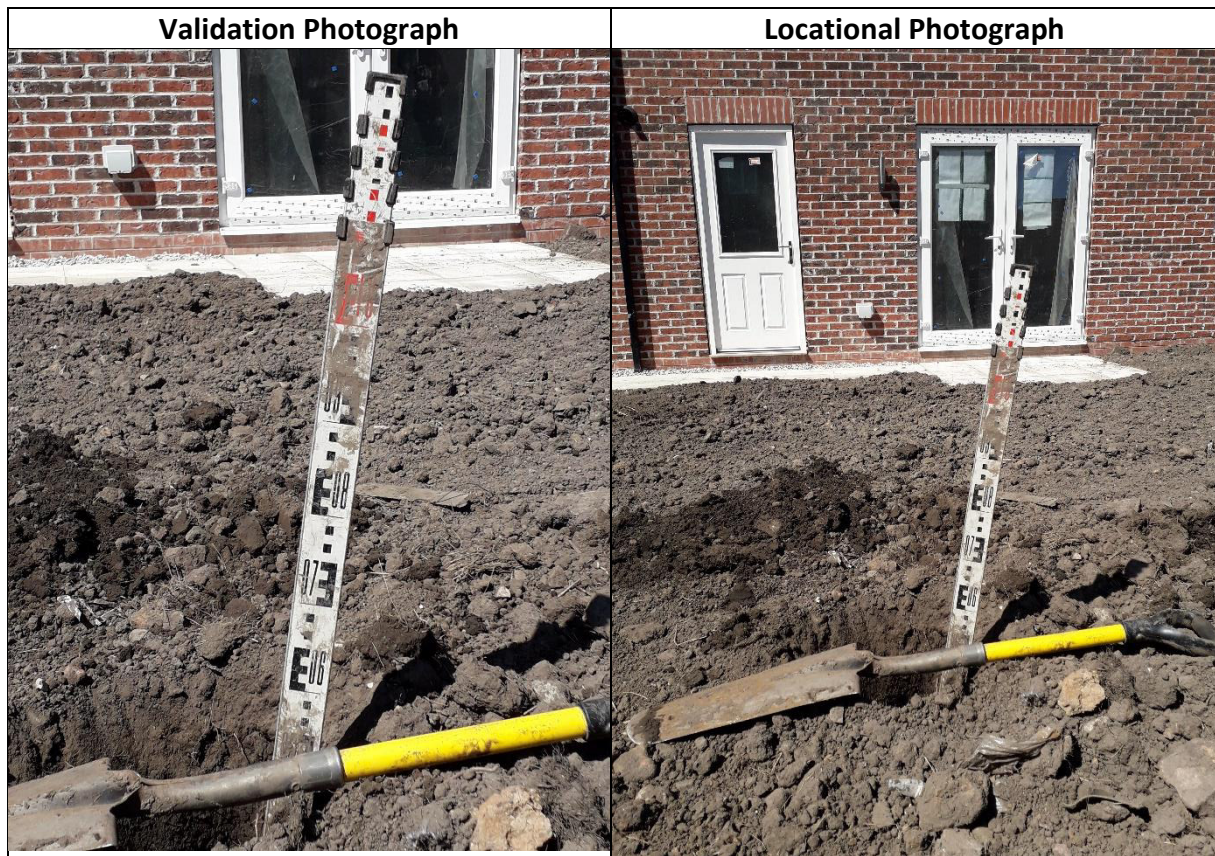


PLOT NUMBER: 69

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 29/05/2020
Consultant: C. Lima

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	400 mm bgl
Subsoil	> 450mm bgl	Subsoil	>200 mm bgl
Break Layer	N/A	Break Layer	N /A
TOTAL DEPTH	> 600mm bgl	TOTAL DEPTH	600 mm bgl



