

Our Ref: MW/14647/VR-Plots 131-132

Your Ref:

Contact: Michael Watkins

13th October 2022

Persimmon Homes West Wales
Dragon House
Parc y Ddraig
Penllagaer Business Park
Swansea
SA4 9HJ

For the Attention of: Mr Ellis Jones

Dear Ellis,

CAPPING LAYER VALIDATION REPORT: PLOTS 131 AND 132, AFAN LIDO, PORT TALBOT

Section 1 Introduction

Persimmon Homes West Wales (the Client) are developing land at the former Afan Lido site and land to the south of Channel View in Port Talbot for residential purposes. The majority of the dwellings are low-rise dwellings with private gardens. Sixteen apartments (65-72 and 93-100) are to be built within two buildings. The proposed layout is illustrated on **Drawing 01**.

Hyder Consulting (UK) Limited completed a Geo-environmental and Geotechnical Site Investigation in July 2015 (Report No. UA007442-001-R001). Terra Firma (Wales) Limited completed a Supplementary Geotechnical and Geo-environmental Site Investigation Report in November 2018, and a Remediation Strategy report in April 2022.

The Remediation Strategy report (14647/RS dated June 2021) made recommendation for mitigation measures in areas of soft surfacing. The recommendation was to place 600mm of clean inert soils over a no-dig membrane comprising a geo-grid and high-visibility geotextile.

TFW Group Limited have been commissioned by the Client to validate the thickness of the capping soils, presence of the no-dig membrane, and the soils suitability to be used in residential gardens with plant uptake based upon their chemical composition in the gardens of Plots 131 and 132.

Capping soils comprise a top layer of soil comprising of dark brown, clayey **SAND** with fine roots. The subsoil comprised reddish brown mottled grey sandy slightly gravelly **CLAY**.

Section 2 Soil Chemical Testing of

A TFW Group Limited engineer visited the site on 7th September 2022 to collect samples for chemical analysis from a 20m³ stockpile of topsoil and a 100m³ stockpile of subsoil.

Sampling was undertaken 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. To this end two samples of the topsoil and four samples of the subsoil were collected.

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 A**.

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

Substance	Threshold Value (mg/kg)	Source	Measured Concentrations (mg/kg)				Number of Exceedances
			Topsoil		Subsoil		
			Min	Max	Min	Max	
Arsenic	37	LQM/CIEH	3.2	4.9	4.1	4.6	0
Cadmium	11	LQM/CIEH	<1.0	<1.0	0.24	0.48	0
Chromium III	910	LQM/CIEH	4.4	6.2	18	56	0
Chromium VI	6	LQM/CIEH	<0.5	<0.5	<0.5	<0.5	0
Copper	2400	LQM/CIEH	6.8	10	12	23	0
Lead	200	pC4SL	16	54	16	26	0
Mercury (inorganic)	40	LQM/CIEH	<0.05	<0.05	<0.05	<0.05	0
Nickel	180	LQM/CIEH	10	14	13	18	0
Selenium	250	LQM/CIEH	<0.25	<0.25	0.46	0.52	0
Zinc	3700	LQM/CIEH	38	98	61	130	0
Cyanide*	-	-	<0.5	<0.50	<0.5	<0.5	0
Phenols	120	LQM/CIEH	0.70	0.86	<0.10	<0.10	0
Boron	290	LQM/CIEH	1.5	1.7	1.4	2.2	0
Organic Matter (%)	-	-	4.5	4.8	0.40	2.4	-
pH	-	-	8.7	8.8	9.4	9.6	-
Asbestos	-	-	Not Detected	Not Detected	Not Detected	Not 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
			Topsoil		Subsoil		
			Min	Max	Min	Max	
Naphthalene	2.3	LQM/CIEH	< 0.10	< 0.10	< 0.10	< 0.10	0
Acenaphthylene	170	LQM/CIEH	< 0.10	< 0.10	< 0.10	< 0.10	0
Acenaphthene	210	LQM/CIEH	< 0.10	< 0.10	< 0.10	< 0.10	0
Fluorene	170	LQM/CIEH	< 0.10	< 0.10	< 0.10	< 0.10	0
Phenanthrene	95	LQM/CIEH	< 0.10	< 0.10	< 0.10	< 0.10	0
Anthracene	2400	LQM/CIEH	< 0.10	< 0.10	< 0.10	0.12	0
Fluoranthene	280	LQM/CIEH	< 0.10	< 0.10	< 0.10	4.9	0
Pyrene	620	LQM/CIEH	< 0.10	< 0.10	< 0.10	4.7	0
Benzo(a)anthracene	7.2	LQM/CIEH	< 0.10	< 0.10	< 0.10	0.12	0
Chrysene	15	LQM/CIEH	< 0.10	< 0.10	< 0.10	1.3	0
Benzo(b)fluoranthene	2.6	LQM/CIEH	< 0.10	< 0.10	< 0.10	< 0.10	0
Benzo(k)fluoranthene	77	LQM/CIEH	< 0.10	< 0.10	< 0.10	< 0.10	0
Benzo(a)pyrene	2.2	LQM/CIEH	< 0.10	< 0.10	< 0.10	< 0.10	0
Indeno(123cd)pyrene	27	LQM/CIEH	< 0.10	< 0.10	< 0.10	< 0.10	0
Dibenzo(ah)anthracene	0.24	LQM/CIEH	< 0.10	< 0.10	< 0.10	< 0.10	0
Benzo(ghi)perylene	320	LQM/CIEH	< 0.10	< 0.10	< 0.10	< 0.10	0
Total PAH	-	-	< 2.0	< 2.0	< 2.0	11	-

