

ANNEX E
Soil Chemical Test Results



DETS

Certificate of Analysis

Certificate Number 18-26730-1

22-Nov-18

Client Terra Firma (Wales) Ltd
5 Deryn Court
Wharfdale Road
Pentwyn
Cardiff
CF23 7HB

Our Reference 18-26730-1

Client Reference (not supplied)

Order No (not supplied)

Contract Title CELSA

Description 6 Soil samples.

Date Received 09-Nov-18

Date Started 09-Nov-18

Date Completed 22-Nov-18

Test Procedures Identified by prefix DETSn (details on request).

Notes This report supersedes 18-26730, additional testing added

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.

Approved By



Adam Fenwick
Contracts Manager



Summary of Chemical Analysis

Matrix Descriptions

Our Ref 18-26730-1

Client Ref

Contract Title CELSA

Sample ID	Depth	Lab No	Completed	Matrix Description
TP01	1	1418750	16/11/2018	Black sandy GRAVEL (Made ground - coal (sample matrix outside MCERTS scope of accreditation))
TP03	0.4	1418751	16/11/2018	Grey GRAVEL (sample matrix outside MCERTS scope of accreditation)
TP03	0.7	1418752	16/11/2018	Very dark brown gravelly, clayey SAND (Possible made ground - brick)
TP03	1.8	1418753	16/11/2018	Very dark brown gravelly, clayey SAND
TP09	0.3	1418754	16/11/2018	Dark brown sandy GRAVEL (sample matrix outside MCERTS scope of accreditation)
TP09	1.1	1418755	16/11/2018	Dark brown gravelly, clayey SAND

Summary of Chemical Analysis

Soil Samples

Our Ref 18-26730-1

Client Ref

Contract Title CELSA

Lab No	1418750	1418751	1418752	1418753	1418754	1418755
Sample ID	TP01	TP03	TP03	TP03	TP09	TP09
Depth	1.00	0.40	0.70	1.80	0.30	1.10
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	06/11/18	06/11/18	06/11/18	06/11/18	06/11/18	06/11/18
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Asbestos Quantification	DETSC 1102	0						Y	Y
Preparation									
Moisture Content	DETSC 1004	0.1	%	3.0	4.1	9.0	9.5	2.9	4.6
Metals									
Antimony	DETSC 2301*	1	mg/kg	3.2	18	18	13	12	27
Arsenic	DETSC 2301#	0.2	mg/kg	150	3.1	25	15	34	13
Beryllium	DETSC 2301#	0.2	mg/kg	0.9	0.4	0.4	0.3	0.5	0.4
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	2.6	12	5.9	3.9	13	13
Cadmium	DETSC 2301#	0.1	mg/kg	0.4	0.9	3.7	2.3	1.4	20
Chromium	DETSC 2301#	0.15	mg/kg	82	1200	1100	740	790	680
Chromium III	DETSC 2301*	0.15	mg/kg	82	1200	1100	740	790	680
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	61	420	180	88	4300	980
Lead	DETSC 2301#	0.3	mg/kg	40	120	290	220	94	1700
Manganese	DETSC 2301#	20	mg/kg	1000	27000	22000	32000	15000	11000
Mercury	DETSC 2325#	0.05	mg/kg	0.28	0.07	1.7	0.86	0.24	1.3
Molybdenum	DETSC 2301#	0.4	mg/kg	3.2	16	7.6	6.6	9.5	26
Nickel	DETSC 2301#	1	mg/kg	37	370	110	270	31	120
Selenium	DETSC 2301#	0.5	mg/kg	2.5	6.6	5.4	11	4.9	2.7
Zinc	DETSC 2301#	1	mg/kg	110	580	880	470	480	8300
Inorganics									
Loss on Ignition at 440oC	DETSC 2003#	0.01	%	36					
pH	DETSC 2008#			9.8	11.3	11.4	11.5	11.4	10.0
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	1.1	2.1	0.5	3.8
Cyanide, Complex	DETSC 2130*	0.2	mg/kg	< 0.2	< 0.2	1.1	2.1	0.5	3.8
Organic matter	DETSC 2002#	0.1	%	> 25	0.4	4.9	2.5	3.9	4.8
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	130	110	79	59	110	270
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.11	0.30	0.26	0.28	0.24	0.55
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	1.6	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	7.2	5.6	10
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	16	< 1.5	19	37	59
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	79	48	110	200	360
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	7.8	< 3.4	6.7	16	33
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	96	49	130	250	430
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	1.1	1.8	< 0.9	< 0.9