Additional Comments:
Sampled at 0.10m bgl and 0.70m bgl

GARDEN VALIDATION: PASS

SUITABILITY CRITERIA

Table 3: Validation Testing Summary

Determinand	Units	Screening Value for Use within Private Gardens	Maximum Concentration within Topsoil	Maximum Concentration within Subsoil	Screening Value Source
Inorganics – Metals and Asbestos					
Arsenic	mg/kg	37	20	15	(i)
Cadmium	mg/kg	11	3.4	3.5	(i)
Chromium VI	mg/kg	6	< 1.2	< 1.2	(i)
Lead	mg/kg	200	160	26	(iv)
Inorganic Mercury	mg/kg	40	0.5	0.5	(i)
Nickel	mg/kg	130	33	25	(i)
Selenium	mg/kg	250	< 1.0	2.1	(i)
Copper	mg/kg	2,400	180	17	(i)
Zinc	mg/kg	3,700	230	34	(i)
Cyanide	mg/kg	3.4	< 1	< 1	(v)
Asbestos	%	Not Detected	See report	Not Detected	N/A
Phenol	mg/kg	550	< 1.0	< 1.0	(ii)
Naphthalene	mg/kg	5.6	< 0.05	< 0.05	(ii)
Acenaphthylene	mg/kg	420	< 0.05	< 0.05	(ii)
Acenaphthene	mg/kg	510	< 0.05	< 0.05	(ii)
Fluorene	mg/kg	400	< 0.05	< 0.05	(ii)
Phenanthrene	mg/kg	220	2.2	0.31	(ii)
Anthracene	mg/kg	2,400	0.56	<0.05	(ii)
Fluoranthene	mg/kg	280	4.6	0.40	(ii)
Pyrene	mg/kg	1200	4.6	0.50	(ii)
Benzo(a)Anthracene	mg/kg	11	2.8	0.40	(ii)
Chrysene	mg/kg	22	2.3	0.20	(ii)
Benzo(b)Fluoranthene	mg/kg	3.3	2.6	0.27	(ii)
Benzo(k)Fluoranthene	mg/kg	93	1.4	0.20	(ii)
Benzo(a)Pyrene	mg/kg	2.7	2.5	0.26	(ii)
Indeno(123-cd)Pyrene	mg/kg	36	1.2	< 0.05	(ii)
Dibenzo(a,h)Anthracene	mg/kg	0.43	0.43	< 0.05	(ii)
Benzo(ghi)Perylene	mg/kg	340	1.4	< 0.05	(ii)
TPH C ₅ -C ₆	mg/kg	78	< 0.001	< 0.001	(iii)
TPH C ₆ -C ₈	mg/kg	230	< 0.001	< 0.001	(iii)
TPH C ₈ -C ₁₀	mg/kg	65	< 0.001	< 0.001	(iii)
TPH C ₁₀ -C ₁₂	mg/kg	180	< 1.0	< 1.0	(iii)
TPH C ₁₂ -C ₁₆	mg/kg	330	< 2.0	< 2.0	(iii)
TPH C ₁₆ -C ₂₁	mg/kg	540	< 8.0	< 8.0	(iii)
TPH C ₂₁ -C ₃₅	mg/kg	1,500	51	23	(iii)
TPH C ₃₅ -C ₄₄	mg/kg	1,500	< 8.4	< 8.4	(iii)
Screening Value Source					
(i) LQM/CIEH Suitable For Use Level (S4UL) (2015);					
(ii) S4UL –Assessment Approach of 2.5% SOM;					
(iii) S4UL –2.5% SOM and assumed worst case aliphatic / aromatic compound;					
(iv) Defra Category 4 Screening Level (2014);					
(v) CLEA v1.06 Derived Value.					

SOIL CHEMICAL ANALYSIS



Catarina Lima
Ensafe Consultants
Osprey House
Pacific Quay
Manchester
M50 2UE

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

e:

Analytical Report Number : 20-15013

Project / Site name:	Scotchbarn	Samples received on:	19/06/2020
Your job number:	103358	Sample instructed/ Analysis started on:	19/06/2020
Your order number:	8357	Analysis completed by:	24/06/2020
Report Issue Number:	1	Report issued on:	24/06/2020
Samples Analysed:	3 soil samples		

Signed: *A. Czerwińska*

Agnieszka Czerwińska

Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Iss No 20-15013-1 Scotchbarn 103358

This certificate should not be reproduced, except in full, without the express permission of the laboratory.

The results included within the report relate only to the sample(s) submitted for testing.

Page 1 of 5

Analytical Report Number: 20-15013

Project / Site name: Scotchbarn

Your Order No: 8357

Lab Sample Number				1538600	1538601	1538602		
Sample Reference				Plot 69 ES1	Plot 69 ES2	Plot 69 ES3		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.10	0.20	0.30		
Date Sampled				18/06/2020	18/06/2020	18/06/2020		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1		
Moisture Content	%	N/A	NONE	18	20	22		
Total mass of sample received	kg	0.001	NONE	0.55	0.55	0.55		

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.1	7.5	6.9		
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1		
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.070	0.12	0.061		
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	140	240	120		
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	69.8	119	60.9		
Organic Matter	%	0.1	MCERTS	5.9	4.7	5.3		
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.034	0.027	0.031		

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
----------------------------	-------	---	--------	-------	-------	-------	--	--

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Phenanthrene	mg/kg	0.05	MCERTS	2.0	2.2	< 0.05		
Anthracene	mg/kg	0.05	MCERTS	0.56	0.47	< 0.05		
Fluoranthene	mg/kg	0.05	MCERTS	4.6	4.1	1.0		
Pyrene	mg/kg	0.05	MCERTS	4.6	3.9	0.99		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	2.8	2.6	0.66		
Chrysene	mg/kg	0.05	MCERTS	2.3	1.8	0.63		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	2.6	2.6	0.73		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.4	1.1	0.49		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	2.5	2.1	0.60		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.2	1.2	0.37		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.43	< 0.05	< 0.05		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.4	1.3	0.45		