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
			Topsoil		Subsoil		
			Min	Max	Min	Max	
Aliphatic							
PH C5 – C6 Ali	42	LQM/CIEH	< 1.0	< 1.0	< 1.0	< 1.0	0
PH C6 – C8 Ali	100	LQM/CIEH	< 1.0	< 1.0	< 1.0	< 1.0	0
PH C8 – C10 Ali	27	LQM/CIEH	< 1.0	< 1.0	< 1.0	< 1.0	0
PH C10 – C12 Ali	130	LQM/CIEH	< 1.0	< 1.0	< 1.0	< 1.0	0
PH C12 – C16 Ali	1100	LQM/CIEH	< 1.0	< 1.0	< 1.0	< 1.0	0
PH C16 – C21 Ali	65000*	LQM/CIEH	< 1.0	< 1.0	< 1.0	< 1.0	0
PH C21 – C35 Ali	65000*	LQM/CIEH	< 1.0	< 1.0	< 1.0	< 1.0	0
PH C35 – C44 Ali	65000	LQM/CIEH	< 1.0	< 1.0	< 1.0	< 1.0	0
Aromatic							
PH C5 – C7 Arom	70	LQM/CIEH	< 1.0	< 1.0	< 1.0	< 1.0	0
PH C7 – C8 Arom	130	LQM/CIEH	< 1.0	< 1.0	< 1.0	< 1.0	0
PH C8 – C10 Arom	34	LQM/CIEH	< 1.0	< 1.0	< 1.0	< 1.0	0

PH C10 – C12 Arom	74	LQM/CIEH	< 1.0	< 1.0	< 1.0	< 1.0	0
PH C12 – C16 Arom	140	LQM/CIEH	< 1.0	< 1.0	< 1.0	< 1.0	0
PH C16 – C21 Arom	260	LQM/CIEH	< 1.0	< 1.0	< 1.0	< 1.0	0
PH C21 – C35 Arom	1100	LQM/CIEH	< 1.0	< 1.0	< 1.0	< 1.0	0
PH C35 – C44 Arom	1100	LQM/CIEH	< 1.0	< 1.0	< 1.0	< 1.0	0

Notes:

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 Verification of Capping Thickness and No Dig Barrier

A TFW Group Limited engineer visited the site on 13th October 2022 to confirm the capping thickness and presence of no dig-barrier.

Hand dug inspection pits were excavated in the rear gardens of Plot 131 and 132 as indicated in **Figure 3.1**.



Figure 3.1: Location of Validation Pits / Samples

Table 3.1 records the depth of the upper soil layer and lower soil layer, and the depth of samples taken.

