2471 – Bedewell Court, Hebburn

Plotworks Validation Certificate

No.91

SHADBOLT
ENVIRONMENTAL

Plotworks Validation Certificate - Property Numbers 201 and 202

Shadbolt Environmental were commissioned by Barratt Homes North East to undertake plot works validation of groups of properties at Bedewell Court, Hebburn.

Date of Works: Wednesday 07th December 2022

Thickness of Cover Layer Encountered:

Plot 201 / 202	300mm of brown clayey gravelly Topsoil and 700 brown sandy gravelly clay over separator membrane.

Chemical Analysis:

Soils placed within plots were sampled from stockpiles prior to placement on site and submitted for chemical analysis.

Chemical testing results have been compared to the assessment criteria with all determinants being reported within acceptability criteria set out in the Remediation and Earthworks Strategy for the site and is considered suitable for use in residential properties at this site.

Copies of chemical testing results and assessment criteria are appended for review.

Validation Statement:

The validation trial pits excavated within the properties reported the required thickness of "clean" soils to be at least 1.00m in line with the Remediation and Earthworks Strategy for this area. The above referenced plots are now considered to be fully remediated and suitable for occupation.

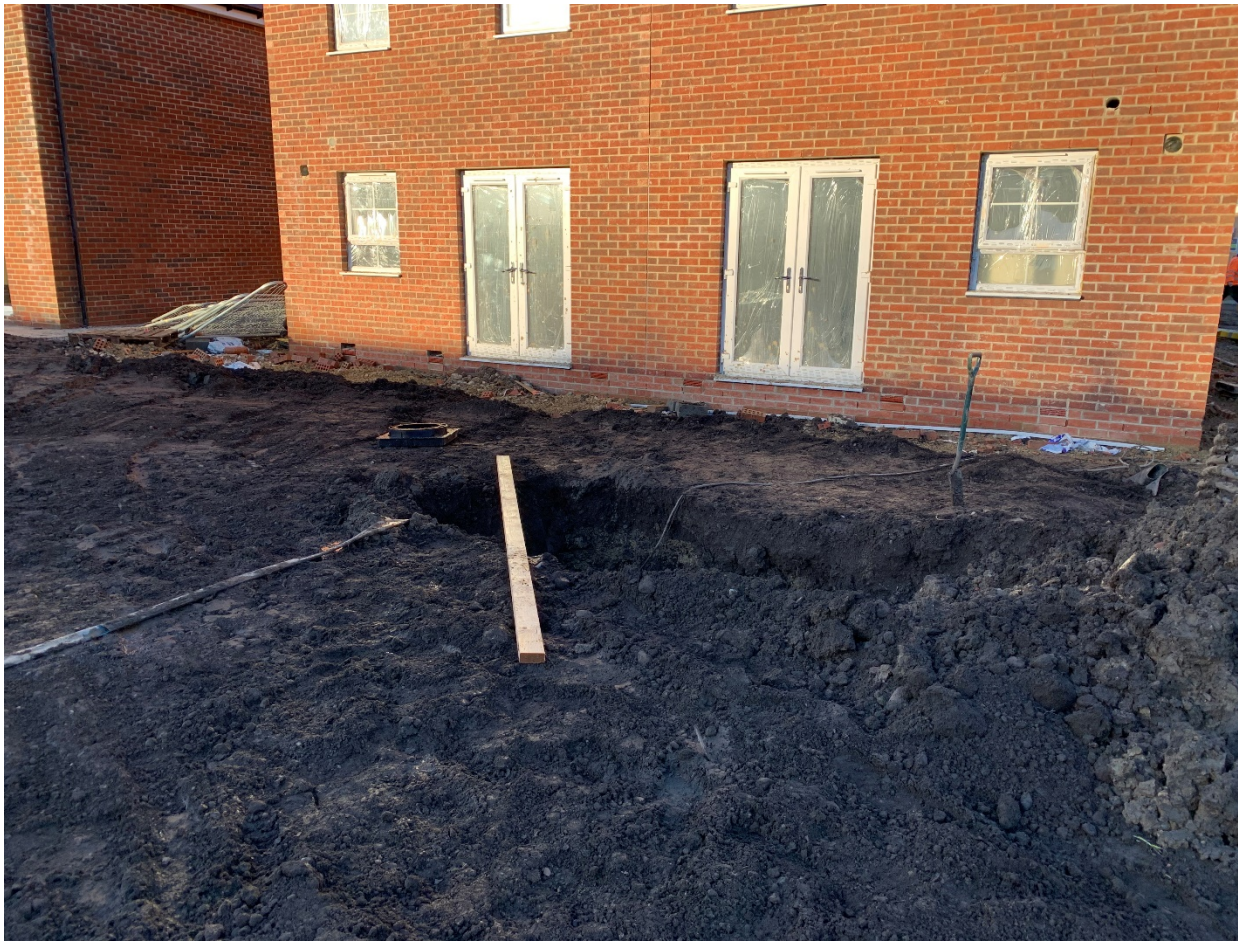
The Shadbolt Group

2471 – Bedewell Court, Hebburn

Plotworks Validation Certificate

No.91

SHADBOLT
ENVIRONMENTAL



Plot 201 / 202

2471 – Bedewell Court, Hebburn

Plotworks Validation Certificate

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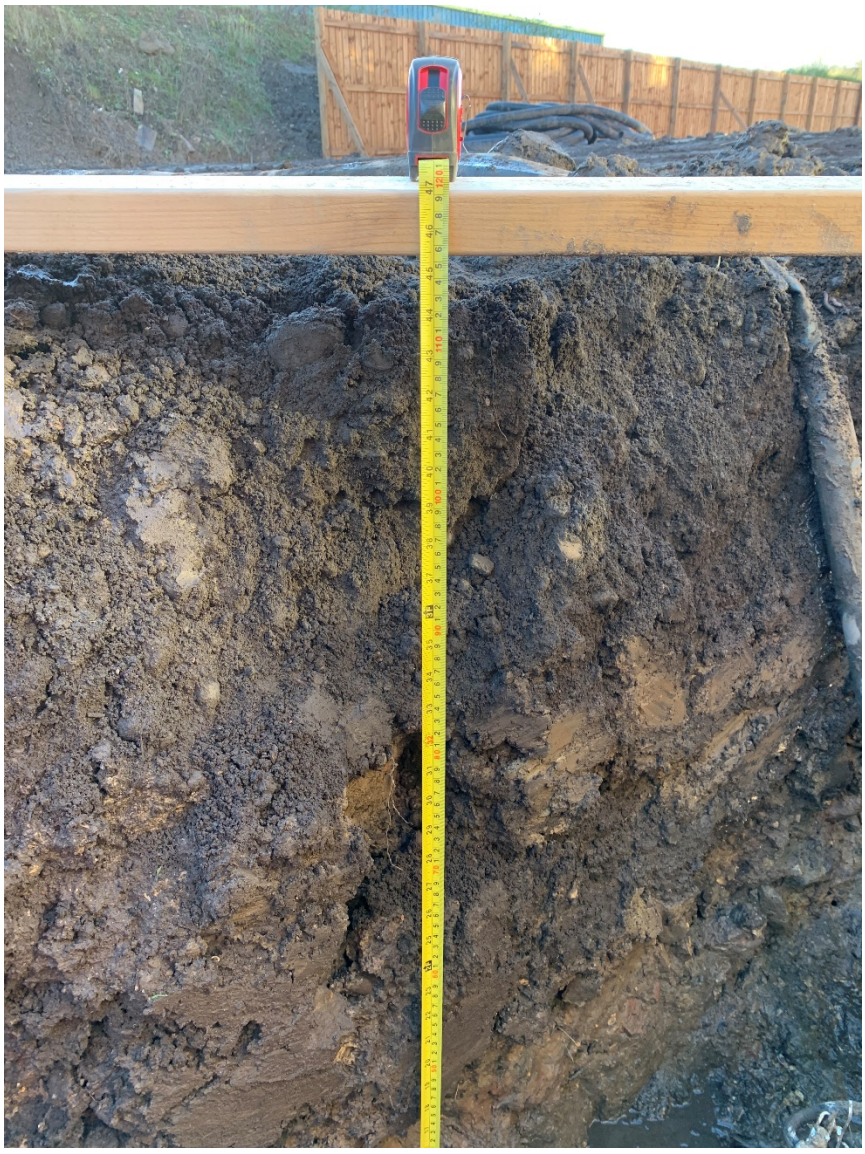
SHADBOLT
ENVIRONMENTAL