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	26.3	23.2	5.93		
-----------------------------	-------	-----	--------	------	------	------	--	--

Heavy Metals / Metalloids

Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	3.5	4.2	3.3		
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	17	20	16		
Barium (aqua regia extractable)	mg/kg	1	MCERTS	130	200	130		
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.1	1.4	1.1		
Boron (water soluble)	mg/kg	0.2	MCERTS	0.9	1.0	1.0		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	3.4	3.0	2.9		
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	26	26	26		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	150	180	130		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	120	160	110		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.5	0.5	0.4		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	25	33	26		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	1.9	< 1.0		
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	31	34	30		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	150	230	130		

Analytical Report Number: 20-15013

Project / Site name: Scotchbarn

Your Order No: 8357

Lab Sample Number				1538600	1538601	1538602		
Sample Reference				Plot 69 ES1	Plot 69 ES2	Plot 69 ES3		
Sample Number				None Supplied	None Supplied	None Supplied		
Depth (m)				0.10	0.20	0.30		
Date Sampled				18/06/2020	18/06/2020	18/06/2020		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0		
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0		
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0		
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4		
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10		
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10	< 10		

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001		
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0		
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0		
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	26	20	10		
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	51	36	27		
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4		
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	77	56	37		
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	77	56	37		



Analytical Report Number : 20-15013

Project / Site name: Scotchbarn

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1538600	Plot 69 ES1	None Supplied	0.10	Brown loam and clay with gravel and vegetation.
1538601	Plot 69 ES2	None Supplied	0.20	Brown loam and clay with gravel and vegetation.
1538602	Plot 69 ES3	None Supplied	0.30	Brown loam and clay with gravel and vegetation.

Analytical Report Number : 20-15013

Project / Site name: Scotchbarn

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/cleanup.	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Iss No 20-15013-1 Scotchbarn 103358

This certificate should not be reproduced, except in full, without the express permission of the laboratory.

The results included within the report relate only to the sample(s) submitted for testing.

Page 5 of 5



CERTIFICATE OF ANALYSIS

Certificate Number: J109861

Client:	Bellway Homes Limited (North West) (Merseyside), 2 Alderman Road, Hunts Cross, Liverpool, L24 9LR
Site:	Scotchbarn, L357jd

Date Received:	22/06/2020	Date Sampled:	N/A	Date Analysed:	22/06/2020
Sampled By:	Bellway Homes Limited (North West) (Merseyside)			Analysed By:	Joanna Cannon

Certificate Number: J109861				
Sample Number	Location	Material	Description	Asbestos Fibre Type(s) Detected
BS003403	Plot 69	Soil	0.10m	No Asbestos Detected
BS003404	Plot 69	Soil	0.20m	No Asbestos Detected
BS003405	Plot 69	Soil	0.30m	No Asbestos Detected

J. Cannon

Laboratory Manager
Issue Date: 22/06/2020

Sample analysis was conducted at Ensaf Consultants Permanent Laboratory, Cody Court, Unit M3, Kansas Avenue, Salford, Manchester, M50 2GE

The methodology is based on procedures within the HSE Document HSG248 'Asbestos: The analysts' guide for sampling, analysis and clearance procedures' and in-house procedures.

Where samples have been supplied by the Client (as specified within the Sampled By section), Ensaf Consultants have no responsibility for any sampling carried out and can only make reference to information supplied by the Client. Ensaf Consultants cannot be held responsible for any errors that occurred during sampling or data handling by the Client.

The opinions and interpretations indicated on this certificate are outside the scope of UKAS accreditation.



John Fenlon
Bellway Homes Limited (North West)
 2 Alderman Road
 Hunts Cross
 Liverpool
 Merseyside
 L24 9LR

Ref: 26v103358
 Date: 17th July 2020

By email only: john.fenlon@bellway.co.uk

Dear John,

Garden Validation – Scotchbarn Lane, Knowsley – Plots 70 - 73

Background and Objectives

In accordance with the Remediation Strategy ref 103358p2r2, dated November 2017, the following remedial measures are required in all areas of the site:

Depth Requirement for Gardens

- A total clean cover system comprising a minimum thickness of 600 mm;
- A minimum topsoil thickness of 150 mm; and,
- The remainder of the clean cover system shall be comprised of subsoil.

Validation Requirement

- Independent validation of works by Geo-Environmental Consultant;
- Visual inspection and chemical laboratory validation sampling; and
- Production of validation letter reports for the clean cover system.