Summary of Chemical Analysis

Soil Samples

Our Ref 18-26730-1

Client Ref

Contract Title CELSA

Lab No	1418750	1418751	1418752	1418753	1418754	1418755
Sample ID	TP01	TP03	TP03	TP03	TP09	TP09
Depth	1.00	0.40	0.70	1.80	0.30	1.10
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	06/11/18	06/11/18	06/11/18	06/11/18	06/11/18	06/11/18
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	6.7	11	2.5	2.8
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	31	51	38	49
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	150	260	250	310
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	13	22	37	47
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	190	330	290	370
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	96	240	460	530	790
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	0.44	0.04	0.38	< 0.30	0.16	0.16
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.30	< 0.30	< 0.03	0.05
Acenaphthene	DETSC 3303#	0.03	mg/kg	0.24	< 0.03	< 0.30	< 0.30	0.05	0.05
Fluorene	DETSC 3303	0.03	mg/kg	0.22	< 0.03	0.45	< 0.30	0.04	0.07
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.62	0.11	1.0	0.34	0.35	0.68
Anthracene	DETSC 3303	0.03	mg/kg	0.08	< 0.03	4.9	< 0.30	0.05	0.14
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.15	0.18	3.1	1.2	0.33	0.99
Pyrene	DETSC 3303#	0.03	mg/kg	0.13	0.18	2.9	1.1	0.32	1.3
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.06	0.06	1.4	0.75	< 0.03	0.35
Chrysene	DETSC 3303	0.03	mg/kg	0.15	0.11	1.5	0.69	< 0.03	0.66
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.06	0.08	1.7	0.91	0.19	0.96
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	0.03	0.84	0.42	0.06	0.34
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.03	0.03	1.2	0.67	0.10	0.59
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.03	0.67	0.38	0.08	0.48
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.30	< 0.30	< 0.03	0.15
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.04	0.04	0.87	0.43	0.10	0.70
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	2.2	0.91	21	< 6.36	1.8	7.6
PCBs									
PCB 28 + PCB 31	DETSC 3401#	0.01	mg/kg	< 0.01	0.02	< 0.01	< 0.01	0.12	1.1
PCB 52	DETSC 3401#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.57
PCB 101	DETSC 3401#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	0.05	0.42
PCB 118	DETSC 3401#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.27
PCB 153	DETSC 3401#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.20
PCB 138	DETSC 3401#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.34
PCB 180	DETSC 3401#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.07
PCB 7 Total	DETSC 3401#	0.01	mg/kg	< 0.01	0.02	< 0.01	< 0.01	0.17	2.9
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	1.0

Summary of Asbestos Analysis Soil Samples

Our Ref 18-26730-1

Client Ref

Contract Title CELSA

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1418750	TP01 1.00	SOIL	NAD	none	A Christodoulou
1418751	TP03 0.40	SOIL	NAD	none	A Christodoulou
1418752	TP03 0.70	SOIL	NAD	none	A Christodoulou
1418753	TP03 1.80	SOIL	NAD	none	A Christodoulou
1418754	TP09 0.30	SOIL	Chrysotile	Chrysotile Present in microscopic bitumen fragments	A Christodoulou
1418755	TP09 1.10	SOIL	Chrysotile	Chrysotile Present in microscopic loose fibrous asbestos debris and in microscopic bitumen fragments	A Christodoulou