Plots 201 / 202

2471 – Bedewell Court, Hebburn

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No.91

SHADBOLT
ENVIRONMENTAL

VALIDATION CRITERIA

Adopted Sirius Remediation Criteria for Residential Private Garden Cover Layer

Parameter	Threshold Concentration (mg/kg, unless otherwise stated)			Comment
	1% SOM*	2.5% SOM	5% SOM	
Metals/Metalloids				
Arsenic (inorganic)	37			
Cadmium	11			Soil pH 6-9
Chromium (III)	910			
Copper	200			Based on phytotoxic effect
Lead	200			
Mercury (inorganic)	40			
Nickel	180			
Selenium	250			
Zinc	450			Based on phytotoxic effect
Other Inorganics				
pH	<5 or >9			Must be in range 5-9
Water-Soluble Sulphate	0.5 g/l			
Organics				
PAHs**				
Benzo(a)pyrene	2.1	2.1	2.2	Genotoxic surrogate
Naphthalene	1.0	2.3	4.6	
TPH†				
Sum of TPH fractions EC5-35	***500***	***500***	***500***	Speciate if elevated
Aliphatic EC 5-6	24	41	68	
Aliphatic EC >6-8	53	110	210	
Aliphatic EC >8-10	13	31	61	
Aliphatic EC >10-12	62	150	300	
Aliphatic EC >12-16	510	1200	2300	
Aliphatic EC >16-35	41000	70000	90000	
Aromatic EC >5-7	53	110	200	
Aromatic EC >7-8	100	240	460	
Aromatic EC >8-10	20	48	94	
Aromatic EC >10-12	63	150	290	
Aromatic EC >12-16	140	320	570	
Aromatic EC >16-21	260	540	840	
Aromatic EC >21-35	1100	1500	1700	
TPH Hazard Index (no units)	<1	<1	<1	
BTEX‡				
Benzene	0.063	0.13	0.24	
Miscellaneous Organics				
Phenol	270	440	440	440mg/kg is the skin irritation threshold
Other Parameters				
Asbestos	<0.001% by weight			

Based on sandy soil at a range of soil organic matter contents and assuming a standard residential with gardens land use. Alternative criteria may be specified for other soil types and SOM contents, for soils placed at depth, or for other land uses.

Notes:

* Soil organic matter; %SOM = 1.724 * %TOC.

** Soils must meet the specified criteria for each component AND the sum of 16 PAHs. The total is specified to prevent unsuitable materials being placed as cover. Where an individual PAH is not shown, then its criterion is greater than that for the sum or it is a genotoxic PAH assessed by using benzo(a)pyrene as a surrogate marker.

† Soils must meet the specified criteria for each component and the Hazard Index for TPH must be <1.0. The sum of TPH fractions must also be met to prevent unsuitable materials being placed as cover. Where an individual TPH fraction has a criterion greater than that for the sum of TPH fractions, the value is solely provided for the calculation of the Hazard Index.