Required sample numbers for chemical validation are summarised in Table 1.

Table 1: Chemical Validation Testing Requirement

Source	Source of Material		
	Greenfield	Remediated	Brownfield / Unknown
Gardens	1 per 250m ³	1 per 100 m ³	1 per 50 m ³
Soft Landscaping		1 per 150 m ³	1 per 150 m ³
Other Fill Materials		1 per 250m ³	1 per 250m ³

Validation Works Completed

Table 2 summarises plots inspected as part of each visit and the corresponding letter.

Table 2: Summary of Validated Plots

Validated Plots [w/ 600mm Cover System]	Letter Reference
7-10	01v103358
1-2, 5	02v103358
6, 34-39, 118-119	03v103358
41-43 & 117	04v103358
11 & 40	05v103358
12-13	06v103358
14-16	07v103358
17-19	08v103358
120-123	09v103358
124-128	10v103358
20 – 26	11v103358
27, 31-33	12v103358
28-30	13v103358
50-55	14v103358
56-59	15v103358
48, 49, 60	16v103358
129, 130, 44 – 47, 59	17v103358
61 – 63	18v103358
65-67 (further action required)	19v103358
65-68 (further action required for Plot 66)	20v103358
112 – 116	21v103358
108 – 111	22v103358
104 – 108	23v103358
69, 103 – 105	24v103358
69 (re-validation)	25v103358
70-73	26v103358

Validation Visit – 1st July 2020

Ensafe attended site on 1st July 2020 to confirm the correct thickness of topsoil and subsoil has been used in the rear gardens of properties in Plots 70, 71, 72 and 73 and to collect samples for laboratory analysis.

One hand dug pit was completed in the rear garden of Plots 70 - 73 and the depths and descriptions of each strata encountered recorded.

Ensafe's independent inspection shows that the required 600mm of clean cover is present within the rear gardens of Plots 70 - 73.

A visual inspection of the topsoil and subsoil within each pit confirms them to be free of potentially deleterious or unsuitable materials discernible by the naked eye such as ceramic materials, metal objects, plastics, treated wood or textiles.

Topsoil and subsoil samples were collected and analysed for the constituents of concern noted in Table 3 (enclosed to this letter) to the correct frequency as specified in Table 1 above and have been subsequently assessed against their suitability for a residential with gardens and plant uptake end use development.

Laboratory Testing of Site Won Soil

Ensafe attended site on 1st July 2020 to undertake intrusive ground investigations. Sampling and testing of site won topsoil as part of this work determined it suitable for use within gardens. Laboratory test certificates are attached to this report.

Laboratory Testing of Placed Topsoil

Topsoil has been purchased from the R Draper LTD soil merchant. One sample of topsoil and one sample of subsoil were tested at a frequency of 1 per 50m³ within Plots 70 – 73. Laboratory analysis confirms its suitability for use within the gardens (Table 4). Laboratory test certificates are attached to this report.

Summary

Ensafe can confirm that the topsoil and subsoil installed in the rear garden of Plot 70 - 73 meet the specified requirements as a suitable growing medium and is suitable for its intended use.

Yours Sincerely,

For and on Ensaf Consultants



**Matthew Dee
Consultant**

Approved and Authorised



**Ged Sojka
Operations Director**

Enclosed:

Location Plan of Validated Plots

Plot Inspection Records (including photographs and description)

Table 3: Screening Values for Materials within Residential Soft Landscaping Areas

Chemical Analysis Certificates

Figure 1: Sketch Plot Validation Pit Location



PLOT INSPECTION RECORDS

PLOT NUMBER: 70

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 01/07/2020
Consultant: M.De

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	600 mm bgl
Subsoil	> 450mm bgl	Subsoil	N /A
Break Layer	N/A	Break Layer	N /A
TOTAL DEPTH	> 600mm bgl	TOTAL DEPTH	600 mm bgl

Validation Photograph	Locational Photograph
	

Additional Comments:
Sampled at 0.20m bgl and 0.40m bgl

GARDEN VALIDATION: PASS

PLOT NUMBER: 71

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 01/07/2020
Consultant: M. Dee

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	600 mm bgl
Subsoil	> 450mm bgl	Subsoil	N /A
Break Layer	N/A	Break Layer	N /A
TOTAL DEPTH	> 600mm bgl	TOTAL DEPTH	600 mm bgl

Validation Photograph	Locational Photograph
	

Additional Comments:
N/A

GARDEN VALIDATION: PASS

PLOT NUMBER: 72

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 01/07/2020
Consultant: M.De

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	600 mm bgl
Subsoil	> 450mm bgl	Subsoil	N /A
Break Layer	N/A	Break Layer	N /A
TOTAL DEPTH	> 600mm bgl	TOTAL DEPTH	600 mm bgl



