

2471 – Bedewell Court, Hebburn

Plotworks Validation Certificate

No.93



Plotworks Validation Certificate - Property Numbers 175 and 176

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: Thursday 08th December 2022

Thickness of Cover Layer Encountered:

Plot 175 / 176 1000mm of brown clayey gravelly Topsoil 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

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SHADBOLT
ENVIRONMENTAL



Plots 175/176

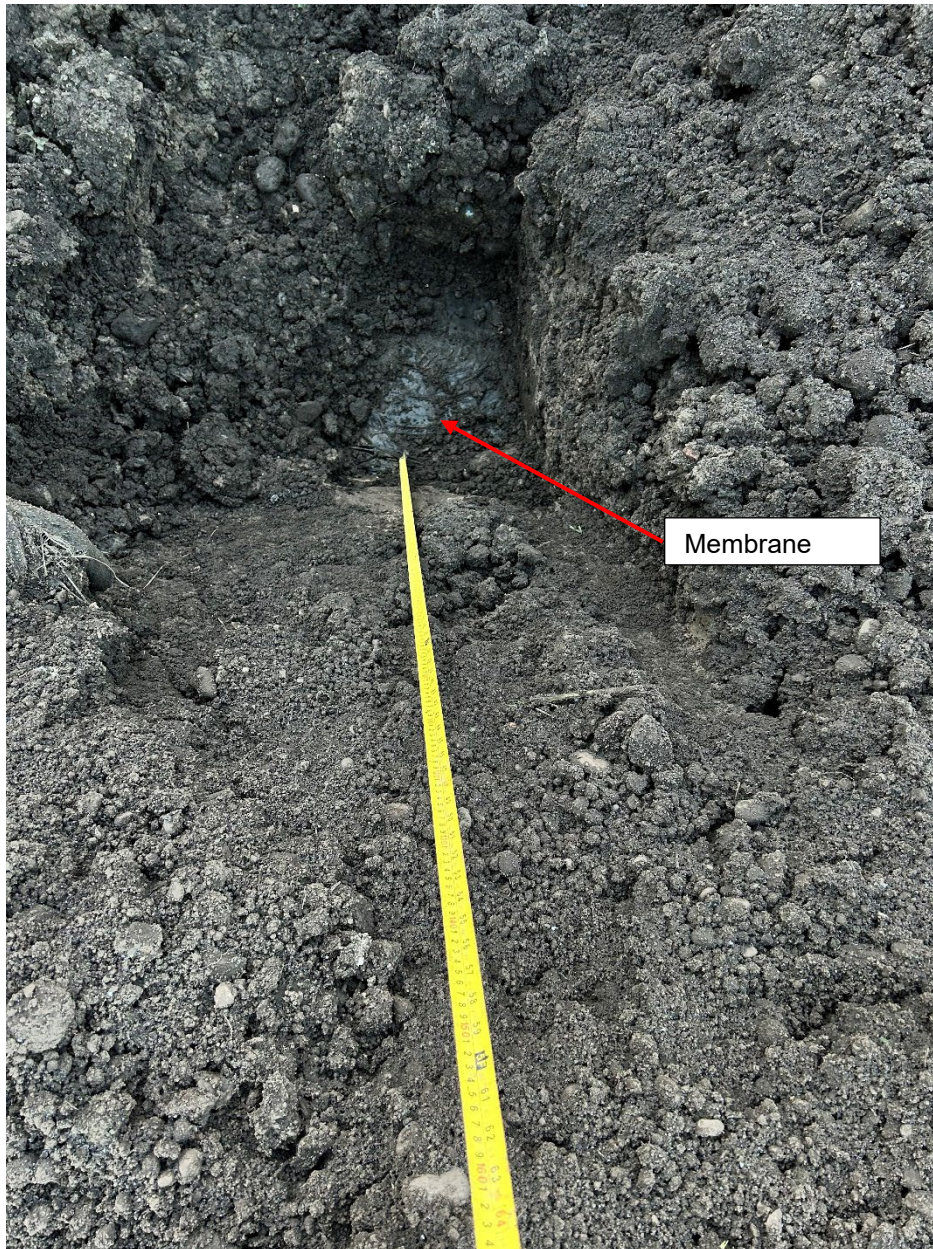
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SHADBOLT
ENVIRONMENTAL



Plots 175/176

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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			Soil pH 6-9
Cadmium	120			
Chromium (III)	1500			
Copper	200			Based on phytotoxic effect
Lead	630			
Mercury (inorganic)	120			
Selenium	180			
Nickel	230			Based on phytotoxic effect
Zinc	450			
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.

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CHEMICAL ANALYSIS



Certificate of Analysis

Certificate Number 22-20124

Issued: 18-Oct-22

Client Shadbolt Group
18 Bewick Road
Gateshead
NE8 4DP

Our Reference 22-20124

Client Reference 2471

Order No 2322

Contract Title Bedewell

Description 6 Soil samples.