‡ Components other than benzene are not genotoxic carcinogens and therefore assessed as part of the TPH mixture.

Soils must have no visual or olfactory evidence of contamination.

Adopted Sirius Remediation Criteria for Soft Landscaping
Cover Layer

Parameter	Threshold Concentration (mg/kg, unless otherwise stated)			Comment
	1% SOM*	2.5% SOM	5% SOM	
Metals/Metalloids				
Arsenic (inorganic)	70			
Cadmium	120			Soil pH 6-9
Chromium (III)	1500			
Copper	200			Based on phytotoxic effect
Lead	630			
Mercury (inorganic)	120			
Selenium	180			
Nickel	230			
Zinc	450			Based on phytotoxic effect
Other Inorganics				
pH	<5 or >9			pH to be in range 5-9
Water-Soluble Sulphate	0.5 g/l			
Organics				
PAHs**				
Benzo(a)pyrene	4.2	4.2	4.2	Genotoxic surrogate
TPH†				
Sum of TPH fractions EC5-35	***500***	***500***	***500***	Speciate if elevated
Aliphatic EC 5-6	520000	550000	570000	
Aliphatic EC >6-8	560000	580000	600000	
Aliphatic EC >8-10	12000	12000	12000	
Aliphatic EC >10-12	13000	13000	13000	
Aliphatic EC >12-16	13000	13000	13000	
Aliphatic EC >16-35	250000	250000	250000	
Aromatic EC >5-7	55000	55000	55000	
Aromatic EC >7-8	55000	55000	55000	
Aromatic EC >8-10	5000	5000	5000	
Aromatic EC >10-12	5000	5000	5000	
Aromatic EC >12-16	5000	5000	5000	
Aromatic EC >16-21	3800	3800	3800	
Aromatic EC >21-35	3800	3800	3800	
TPH Hazard Index (no units)	<1	<1	<1	
BTEX‡				
Benzene	71	72	72	
Miscellaneous Organics				
Phenol	440	440	440	440mg/kg is the skin irritation threshold
Other Parameters				
Asbestos	<0.001% by weight			

Based on sandy soil at a range of soil organic matter contents for areas of vegetated landscaping in residential or commercial land uses. Alternative criteria may be specified for other soil types and SOM contents, for soils placed at depth, or for other land uses.

Notes:

* Soil organic matter; %SOM = 1.724 * %TOC.

** Soils must meet the specified criteria for each component AND the sum of 16 PAHs. The total is specified to prevent unsuitable materials being placed as cover. Where an individual PAH is not shown, then its criterion is greater than that for the sum or it is a genotoxic PAH assessed by using benzo(a) pyrene as a surrogate marker.

† Soils must meet the specified criteria for each component and the Hazard Index for TPH must be <1.0. The sum of TPH fractions must also be met to prevent unsuitable materials being placed as cover. Where an individual TPH fraction has a criterion greater than that for the sum of TPH fractions, the value is solely provided for the calculation of the Hazard Index.

‡ Components other than benzene are not genotoxic carcinogens and therefore assessed as part of the TPH mixture.

Soils must have no visual or olfactory evidence of contamination.

2471 – Bedewell Court, Hebburn

Plotworks Validation Certificate

No.91

SHADBOLT
ENVIRONMENTAL

CHEMICAL ANALYSIS

ANALYTICAL TEST REPORT

Contract no: 106266

Contract name: Bedewell

Client reference: 2471

Clients name: Shadbolt Group

Clients address: 18 Bewick Road
Gateshead
Tyne & Wear
NE8 4DP

Samples received: 22 February 2022

Analysis started: 22 February 2022

Analysis completed: 01 March 2022

Report issued: 01 March 2022

Key

U	UKAS accredited test
M	MCERTS & UKAS accredited test
$	Test carried out by an approved subcontractor
I/S	Insufficient sample to carry out test
N/S	Sample not suitable for testing
NAD	No Asbestos Detected