Additional Comments:
N/A

GARDEN VALIDATION: PASS

PLOT NUMBER: 73

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 01/07/2020
Consultant: M. Dee

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	600 mm bgl
Subsoil	> 450mm bgl	Subsoil	N /A
Break Layer	N/A	Break Layer	N /A
TOTAL DEPTH	> 600mm bgl	TOTAL DEPTH	600 mm bgl

Validation Photograph	Locational Photograph
	

Additional Comments:
Sampled at 0.10m bgl and 0.50m bgl

GARDEN VALIDATION: PASS

SUITABILITY CRITERIA

Table 3: Validation Testing Summary

Determinand	Units	Screening Value for Use within Private Gardens	Maximum Concentration within Topsoil	Maximum Concentration within Subsoil	Screening Value Source
Inorganics – Metals and Asbestos					
Arsenic	mg/kg	37	13	17	(i)
Cadmium	mg/kg	11	2.5	3.2	(i)
Chromium VI	mg/kg	6	< 1.2	< 1.2	(i)
Lead	mg/kg	200	90	110	(iv)
Inorganic Mercury	mg/kg	40	0.5	0.6	(i)
Nickel	mg/kg	130	20	22	(i)
Selenium	mg/kg	250	< 1.0	< 1.0	(i)
Copper	mg/kg	2,400	120	150	(i)
Zinc	mg/kg	3,700	120	140	(i)
Cyanide	mg/kg	3.4	< 1	< 1	(v)
Asbestos	%	Not Detected	Not Detected	Not Detected	N/A
Phenol	mg/kg	550	< 1.0	< 1.0	(ii)
Naphthalene	mg/kg	13	< 0.05	< 0.05	(ii)
Acenaphthylene	mg/kg	920	< 0.05	< 0.05	(ii)
Acenaphthene	mg/kg	1100	< 0.05	< 0.05	(ii)
Fluorene	mg/kg	860	< 0.05	< 0.05	(ii)
Phenanthrene	mg/kg	440	0.57	0.53	(ii)
Anthracene	mg/kg	11,000	0.13	0.12	(ii)
Fluoranthene	mg/kg	890	1	1.1	(ii)
Pyrene	mg/kg	2000	1.1	1.1	(ii)
Benzo(a)Anthracene	mg/kg	13	0.52	0.60	(ii)
Chrysene	mg/kg	27	0.61	0.56	(ii)
Benzo(b)Fluoranthene	mg/kg	3.7	0.66	0.74	(ii)
Benzo(k)Fluoranthene	mg/kg	100	0.44	0.37	(ii)
Benzo(a)Pyrene	mg/kg	3	0.64	0.58	(ii)
Indeno(123-cd)Pyrene	mg/kg	41	0.33	0.32	(ii)
Dibenzo(a,h)Anthracene	mg/kg	0.3	< 0.05	< 0.05	(ii)
Benzo(ghi)Perylene	mg/kg	350	0.36	0.38	(ii)
TPH C ₅ -C ₆	mg/kg	160	< 0.001	< 0.001	(iii)
TPH C ₆ -C ₈	mg/kg	530	< 0.001	< 0.001	(iii)
TPH C ₈ -C ₁₀	mg/kg	150	< 0.001	< 0.001	(iii)
TPH C ₁₀ -C ₁₂	mg/kg	380	< 1.0	< 1.0	(iii)
TPH C ₁₂ -C ₁₆	mg/kg	660	< 2.0	< 2.0	(iii)
TPH C ₁₆ -C ₂₁	mg/kg	930	< 8.0	< 8.0	(iii)
TPH C ₂₁ -C ₃₅	mg/kg	1,700	15	13	(iii)
TPH C ₃₅ -C ₄₄	mg/kg	1,700	< 8.4	< 8.4	(iii)
Screening Value Source					
(i) LQM/CIEH Suitable For Use Level (S4UL) (2015);					
(ii) S4UL –Assessment Approach of 2.5% SOM;					
(iii) S4UL –2.5% SOM and assumed worst case aliphatic / aromatic compound;					
(iv) Defra Category 4 Screening Level (2014);					
(v) CLEA v1.06 Derived Value.					

SOIL CHEMICAL ANALYSIS



Matt Dee
Ensafe Consultants
Unit 47
1 Winnall Valley Road
Winchester
SO23 0LD

e: mdee@ensafe.co.uk

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 20-17658

Project / Site name:	Scotchbarn	Samples received on:	03/07/2020
Your job number:	103358	Sample instructed/ Analysis started on:	03/07/2020
Your order number:	8387	Analysis completed by:	10/07/2020
Report Issue Number:	1	Report issued on:	10/07/2020
Samples Analysed:	4 soil samples		

Signed:

Rachel Bradley

Deputy Quality Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Iss No 20-17658-1 Scotchbarn 103358.XLS

This certificate should not be reproduced, except in full, without the express permission of the laboratory.