Table 3.1 Summary of Capping Soil Thickness and Sample Depth

Plot	Upper Soil Layer Depth (m)	Sample Depth (m)	Lower Soil Layer Depth (m)	Sample Depth (m)	High Visibility Geotextile Membrane Present?
Plot 131	0.15	-	0.7	-	Yes
Plot 132	0.15	-	0.7	-	Yes

Photographs of the inspection trial pits are presented in **Annex B**.

Section 4 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 above a no-dig barrier comprising a geo-grid laid over a high-visibility membrane.

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 Plots 131 and 132 have 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



Michael Watkins

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ANNEX A
Soil Laboratory Chemical Test Results



Amended Report

Report No.:	22-34573-2		
Initial Date of Issue:	16-Sep-2022	Date of Re-Issue:	21-Sep-2022
Client	Terra Firma (Wales) Ltd		
Client Address:	5 Deryn Court Wharfedale Road Pentwyn Cardiff CF23 7HA		
Contact(s):	ruth@terrafirmawales.co.uk; michael@terrafirmawales.co.uk		
Project	Afan Lido		
Quotation No.:		Date Received:	09-Sep-2022
Order No.:	14647RH	Date Instructed:	09-Sep-2022
No. of Samples:	2		
Turnaround (Wkdays):	11	Results Due:	26-Sep-2022
Date Approved:	21-Sep-2022		
Approved By:			

Details: Stuart Henderson, Technical Manager

Results - Soil

Project: Afan Lido

Client: Terra Firma (Wales) Ltd	Chemtest Job No.:				22-34573	22-34573
Quotation No.:	Chemtest Sample ID.:				1503887	1503888
Order No.: 14647RH	Client Sample Ref.:				TS	TS
	Client Sample ID.:				S1	S2
	Sample Type:				SOIL	SOIL
	Date Sampled:				08-Sep-2022	08-Sep-2022
	Time Sampled:				12:00	12:00
	Asbestos Lab:				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
ACM Detection Stage	U	2192		N/A	-	-
Moisture	N	2030	%	0.020	13	12
Soil Colour	N	2040		N/A	Black	Black
Other Material	N	2040		N/A	None	None
Soil Texture	N	2040		N/A	Sand	Sand
pH	M	2010		4.0	8.9	8.7
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	1.7	1.5
Cyanide (Complex)	M	2300	mg/kg	0.50	0.60	0.50
Cyanide (Free)	M	2300	mg/kg	0.50	< 0.50	< 0.50
Cyanide (Total)	M	2300	mg/kg	0.50	0.60	0.50
Sulphate (Acid Soluble)	U	2430	%	0.010	0.026	0.024
Arsenic	M	2455	mg/kg	0.5	3.2	4.9
Cadmium	M	2455	mg/kg	0.10	< 0.10	< 0.10
Chromium	M	2455	mg/kg	0.5	4.4	6.2
Mercury Low Level	M	2450	mg/kg	0.05	< 0.05	< 0.05
Copper	M	2455	mg/kg	0.50	6.8	10
Nickel	M	2455	mg/kg	0.50	10	14
Lead	M	2455	mg/kg	0.50	16	54
Selenium	M	2455	mg/kg	0.25	< 0.25	< 0.25
Zinc	M	2455	mg/kg	0.50	38	98
Chromium (Trivalent)	N	2490	mg/kg	1.0	4.4	6.2
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0

Results - Soil

Project: Afan Lido

Client: Terra Firma (Wales) Ltd	Chemtest Job No.:				22-34573	22-34573
Quotation No.:	Chemtest Sample ID.:				1503887	1503888
Order No.: 14647RH	Client Sample Ref.:				TS	TS
	Client Sample ID.:				S1	S2
	Sample Type:				SOIL	SOIL
	Date Sampled:				08-Sep-2022	08-Sep-2022
	Time Sampled:				12:00	12:00
	Asbestos Lab:				DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD		
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10
Naphthalene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Chrysene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0	< 2.0
Total Phenols	M	2920	mg/kg	0.10	0.86	0.70
Organic Matter BS1377	N	2930	%	0.10	4.5	4.8