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

Summary of Asbestos Quantification Analysis

Soil Samples

Our Ref 18-26730-1

Client Ref

Contract Title CELSA

Lab No	1418754	1418755
Sample ID	TP09	TP09
Depth	0.30	1.10
Other ID		
Sample Type	SOIL	SOIL
Sampling Date	06/11/18	06/11/18
Sampling Time		

Test	Method	Units			
Total Mass% Asbestos (a+b+c)	DETSC 1102	Mass %	< 0.001	0.026	
Gravimetric Quantification (a)	DETSC 1102	Mass %	0.001	0.026	
Detailed Gravimetric Quantification (b)	DETSC 1102	Mass %	na	na	
Quantification by PCOM (c)	DETSC 1102	Mass %	na	na	
Potentially Respirable Fibres (d)	DETSC 1102	Fibres/g	na	na	

Breakdown of Gravimetric Analysis (a)

Mass of Sample		g	162.42	165.62	
ACMs present*		type	Bitumen	LFAD	Bitumen
Mass of ACM in sample		g	0.01	0.05	0.01
% ACM by mass		%	0.01	0.03	0.00
% asbestos in ACM		%	8.00	85	8
% asbestos in sample		%	0.00	0.026	0.000

Breakdown of Detailed Gravimetric Analysis (b)

% Amphibole bundles in sample		Mass %	na	na	
% Chrysotile bundles in sample		Mass %	na	na	

Breakdown of PCOM Analysis (c)

% Amphibole fibres in sample		Mass %	na	na	
% Chrysotile fibres in sample		Mass %	na	na	

Breakdown of Potentially Respirable Fibre Analysis (d)

Amphibole fibres		Fibres/g	na	na	
Chrysotile fibres		Fibres/g	na	na	

* Denotes test or material description outside of UKAS accreditation.
 % asbestos in Asbestos Containing Materials (ACMs) is determined by
 by reference to HSG 264.
 Recommended sample size for quantification is approximately 1kg
 # denotes deviating sample

Information in Support of the Analytical Results

Our Ref 18-26730-1
 Client Ref
 Contract CELSA

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1418750	TP01 1.00 SOIL	06/11/18	GJ 250ml, PT 500ml		
1418751	TP03 0.40 SOIL	06/11/18	GJ 250ml, PT 500ml		
1418752	TP03 0.70 SOIL	06/11/18	GJ 250ml, PT 500ml		
1418753	TP03 1.80 SOIL	06/11/18	GJ 250ml, PT 500ml		
1418754	TP09 0.30 SOIL	06/11/18	GJ 250ml, PT 500ml		
1418755	TP09 1.10 SOIL	06/11/18	GJ 250ml, PT 500ml		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.



DETS

Certificate of Analysis

Certificate Number 19-00239

14-Jan-19

Client Terra Firma (Wales) Ltd
5 Deryn Court
Wharfdale Road
Pentwyn
Cardiff
CF23 7HB

Our Reference 19-00239

Client Reference (not supplied)

Order No 14958

Contract Title CELSA

Description 2 Soil samples.

Date Received 08-Jan-19

Date Started 08-Jan-19

Date Completed 14-Jan-19

Test Procedures Identified by prefix DETSn (details on request).

Notes 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.

Approved By



Adam Fenwick
Contracts Manager



Summary of Chemical Analysis

Matrix Descriptions

Our Ref 19-00239

Client Ref

Contract Title CELSA

Sample ID	Depth	Lab No	Completed	Matrix Description
HD01	0.1	1442212	14/01/2019	Dark grey sandy GRAVEL (sample matrix outside MCERTS scope of accreditation)
HD02	0.1	1442213	14/01/2019	Dark grey sandy GRAVEL (sample matrix outside MCERTS scope of accreditation)

Summary of Chemical Analysis

Soil Samples

Our Ref 19-00239

Client Ref

Contract Title CELSA

Lab No	1442212	1442213
Sample ID	HD01	HD02
Depth	0.10	0.10
Other ID		
Sample Type	SOIL	SOIL
Sampling Date	04/01/19	04/01/19
Sampling Time	n/s	n/s