The results included within the report relate only to the sample(s) submitted for testing.

Page 1 of 5

Analytical Report Number: 20-17658

Project / Site name: Scotchbarn

Your Order No: 8387

Lab Sample Number				1552454	1552455	1552456	1552457	
Sample Reference				Plot 71	Plot 71	Plot 73	Plot 73	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				0.20	0.40	0.10	0.50	
Date Sampled				01/07/2020	01/07/2020	01/07/2020	01/07/2020	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	22	23	18	22	
Total mass of sample received	kg	0.001	NONE	0.55	0.55	0.55	0.55	

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7	7.8	7.7	7.3	
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	130	120	210	100	
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.064	0.060	0.10	0.051	
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	64.0	60.2	105	50.6	
Organic Matter	%	0.1	MCERTS	5.4	6.1	4.0	6.3	
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.031	0.035	0.023	0.037	

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	
----------------------------	-------	---	--------	-------	-------	-------	-------	--

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Phenanthrene	mg/kg	0.05	MCERTS	0.57	0.51	0.56	0.53	
Anthracene	mg/kg	0.05	MCERTS	0.13	0.12	0.13	0.12	
Fluoranthene	mg/kg	0.05	MCERTS	1.0	1.1	0.68	0.89	
Pyrene	mg/kg	0.05	MCERTS	1.1	1.1	0.66	1.1	
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.52	0.60	0.34	0.46	
Chrysene	mg/kg	0.05	MCERTS	0.61	0.56	0.40	0.55	
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.66	0.74	0.46	0.53	
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.44	0.37	0.28	0.34	
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.64	0.58	0.44	0.53	
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.33	0.32	0.25	0.25	
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.36	0.38	0.22	0.29	

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	6.38	6.33	4.42	5.54	
-----------------------------	-------	-----	--------	------	------	------	------	--

Analytical Report Number: 20-17658

Project / Site name: Scotchbarn

Your Order No: 8387

Lab Sample Number	1552454	1552455	1552456	1552457
Sample Reference	Plot 71	Plot 71	Plot 73	Plot 73
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	0.20	0.40	0.10	0.50
Date Sampled	01/07/2020	01/07/2020	01/07/2020	01/07/2020
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	

Heavy Metals / Metalloids

Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	2.5	3.1	1.4	2.8
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	17	6.8	15
Barium (aqua regia extractable)	mg/kg	1	MCERTS	120	140	88	120
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.89	1.0	0.37	0.95
Boron (water soluble)	mg/kg	0.2	MCERTS	1.4	1.4	0.7	1.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	2.5	3.2	0.3	2.9
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	23	28	13	26
Copper (aqua regia extractable)	mg/kg	1	MCERTS	120	150	25	130
Lead (aqua regia extractable)	mg/kg	1	MCERTS	90	110	40	100
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.5	0.5	0.3	0.6
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	20	22	11	21
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	25	29	13	29
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	120	140	48	130

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	15	< 10	< 10	13
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4	< 8.4
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	24	< 10	< 10	22
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	24	< 10	< 10	22



Analytical Report Number : 20-17658

Project / Site name: Scotchbarn

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1552454	Plot 71	None Supplied	0.20	Brown loam and clay with vegetation and gravel
1552455	Plot 71	None Supplied	0.40	Brown loam and clay with vegetation and gravel
1552456	Plot 73	None Supplied	0.10	Brown loam and clay with vegetation and gravel
1552457	Plot 73	None Supplied	0.50	Brown loam and clay with vegetation and gravel

Analytical Report Number : 20-17658

Project / Site name: Scotchbarn

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/cleanup.	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.



CERTIFICATE OF ANALYSIS

Certificate Number: J110366

Client:	Bellway Homes Limited (North West) (Merseyside), 2 Alderman Road, Hunts Cross, Liverpool, L24 9LR
Site:	Scotchbarn, L357jd

Date Received:	09/07/2020	Date Sampled:	N/A	Date Analysed:	09/07/2020
Sampled By:	Bellway Homes Limited (North West) (Merseyside)			Analysed By:	Joanna Cannon

Certificate Number: J110366				
Sample Number	Location	Material	Description	Asbestos Fibre Type(s) Detected
BS003578	Plot 71	Soil	0.20m	No Asbestos Detected
BS003579	Plot 71	Soil	0.40m	No Asbestos Detected
BS003580	Plot 73	Soil	0.10m	No Asbestos Detected
BS003581	Plot 73	Soil	0.50m	No Asbestos Detected

J. Cannon

Laboratory Manager
Issue Date: 09/07/2020

Sample analysis was conducted at Ensaf Consultants Permanent Laboratory, Cody Court, Unit M3, Kansas Avenue, Salford, Manchester, M50 2GE

The methodology is based on procedures within the HSE Document HSG248 'Asbestos: The analysts' guide for sampling, analysis and clearance procedures' and in-house procedures.