Test Methods

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

Report Information

Key

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.: 22-34568-1
Initial Date of Issue: 19-Sep-2022
Client Terra Firma (Wales) Ltd
Client Address: 5 Deryn Court
Wharfedale Road
Pentwyn
Cardiff
CF23 7HA
Contact(s): michael@terrafirmawales.co.uk;
ruth@terrafirmawales.co.uk
Project Afan Lido SS
Quotation No.:
Order No.: 14647RH
No. of Samples: 4
Turnaround (Wkdays): 5
Date Approved: 19-Sep-2022
Approved By:

Date Received: 09-Sep-2022

Date Instructed: 09-Sep-2022

Results Due: 15-Sep-2022

Details: Stuart Henderson, Technical
Manager

Results - Soil

Project: Afan Lido SS

Client: Terra Firma (Wales) Ltd	Chemtest Job No.:				22-34568	22-34568	22-34568	22-34568
Quotation No.:	Chemtest Sample ID.:				1503776	1503777	1503778	1503779
Order No.: 14647RH	Client Sample Ref.:				SS	SS	SS	SS
	Client Sample ID.:				S1	S2	S3	S4
	Sample Type:				SOIL	SOIL	SOIL	SOIL
	Date Sampled:				08-Sep-2022	08-Sep-2022	08-Sep-2022	08-Sep-2022
	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
ACM Detection Stage	U	2192		N/A	-	-	-	-
Moisture	N	2030	%	0.020	8.9	11	10	11
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Sand
pH	M	2010		4.0	9.5	9.5	9.6	9.4
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	1.9	2.1	2.2	1.4
Cyanide (Total)	M	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Sulphate (Acid Soluble)	U	2430	%	0.010	0.11	0.10	0.099	0.071
Arsenic	M	2455	mg/kg	0.5	4.6	4.4	4.1	4.3
Cadmium	M	2455	mg/kg	0.10	0.48	0.52	0.46	0.24
Chromium	M	2455	mg/kg	0.5	56	51	45	18
Mercury Low Level	M	2450	mg/kg	0.05	< 0.05	< 0.05	< 0.05	< 0.05
Copper	M	2455	mg/kg	0.50	23	20	16	12
Nickel	M	2455	mg/kg	0.50	18	17	15	13
Lead	M	2455	mg/kg	0.50	22	26	20	16
Selenium	M	2455	mg/kg	0.25	0.48	0.48	0.46	0.52
Zinc	M	2455	mg/kg	0.50	110	130	110	61
Chromium (Trivalent)	N	2490	mg/kg	1.0	56	51	45	18
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Soil

Project: Afan Lido SS

Client: Terra Firma (Wales) Ltd	Chemtest Job No.:				22-34568	22-34568	22-34568	22-34568
Quotation No.:	Chemtest Sample ID.:				1503776	1503777	1503778	1503779
Order No.: 14647RH	Client Sample Ref.:				SS	SS	SS	SS
	Client Sample ID.:				S1	S2	S3	S4
	Sample Type:				SOIL	SOIL	SOIL	SOIL
	Date Sampled:				08-Sep-2022	08-Sep-2022	08-Sep-2022	08-Sep-2022
	Time Sampled:				12:00	12:00	12:00	12:00
	Asbestos Lab:				DURHAM	DURHAM	DURHAM	DURHAM
Determinand	Accred.	SOP	Units	LOD				
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	< 10	< 10	< 10	< 10
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	0.12
Fluoranthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	4.9
Pyrene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	4.7
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	0.12
Chrysene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	1.3
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	11
Total Phenols	M	2920	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10
Organic Matter BS1377	N	2930	%	0.10	2.4	0.40	1.0	1.2

Test Methods

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

Report Information

Key

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 B
Validation Photographs

SITE PHOTOGRAPHS

Photo No: 01 Date: 13/10/22 Description: Validation of capping thickness at plot 131.	
Photo No: 02 Date: 13/10/22 Description: Photograph of trial pit in plot 131.	
Photo No: 03 Date: 13/10/22 Description: Validation of capping thickness at plot 131 with no dig barrier.	

SITE PHOTOGRAPHS

Photo No: 04		
Date: 13/10/22		
Description: Validation of capping thickness at plot 132 with no dig barrier.		
Photo No: 05		
Date: 13/10/22		
Description: Photograph of trial pit in plot 131.		
Photo No:		
Date:		
Description:		