Date Received 07-Oct-22

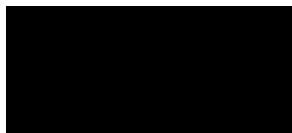
Date Started 07-Oct-22

Date Completed 18-Oct-22

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



Kirk Bridgewood
General Manager



2139

Summary of Chemical Analysis

Soil Samples

Our Ref 22-20124

Client Ref 2471

Contract Title Bedewell

Lab No	2068561	2068562	2068563	2068564	2068565	2068566
Sample ID	TS-301	TS-302	TS-303	SS-301	SS-302	SS-303
Depth						
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	06/10/2022	06/10/2022	06/10/2022	06/10/2022	06/10/2022	06/10/2022
Sampling Time	1100	1100	1100	1130	1130	1130

Test	Method	LOD	Units						
Preparation									
Stones >20mm	DETS 1003*	1	% m/m	4.0	9.0	5.0	17	22	25
Moisture Content	DETS 1004	0.1	%	13	15	14	10	10	10
Metals									
Arsenic	DETS 2301#	0.2	mg/kg	8.5	5.3	9.5	4.0	5.3	5.7
Boron, Water Soluble	DETS 2311#	0.2	mg/kg	1.6	3.5	0.6	0.8	0.7	0.7
Cadmium	DETS 2301#	0.1	mg/kg	0.3	0.1	0.3	0.2	0.2	0.2
Chromium	DETS 2301#	0.15	mg/kg	15	6.8	16	8.0	11	12
Copper	DETS 2301#	0.2	mg/kg	21	9.4	25	14	21	25
Lead	DETS 2301#	0.3	mg/kg	84	30	100	26	41	31
Mercury	DETS 2325#	0.05	mg/kg	0.07	< 0.05	0.08	< 0.05	< 0.05	< 0.05
Nickel	DETS 2301#	1	mg/kg	10	5.0	16	9.4	12	14
Selenium	DETS 2301#	0.5	mg/kg	0.5	0.6	0.5	0.6	< 0.5	0.7
Zinc	DETS 2301#	1	mg/kg	57	23	61	44	58	59
Inorganics									
pH	DETS 2008#		pH	8.5	8.5	7.6	11.0	11.1	11.3
Cyanide, Total	DETS 2130#	0.1	mg/kg	0.4	0.7	0.2	< 0.1	< 0.1	< 0.1
Organic matter	DETS 2002#	0.1	%	7.8	5.7	8.5	2.0	2.2	1.9
Sulphate Aqueous Extract as SO4	DETS 2076#	10	mg/l	510	1600	65	390	280	260
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETS 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETS 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETS 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETS 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETS 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETS 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETS 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETS 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETS 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETS 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETS 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETS 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETS 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETS 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETS 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C5-C35	DETS 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro Total C5-C35	DETS 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
EPH (C10-C40)	DETS 3311#	10	mg/kg	< 10	< 10	< 10	190	610	85
Benzene	DETS 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETS 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETS 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETS 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01



Summary of Chemical Analysis

Soil Samples

Our Ref 22-20124

Client Ref 2471

Contract Title Bedewell

Lab No	2068561	2068562	2068563	2068564	2068565	2068566
Sample ID	TS-301	TS-302	TS-303	SS-301	SS-302	SS-303
Depth						
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	06/10/2022	06/10/2022	06/10/2022	06/10/2022	06/10/2022	06/10/2022
Sampling Time	1100	1100	1100	1130	1130	1130

Test	Method	LOD	Units						
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.11	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.03	0.11	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.04	0.14	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.07	0.06	0.06	0.33	0.75	0.11
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.09	0.17	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.07	0.05	0.06	0.49	0.68	0.15
Pyrene	DETSC 3303#	0.03	mg/kg	0.06	0.04	0.04	0.40	0.53	0.13
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.17	0.24	0.05
Chrysene	DETSC 3303	0.03	mg/kg	0.07	< 0.03	0.05	0.25	0.30	0.08
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.05	0.03	0.04	0.21	0.27	0.07
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.10	0.12	0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.10	0.15	0.04
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.08	0.10	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	0.08	0.14	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.32	0.15	0.25	2.4	3.8	0.64

Summary of Asbestos Analysis

Soil Samples

Our Ref 22-20124

Client Ref 2471

Contract Title Bedewell

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2068561	TS-301	SOIL	NAD	none	Vicky Convery
2068562	TS-302	SOIL	NAD	none	Vicky Convery
2068563	TS-303	SOIL	NAD	none	Vicky Convery
2068564	SS-301	SOIL	NAD	none	Vicky Convery
2068565	SS-302	SOIL	NAD	none	Vicky Convery
2068566	SS-303	SOIL	NAD	none	Vicky Convery

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 22-20124

Client Ref 2471

Contract Bedewell

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
2068561	TS-301 SOIL	06/10/22	GJ 250ml		
2068562	TS-302 SOIL	06/10/22	GJ 250ml		
2068563	TS-303 SOIL	06/10/22	GJ 250ml		
2068564	SS-301 SOIL	06/10/22	GJ 250ml		
2068565	SS-302 SOIL	06/10/22	GJ 250ml		
2068566	SS-303 SOIL	06/10/22	GJ 250ml		

Key: G-Glass J-Jar

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

End of Report