Where samples have been supplied by the Client (as specified within the Sampled By section), Ensaf Consultants have no responsibility for any sampling carried out and can only make reference to information supplied by the Client. Ensaf Consultants cannot be held responsible for any errors that occurred during sampling or data handling by the Client.

The opinions and interpretations indicated on this certificate are outside the scope of UKAS accreditation.



John Fenlon
Bellway Homes Limited (North West)
 2 Alderman Road
 Hunts Cross
 Liverpool
 Merseyside
 L24 9LR

Ref: 26v103358
 Date: 6th August 2020

By email only: john.fenlon@bellway.co.uk

Dear John,

Garden Validation – Scotchbarn Lane, Knowsley – Plots 74 - 77

Background and Objectives

In accordance with the Remediation Strategy ref 103358p2r2, dated November 2017, the following remedial measures are required in all areas of the site:

Depth Requirement for Gardens

- A total clean cover system comprising a minimum thickness of 600 mm;
- A minimum topsoil thickness of 150 mm; and,
- The remainder of the clean cover system shall be comprised of subsoil.

Validation Requirement

- Independent validation of works by Geo-Environmental Consultant;
- Visual inspection and chemical laboratory validation sampling; and
- Production of validation letter reports for the clean cover system.

Required sample numbers for chemical validation are summarised in Table 1.

Table 1: Chemical Validation Testing Requirement

Source	Source of Material		
	Greenfield	Remediated	Brownfield / Unknown
Gardens	1 per 250m ³	1 per 100 m ³	1 per 50 m ³
Soft Landscaping		1 per 150 m ³	1 per 150 m ³
Other Fill Materials		1 per 250m ³	1 per 250m ³

Validation Works Completed

Table 2 summarises plots inspected as part of each visit and the corresponding letter.

Table 2: Summary of Validated Plots

Validated Plots [w/ 600mm Cover System]	Letter Reference
7-10	01v103358
1-2, 5	02v103358
6, 34-39, 118-119	03v103358
41-43 & 117	04v103358
11 & 40	05v103358
12-13	06v103358
14-16	07v103358
17-19	08v103358
120-123	09v103358
124-128	10v103358
20 – 26	11v103358
27, 31-33	12v103358
28-30	13v103358
50-55	14v103358
56-59	15v103358
48, 49, 60	16v103358
129, 130, 44 – 47, 59	17v103358
61 – 63	18v103358
65-67 (further action required)	19v103358
65-68 (further action required for Plot 66)	20v103358
112 – 116	21v103358
108 – 111	22v103358
104 – 108	23v103358
69, 103 – 105	24v103358
69 (re-validation)	25v103358
70 - 73	26v103358
74 - 77	27v103358

Validation Visit – 27th July 2020

Ensaf attended site on 27th July 2020 to confirm the correct thickness of topsoil and subsoil has been used in the rear gardens of properties in Plots 74, 75, 76 and 77 and to collect samples for laboratory analysis.

One hand dug pit was completed in the rear garden of Plots 74 - 77 and the depths and descriptions of each strata encountered recorded.

Ensaf's independent inspection shows that the required 600mm of clean cover is present within the rear gardens of Plots 74 - 77.

A visual inspection of the topsoil and subsoil within each pit confirms them to be free of potentially deleterious or unsuitable materials discernible by the naked eye such as ceramic materials, metal objects, plastics, treated wood or textiles.

Topsoil and subsoil samples were collected and analysed for the constituents of concern noted in Table 3 (enclosed to this letter) to the correct frequency as specified in Table 1 above and have been subsequently assessed against their suitability for a residential with gardens and plant uptake end use development.

Laboratory Testing of Site Won Sub Soil

Ensafe attended site on 27th July 2020 one sample of site won subsoil was tested at a frequency of 1 per 50m³ within Plots 74 – 77. Laboratory analysis confirms its suitability for use within the gardens (Table 3). Laboratory test certificates are attached to this report

Laboratory Testing of Placed Topsoil

Topsoil has been purchased from the R Draper LTD soil merchant. One sample of topsoil was tested at a frequency of 1 per 50m³ within Plots 74 – 77. Laboratory analysis confirms its suitability for use within the gardens (Table 3). Laboratory test certificates are attached to this report.

Summary

Ensafe can confirm that the topsoil and subsoil installed in the rear garden of Plot 74 - 77 meet the specified requirements as a suitable growing medium and is suitable for its intended use.