Approved by: [redacted]

Megan Harris

Senior Reporting Administrator

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
106266-1	TS-201	-	Sandy Loamy Clay with Roots	-	-	12.9
106266-2	TS-202	-	Sandy Loamy Clay with Roots	-	-	14.6
106266-3	TS-203	-	Sandy Loamy Clay with Roots	-	-	16.3
106266-4	TS-204	-	Sandy Loamy Clay with Roots	-	-	15.0
106266-5	SS-201	-	Sandy Loamy Clay with Roots	-	-	15.4
106266-6	SS-202	-	Sandy Loamy Clay with Roots	-	-	13.6
106266-7	SS-203	-	Sandy Loamy Clay with Roots	-	-	14.3
106266-8	SS-204	-	Sandy Loamy Clay with Roots	-	-	13.4

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SOILS

Lab number			106266-1	106266-2	106266-3	106266-4	106266-5	106266-6
Sample id			TS-201	TS-202	TS-203	TS-204	SS-201	SS-202
Depth (m)			-	-	-	-	-	-
Date sampled			22/02/2022	22/02/2022	22/02/2022	22/02/2022	22/02/2022	22/02/2022
Test	**Method**	**Units**						
Arsenic (total)	CE127 M	mg/kg As	9.7	11	10	9.0	8.6	8.7
Boron (water soluble)	CE063 M	mg/kg B	0.8	0.6	0.5	0.6	1.1	1.1
Cadmium (total)	CE127 M	mg/kg Cd	0.3	0.3	0.4	0.3	0.3	<0.2
Chromium (total)	CE127 M	mg/kg Cr	62	63	68	64	65	68
Copper (total)	CE127 M	mg/kg Cu	24	22	27	24	27	31
Lead (total)	CE127 M	mg/kg Pb	59	58	67	60	64	82
Mercury (total)	CE127 M	mg/kg Hg	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Nickel (total)	CE127 M	mg/kg Ni	23	21	27	24	37	57
Selenium (total)	CE127 M	mg/kg Se	1.3	1.2	1.5	1.2	1.5	1.5
Zinc (total)	CE127 M	mg/kg Zn	91	89	102	89	89	79
pH	CE004 M	units	8.1	8.3	8.4	8.1	8.3	8.4
Sulphate (2:1 water soluble)	CE061 U	mg/l SO_4	42	75	72	106	140	212
Cyanide (total)	CE077	mg/kg CN	<1	<1	<1	<1	<1	<1
Total Organic Carbon (TOC)	CE197	% w/w C	3.5	-	-	-	2.8	-
Estimate of OMC (calculated from TOC)	CE197	% w/w	6.1	-	-	-	4.8	-
PAH								
Naphthalene	CE087 M	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Acenaphthylene	CE087 M	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Acenaphthene	CE087 M	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Fluorene	CE087 U	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Phenanthrene	CE087 M	mg/kg	0.02	0.04	0.03	0.03	<0.02	0.13
Anthracene	CE087 U	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	0.02
Fluoranthene	CE087 M	mg/kg	0.04	0.07	0.04	0.04	0.04	0.19
Pyrene	CE087 M	mg/kg	0.03	0.05	0.03	0.03	0.03	0.13
Benzo(a)anthracene	CE087 U	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	0.10
Chrysene	CE087 M	mg/kg	<0.03	<0.03	<0.03	<0.03	<0.03	0.09
Benzo(b)fluoranthene	CE087 M	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	0.08
Benzo(k)fluoranthene	CE087 M	mg/kg	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Benzo(a)pyrene	CE087 U	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	0.06
Indeno(123cd)pyrene	CE087 M	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	0.05
Dibenz(ah)anthracene	CE087 M	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(ghi)perylene	CE087 M	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	0.04
PAH (total of USEPA 16)	CE087	mg/kg	<0.34	<0.34	<0.34	<0.34	<0.34	0.89
BTEX & TPH								
Benzene	CE192 U	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Toluene	CE192 U	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ethylbenzene	CE192 U	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
m & p-Xylene	CE192 U	mg/kg	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