Test	Method	LOD	Units		
Preparation					
Moisture Content	DETSC 1004	0.1	%	7.4	8.3
Metals					
Antimony	DETSC 2301*	1	mg/kg	15	13
Arsenic	DETSC 2301#	0.2	mg/kg	20	16
Beryllium	DETSC 2301#	0.2	mg/kg	0.6	0.5
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	6.3	6.7
Cadmium	DETSC 2301#	0.1	mg/kg	1.9	2.5
Chromium	DETSC 2301#	0.15	mg/kg	970	820
Chromium III	DETSC 2301*	0.15	mg/kg	970	820
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	150	150
Lead	DETSC 2301#	0.3	mg/kg	99	110
Manganese	DETSC 2301#	20	mg/kg	10000	9400
Mercury	DETSC 2325#	0.05	mg/kg	0.18	0.15
Molybdenum	DETSC 2301#	0.4	mg/kg	9.9	9.4
Nickel	DETSC 2301#	1	mg/kg	29	30
Selenium	DETSC 2301#	0.5	mg/kg	3.6	2.9
Zinc	DETSC 2301#	1	mg/kg	950	1100
Inorganics					
pH	DETSC 2008#			11.4	11.3
Cyanide, Total	DETSC 2130#	0.1	mg/kg	0.4	0.7
Cyanide, Complex	DETSC 2130*	0.2	mg/kg	0.4	0.7
Organic matter	DETSC 2002#	0.1	%	15	17
Sulphate as SO ₄ , Total	DETSC 2321#	0.01	%	0.21	0.20
Petroleum Hydrocarbons					
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	3.6	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	30	< 3.4
Aliphatic C35-C40	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	34	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4

Summary of Chemical Analysis

Soil Samples

Our Ref 19-00239

Client Ref

Contract Title CELSA

Lab No	1442212	1442213
Sample ID	HD01	HD02
Depth	0.10	0.10
Other ID		
Sample Type	SOIL	SOIL
Sampling Date	04/01/19	04/01/19
Sampling Time	n/s	n/s

Test	Method	LOD	Units		
Aromatic C35-C40	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	34	< 10
PAHs					
Naphthalene	DETSC 3303#	0.03	mg/kg	0.30	0.15
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	0.16	0.11
Fluorene	DETSC 3303	0.03	mg/kg	0.15	0.11
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.45	0.49
Anthracene	DETSC 3303	0.03	mg/kg	0.08	0.10
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.38	0.51
Pyrene	DETSC 3303#	0.03	mg/kg	0.32	0.42
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.14	0.20
Chrysene	DETSC 3303	0.03	mg/kg	0.20	0.26
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.24	0.23
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.23	0.09
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.11	0.13
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.07	0.09
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.08	0.10
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	2.9	3.0
PCBs					
PCB 28 + PCB 31	DETSC 3401#	0.01	mg/kg	0.05	0.03
PCB 52	DETSC 3401#	0.01	mg/kg	0.02	0.01
PCB 101	DETSC 3401#	0.01	mg/kg	< 0.01	< 0.01
PCB 118	DETSC 3401#	0.01	mg/kg	< 0.01	< 0.01
PCB 153	DETSC 3401#	0.01	mg/kg	< 0.01	< 0.01
PCB 138	DETSC 3401#	0.01	mg/kg	< 0.01	< 0.01
PCB 180	DETSC 3401#	0.01	mg/kg	< 0.01	< 0.01
PCB 7 Total	DETSC 3401#	0.01	mg/kg	0.06	0.05
Phenols					
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3

Summary of Asbestos Analysis

Soil Samples

Our Ref 19-00239

Client Ref

Contract Title CELSA

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1442212	HD01 0.10	SOIL	NAD	none	Colin Patrick
1442213	HD02 0.10	SOIL	NAD	none	Colin Patrick

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 19-00239

Client Ref

Contract CELSA

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1442212	HD01 0.10 SOIL	04/01/19	GJ 250ml, PT 1L		
1442213	HD02 0.10 SOIL	04/01/19	GJ 250ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETS 2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS 2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS 2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS 2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS 2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS 2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS 2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.