	2455	mg/kg	0.5	12	9.1	12	14
Mercury Low Level	M	2450	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05
Manganese	M	2455	mg/kg	1.0	520	390	520	700
Molybdenum	M	2455	mg/kg	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Antimony	N	2455	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0
Copper	M	2455	mg/kg	0.50	13	9.1	12	15
Nickel	M	2455	mg/kg	0.50	25	18	25	29
Lead	M	2455	mg/kg	0.50	17	13	16	19
Selenium	M	2455	mg/kg	0.25	0.29	0.28	0.31	0.34
Zinc	M	2455	mg/kg	0.50	69	51	67	80
Chromium (Trivalent)	N	2490	mg/kg	1.0	12	9.1	12	14
Chromium (Hexavalent)	N	2490	mg/kg	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
Aliphatic VPH >C6-C7	U	2780	mg/kg	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
Aliphatic VPH >C6-C8 (Sum)	N	2780	mg/kg	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
Total Aliphatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25	< 0.25	< 0.25	< 0.25
Aliphatic EPH >C10-C12	M	2690	mg/kg	2.00	4.2	4.6	7.2	8.4
Aliphatic EPH >C12-C16	M	2690	mg/kg	1.00	1.2	1.7	1.7	1.7
Aliphatic EPH >C16-C21	M	2690	mg/kg	2.00	14	6.0	13	16

Results - Soil

Project: Pant Celydd - Capping System Verification Works - First Round

Client: Terra Firma (Wales) Ltd	Chemtest Job No.:				23-34723	23-34723	23-34723	23-34723
Quotation No.: Q20-21666	Chemtest Sample ID.:				1717823	1717824	1717825	1717826
Order No.: 16306-AC	Client Sample Ref.:				SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4
	Client Sample ID.:				SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4
	Sample Type:				SOIL	SOIL	SOIL	SOIL
	Date Sampled:				16-Oct-2023	16-Oct-2023	16-Oct-2023	16-Oct-2023
	Time Sampled:				12:00	12:00	12:00	12:00
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD				
Aliphatic EPH >C21-C35	M	2690	mg/kg	3.00	24	10	27	33
Aliphatic EPH >C35-C40	N	2690	mg/kg	10.00	< 10	< 10	< 10	< 10
Total Aliphatic EPH >C10-C35	M	2690	mg/kg	5.00	43	23	49	58
Total Aliphatic EPH >C10-C40	N	2690	mg/kg	10.00	43	23	49	58
Aromatic VPH >C5-C7	U	2780	mg/kg	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
Aromatic VPH >C8-C10	U	2780	mg/kg	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
Aromatic EPH >C10-C12	U	2690	mg/kg	1.00	2.7	1.8	3.8	3.0
Aromatic EPH >C12-C16	U	2690	mg/kg	1.00	3.2	< 1.0	4.1	4.6
Aromatic EPH >C16-C21	U	2690	mg/kg	2.00	30	9.6	35	40
Aromatic EPH >C21-C35	U	2690	mg/kg	2.00	360	160	330	380
Aromatic EPH >C35-C40	N	2690	mg/kg	1.00	55	23	51	64
Total Aromatic EPH >C10-C35	U	2690	mg/kg	5.00	390	170	370	430
Total Aromatic EPH >C10-C40	N	2690	mg/kg	10.00	450	190	420	490
Total VPH >C5-C10	U	2780	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Total EPH >C10-C35	U	2690	mg/kg	10.00	440	190	420	490
Total EPH >C10-C40	N	2690	mg/kg	10.00	490	210	470	550
Naphthalene	M	2700	mg/kg	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
Acenaphthene	M	2700	mg/kg	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
Phenanthrene	M	2700	mg/kg	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
Fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	M	2700	mg/kg	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
Benzo[k]fluoranthene	M	2700	mg/kg	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
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	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
Benzo[g,h,i]perylene	M	2700	mg/kg	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
Total Phenols	M	2920	mg/kg	0.10	1.1	1.3	0.96	0.99
Organic Matter BS1377	N	2930	%	0.10	3.4	3.8	3.7	4.1

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH at 20°C	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.
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 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
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
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; Dibenzo[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)
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
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"
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

- 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 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



Final Report

Report No.: 23-38465-1

Initial Date of Issue: 27-Nov-2023

Re-Issue Details:

Client Terra Firma (Wales) Ltd

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

Contact(s): aaron@terrafirmawales.co.uk;
a.case@tfwgroup.co.uk

Project Pant Celydd - Capping System
Verification Works - Second Rou

Quotation No.: **Date Received:** 20-Nov-2023

Order No.: 16306-AC **Date Instructed:** 20-Nov-2023

No. of Samples: 4

Turnaround (Wkdays): 5 **Results Due:** 24-Nov-2023

Date Approved: 27-Nov-2023

Approved By:

Details: Stuart Henderson, Technical
Manager

Results - Soil

Project: Pant Celydd - Capping System Verification Works - Second Rou

Client: Terra Firma (Wales) Ltd	Chemtest Job No.:				23-38465	23-38465	23-38465	23-38465
Quotation No.:	Chemtest Sample ID.:				1733302	1733303	1733304	1733305
Order No.: 16306-AC	Client Sample Ref.:				SAMPLE 5	SAMPLE 6	SAMPLE 7	SAMPLE 8
	Client Sample ID.:				SAMPLE 5	SAMPLE 6	SAMPLE 7	SAMPLE 8
	Sample Type:				SOIL	SOIL	SOIL	SOIL
	Date Sampled:				16-Nov-2023	16-Nov-2023	16-Nov-2023	16-Nov-2023
	Time Sampled:				12:00	12:00	12:00	12:00
	Asbestos Lab:				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
Moisture	N	2030	%	0.020	21	19	18	19
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones and Roots	Stones
Soil Texture	N	2040		N/A	Loam	Loam	Loam	Loam
pH at 20C	M	2010		4.0	8.2	8.3	8.6	8.4
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	1.5	2.5	1.3	1.6
Cyanide (Complex)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Sulphate (Acid Soluble)	U	2430	%	0.010	0.018	0.057	0.011	0.034
Arsenic	M	2455	mg/kg	0.5	8.4	12	2.2	9.4
Beryllium	U	2455	mg/kg	0.5	0.6	1.0	< 0.5	0.6
Cadmium	M	2455	mg/kg	0.10	0.15	0.18	< 0.10	0.18
Chromium	M	2455	mg/kg	0.5	11	26	3.6	19
Mercury Low Level	M	2450	mg/kg	0.05	< 0.05	0.06	< 0.05	< 0.05
Manganese	M	2455	mg/kg	1.0	470	710	150	590
Molybdenum	M	2455	mg/kg	0.5	0.8	0.7	< 0.5	0.7
Antimony	N	2455	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0
Copper	M	2455	mg/kg	0.50	22	16	3.4	19
Nickel	M	2455	mg/kg	0.50	23	31	8.0	30
Lead	M	2455	mg/kg	0.50	22	36	5.2	27
Selenium	M	2455	mg/kg	0.25	0.50	0.84	0.27	0.71
Zinc	M	2455	mg/kg	0.50	65	100	19	94
Chromium (Trivalent)	N	2490	mg/kg	1.0	11	26	3.6	19
Chromium (Hexavalent)	N	2490	mg/kg	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
Aliphatic VPH >C6-C7	U	2780	mg/kg	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
Aliphatic VPH >C6-C8 (Sum)	N	2780	mg/kg	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
Total Aliphatic VPH >C5-C10	U	2780	mg/kg	0.25	< 0.25	< 0.25	< 0.25	< 0.25
Aliphatic EPH >C10-C12	M	2690	mg/kg	2.00	6.3	3.0	2.7	2.7
Aliphatic EPH >C12-C16	M	2690	mg/kg	1.00	8.8	5.3	4.7	4.8

Results - Soil

Project: Pant Celydd - Capping System Verification Works - Second Rou

Client: Terra Firma (Wales) Ltd	Chemtest Job No.:				23-38465	23-38465	23-38465	23-38465
Quotation No.:	Chemtest Sample ID.:				1733302	1733303	1733304	1733305
Order No.: 16306-AC	Client Sample Ref.:				SAMPLE 5	SAMPLE 6	SAMPLE 7	SAMPLE 8
	Client Sample ID.:				SAMPLE 5	SAMPLE 6	SAMPLE 7	SAMPLE 8
	Sample Type:				SOIL	SOIL	SOIL	SOIL
	Date Sampled:				16-Nov-2023	16-Nov-2023	16-Nov-2023	16-Nov-2023
	Time Sampled:				12:00	12:00	12:00	12:00
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD				
Aliphatic EPH >C16-C21	M	2690	mg/kg	2.00	20	7.9	7.7	8.2
Aliphatic EPH >C21-C35	M	2690	mg/kg	3.00	30	10	12	15
Aliphatic EPH >C35-C40	N	2690	mg/kg	10.00	< 10	< 10	< 10	< 10
Total Aliphatic EPH >C10-C35	M	2690	mg/kg	5.00	65	26	27	30
Total Aliphatic EPH >C10-C40	N	2690	mg/kg	10.00	65	26	27	30
Aromatic VPH >C5-C7	U	2780	mg/kg	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
Aromatic VPH >C8-C10	U	2780	mg/kg	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
Aromatic EPH >C10-C12	U	2690	mg/kg	1.00	2.9	1.2	1.4	2.4
Aromatic EPH >C12-C16	U	2690	mg/kg	1.00	3.9	< 1.0	3.0	2.3
Aromatic EPH >C16-C21	U	2690	mg/kg	2.00	19	6.6	12	13
Aromatic EPH >C21-C35	U	2690	mg/kg	2.00	260	130	200	230
Aromatic EPH >C35-C40	N	2690	mg/kg	1.00	38	20	28	25
Total Aromatic EPH >C10-C35	U	2690	mg/kg	5.00	280	140	210	240
Total Aromatic EPH >C10-C40	N	2690	mg/kg	10.00	320	160	240	270
Total VPH >C5-C10	U	2780	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Total EPH >C10-C35	U	2690	mg/kg	10.00	350	160	240	270
Total EPH >C10-C40	N	2690	mg/kg	10.00	390	180	270	300
Naphthalene	M	2700	mg/kg	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
Acenaphthene	M	2700	mg/kg	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
Phenanthrene	M	2700	mg/kg	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
Fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	M	2700	mg/kg	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
Benzo[k]fluoranthene	M	2700	mg/kg	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
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	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
Benzo[g,h,i]perylene	M	2700	mg/kg	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
Total Phenols	M	2920	mg/kg	0.10	1.7	0.48	0.47	0.54