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SOILS

Lab number			106266-1	106266-2	106266-3	106266-4	106266-5	106266-6
Sample id			TS-201	TS-202	TS-203	TS-204	SS-201	SS-202
Depth (m)			-	-	-	-	-	-
Date sampled			22/02/2022	22/02/2022	22/02/2022	22/02/2022	22/02/2022	22/02/2022
Test	**Method**	**Units**						
o-Xylene	CE192 [U]	mg/kg	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
EPH (>C10-C40)	CE033 [M]	mg/kg	<19	60	<19	<19	<19	31
Subcontracted analysis								
Asbestos (qualitative)	$	-	NAD	NAD	NAD	NAD	NAD	NAD

Chemtech Environmental Limited

SOILS

Lab number			106266-7	106266-8
Sample id			SS-203	SS-204
Depth (m)			-	-
Date sampled			22/02/2022	22/02/2022
Test	**Method**	**Units**		
Arsenic (total)	CE127 M	mg/kg As	7.7	7.8
Boron (water soluble)	CE063 M	mg/kg B	1.1	0.9
Cadmium (total)	CE127 M	mg/kg Cd	<0.2	<0.2
Chromium (total)	CE127 M	mg/kg Cr	61	61
Copper (total)	CE127 M	mg/kg Cu	28	21
Lead (total)	CE127 M	mg/kg Pb	53	41
Mercury (total)	CE127 M	mg/kg Hg	<0.5	<0.5
Nickel (total)	CE127 M	mg/kg Ni	35	33
Selenium (total)	CE127 M	mg/kg Se	1.5	1.4
Zinc (total)	CE127 M	mg/kg Zn	73	60
pH	CE004 M	units	8.4	8.4
Sulphate (2:1 water soluble)	CE061 U	mg/l SO_4	253	323
Cyanide (total)	CE077	mg/kg CN	<1	<1
Total Organic Carbon (TOC)	CE197	% w/w C	-	-
Estimate of OMC (calculated from TOC)	CE197	% w/w	-	-
PAH				
Naphthalene	CE087 M	mg/kg	<0.02	<0.02
Acenaphthylene	CE087 M	mg/kg	<0.02	<0.02
Acenaphthene	CE087 M	mg/kg	<0.02	<0.02
Fluorene	CE087 U	mg/kg	<0.02	<0.02
Phenanthrene	CE087 M	mg/kg	<0.02	<0.02
Anthracene	CE087 U	mg/kg	<0.02	<0.02
Fluoranthene	CE087 M	mg/kg	<0.02	0.03
Pyrene	CE087 M	mg/kg	<0.02	0.02
Benzo(a)anthracene	CE087 U	mg/kg	<0.02	<0.02
Chrysene	CE087 M	mg/kg	<0.03	<0.03
Benzo(b)fluoranthene	CE087 M	mg/kg	<0.02	<0.02
Benzo(k)fluoranthene	CE087 M	mg/kg	<0.03	<0.03
Benzo(a)pyrene	CE087 U	mg/kg	<0.02	<0.02
Indeno(123cd)pyrene	CE087 M	mg/kg	<0.02	<0.02
Dibenz(ah)anthracene	CE087 M	mg/kg	<0.02	<0.02
Benzo(ghi)perylene	CE087 M	mg/kg	<0.02	<0.02
PAH (total of USEPA 16)	CE087	mg/kg	<0.34	<0.34
BTEX & TPH				
Benzene	CE192 U	mg/kg	<0.01	<0.01
Toluene	CE192 U	mg/kg	<0.01	<0.01
Ethylbenzene	CE192 U	mg/kg	<0.01	<0.01
m & p-Xylene	CE192 U	mg/kg	<0.02	<0.02

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SOILS

Lab number			106266-7	106266-8
Sample id			SS-203	SS-204
Depth (m)			-	-
Date sampled			22/02/2022	22/02/2022
Test	**Method**	**Units**		
o-Xylene	CE192 [U]	mg/kg	<0.01	<0.01
EPH (>C10-C40)	CE033 [M]	mg/kg	32	<19
Subcontracted analysis				
Asbestos (qualitative)	$	-	NAD	NAD

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE127	Arsenic (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg As
CE063	Boron (water soluble)	Hot water extract, ICP-OES	Dry	M	0.5	mg/kg B
CE127	Cadmium (total)	Aqua regia digest, ICP-MS	Dry	M	0.2	mg/kg Cd
CE127	Chromium (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cr
CE127	Copper (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Cu
CE127	Lead (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Pb
CE127	Mercury (total)	Aqua regia digest, ICP-MS	Dry	M	0.5	mg/kg Hg
CE127	Nickel (total)	Aqua regia digest, ICP-MS	Dry	M	1	mg/kg Ni
CE127	Selenium (total)	Aqua regia digest, ICP-MS	Dry	M	0.3	mg/kg Se
CE127	Zinc (total)	Aqua regia digest, ICP-MS	Dry	M	5	mg/kg Zn
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	units
CE061	Sulphate (2:1 water soluble)	Aqueous extraction, ICP-OES	Dry	U	10	mg/l SO_4
CE077	Cyanide (total)	Extraction, Continuous Flow Colorimetry	As received		1	mg/kg CN
CE197	Total Organic Carbon (TOC)	Carbon Analyser	Dry		0.1	% w/w C
CE197	Estimate of OMC (calculated from TOC)	Calculation from Total Organic Carbon	Dry		0.1	% w/w
CE087	Naphthalene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Acenaphthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Fluorene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Phenanthrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(a)anthracene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Chrysene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(b)fluoranthene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(k)fluoranthene	Solvent extraction, GC-MS	As received	M	0.03	mg/kg
CE087	Benzo(a)pyrene	Solvent extraction, GC-MS	As received	U	0.02	mg/kg
CE087	Indeno(123cd)pyrene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Dibenz(ah)anthracene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	Benzo(ghi)perylene	Solvent extraction, GC-MS	As received	M	0.02	mg/kg
CE087	PAH (total of USEPA 16)	Solvent extraction, GC-MS	As received		0.34	mg/kg
CE192	Benzene	Headspace GC-FID	As received	U	0.01	mg/kg
CE192	Toluene	Headspace GC-FID	As received	U	0.01	mg/kg
CE192	Ethylbenzene	Headspace GC-FID	As received	U	0.01	mg/kg
CE192	m & p-Xylene	Headspace GC-FID	As received	U	0.02	mg/kg
CE192	o-Xylene	Headspace GC-FID	As received	U	0.01	mg/kg
CE033	EPH (>C10-C40)	Solvent extraction, GC-FID	As received	M	19	mg/kg
$	Asbestos (qualitative)	HSG 248, Microscopy	Dry	U	-	-

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DEVIATING SAMPLE INFORMATION

Comments
Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
106266-1	TS-201	-	N	
106266-2	TS-202	-	N	
106266-3	TS-203	-	N	
106266-4	TS-204	-	N	
106266-5	SS-201	-	N	
106266-6	SS-202	-	N	
106266-7	SS-203	-	N	
106266-8	SS-204	-	N	

Chemtech Environmental Limited

ADDITIONAL INFORMATION

Notes

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.

Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.

All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.

Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

This report shall not be reproduced except in full, without prior written approval.

Samples will be disposed of 6 weeks from initial receipt unless otherwise instructed.

BTEX compounds are identified by retention time only and may include interference from co-eluting compounds.

For soils and solids, all results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

For soils and solids, analytical results are inclusive of stones, where applicable.