Results - Soil

**Project: Pant Celydd - Capping System Verification Works - Second
Rou**

Client: Terra Firma (Wales) Ltd	Chemtest Job No.:					23-38465	23-38465	23-38465	23-38465
Quotation No.:	Chemtest Sample ID.:					1733302	1733303	1733304	1733305
Order No.: 16306-AC	Client Sample Ref.:					SAMPLE 5	SAMPLE 6	SAMPLE 7	SAMPLE 8
	Client Sample ID.:					SAMPLE 5	SAMPLE 6	SAMPLE 7	SAMPLE 8
	Sample Type:					SOIL	SOIL	SOIL	SOIL
	Date Sampled:					16-Nov-2023	16-Nov-2023	16-Nov-2023	16-Nov-2023
	Time Sampled:					12:00	12:00	12:00	12:00
	Asbestos Lab:					DURHAM	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD					
Organic Matter BS1377	N	2930	%	0.10	3.6	3.3	3.9	3.5	

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH at 20°C	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.
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 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
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
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; Dibenzo[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)
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
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"
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

- 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 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

ANNEX C
Validation Photographs

Toronto Avenue, Port Talbot (Back gardens)

Photo No: 01	
Date: 04/10/23	
Description: Validation of Plot 25's imported soil depth.	
Photo No: 02	
Date: 04/10/23	
Description: Validation of Plot 25's imported soil depth.	
Photo No: 03	
Date: 04/10/23	
Description: Validation of Plot's 17-24's imported soil depth.	

Toronto Avenue, Port Talbot (Back gardens)

Photo No: 04	
Date: 04/10/23	
Description: Validation of Plot's 17-24's imported soil depth.	
Photo No: 05	
Date: 04/10/23	
Description: Validation of Plot 16's imported soil depth.	
Photo No: 06	
Date: 04/10/23	
Description: Validation of Plot 16's imported soil depth.	

Toronto Avenue, Port Talbot (Back gardens)

Photo No: 07	
Date: 04/10/23	
Description: Validation of Plot 4-15's imported soil depth.	
Photo No: 08	
Date: 04/10/23	
Description: Validation of Plot 4-15's imported soil depth.	
Photo No: 09	
Date: 04/10/23	
Description: Validation of Plot 3's imported soil depth.	

Toronto Avenue, Port Talbot (Back gardens)

Photo No:	10	
Date:	04/10/23	
Description: Validation of Plot 2's imported soil depth.		
Photo No:	11	
Date:	04/10/23	
Description: Validation of Plot 1's imported soil depth.		

Toronto Avenue, Port Talbot (Front Gardens)

Photo No: 12	
Date: 14/11/23	
Description: Validation of Plot 1 soil depth.	
Photo No: 13	
Date: 14/11/23	
Description: Validation of Plot 1 soil depth.	
Photo No: 14	
Date: 14/11/23	
Description: Validation of Plot 2-3's imported soil depth.	

Toronto Avenue, Port Talbot (Front Gardens)

Photo No: 15	
Date: 14/11/23	
Description: Validation of Plot 2-3's imported soil depth.	
Photo No: 16	
Date: 14/11/23	
Description: Validation of Plot 4-5 soil depth.	
Photo No: 17	
Date: 14/11/23	
Description: Validation of Plot 4-5 soil depth.	

Toronto Avenue, Port Talbot (Front Gardens)

Photo No: 18	
Date: 14/11/23	
Description: Validation of Plot 6-8's imported soil depth.	
Photo No: 19	
Date: 14/11/23	
Description: Validation of Plot 6-8's imported soil depth.	
Photo No: 20	
Date: 14/11/23	
Description: Validation of Plot 9-13's soil depth.	

Toronto Avenue, Port Talbot (Front Gardens)

Photo No: 21	
Date: 14/11/23	
Description: Validation of Plot 9-13's soil depth.	
Photo No: 22	
Date: 14/11/23	
Description: Validation of Plot 14-17's imported soil depth.	
Photo No: 23	
Date: 14/11/23	
Description: Validation of Plot 14-17's imported soil depth.	

Toronto Avenue, Port Talbot (Front Gardens)

Photo No: 24	
Date: 14/11/23	
Description: Validation of Plot 19-21's soil depth.	
Photo No: 25	
Date: 14/11/23	
Description: Validation of Plot 19-21's soil depth.	
Photo No: 26	
Date: 14/11/23	
Description: Validation of Plot 23-25s imported soil depth.	