Yours Sincerely,

For and on Ensaf Consultants



Matthew Dee
Consultant

Approved and Authorised



Phil Hill
Senior Consultant

Enclosed:

Location Plan of Validated Plots

Plot Inspection Records (including photographs and description)

Table 3: Screening Values for Materials within Residential Soft Landscaping Areas

Chemical Analysis Certificates

Figure 1: Sketch Plot Validation Pit Location



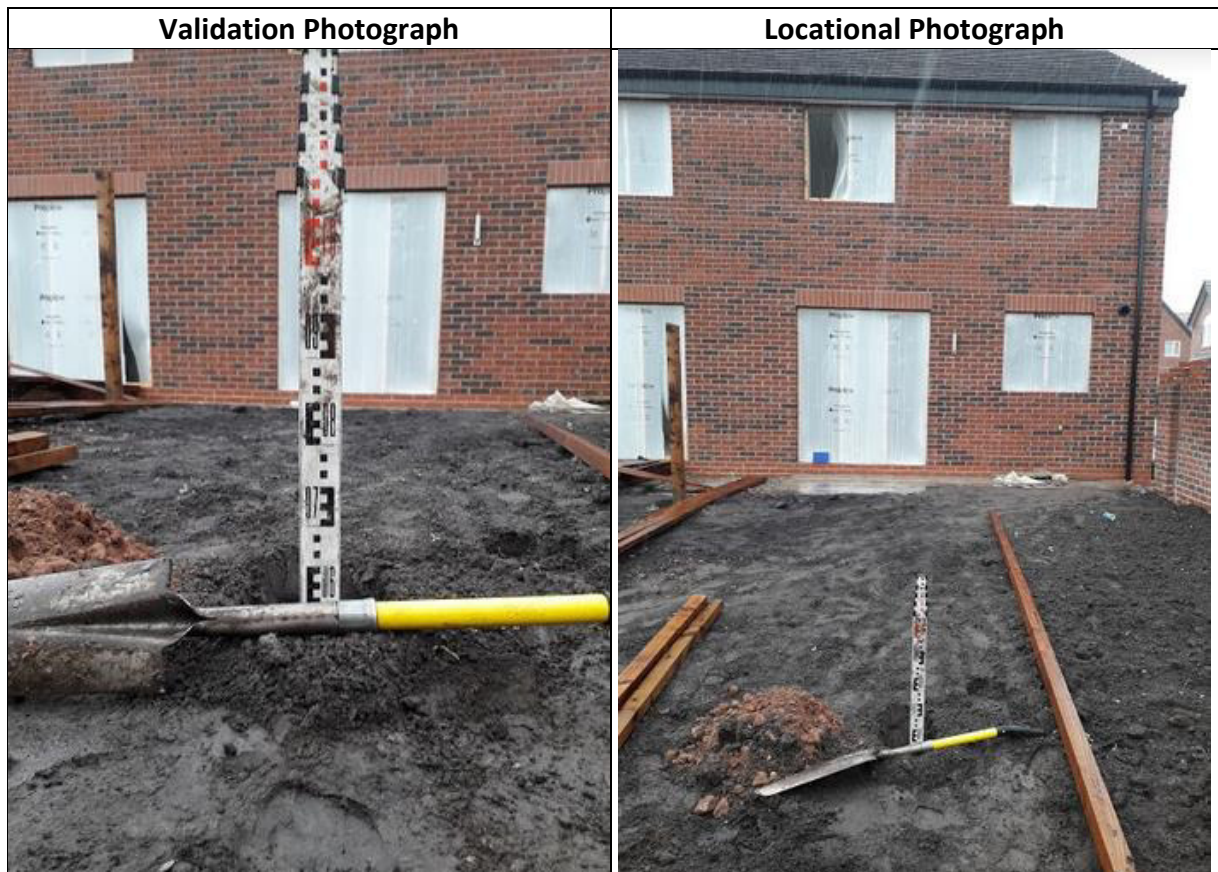
PLOT INSPECTION RECORDS

PLOT NUMBER: 74

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 27/07/2020
Consultant: M.De

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	400 mm bgl
Subsoil	> 450mm bgl	Subsoil	600 mm bgl
Break Layer	N/A	Break Layer	N /A
TOTAL DEPTH	> 600mm bgl	TOTAL DEPTH	600 mm bgl



Additional Comments:
N/A

GARDEN VALIDATION: PASS

PLOT NUMBER: 75

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 27/07/2020
Consultant: M. Dee

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	300 mm bgl
Subsoil	> 450mm bgl	Subsoil	600 mm bgl
Break Layer	N/A	Break Layer	N /A
TOTAL DEPTH	> 600mm bgl	TOTAL DEPTH	600 mm bgl



Additional Comments:
Sampled at 0.20m bgl and 0.40m bgl

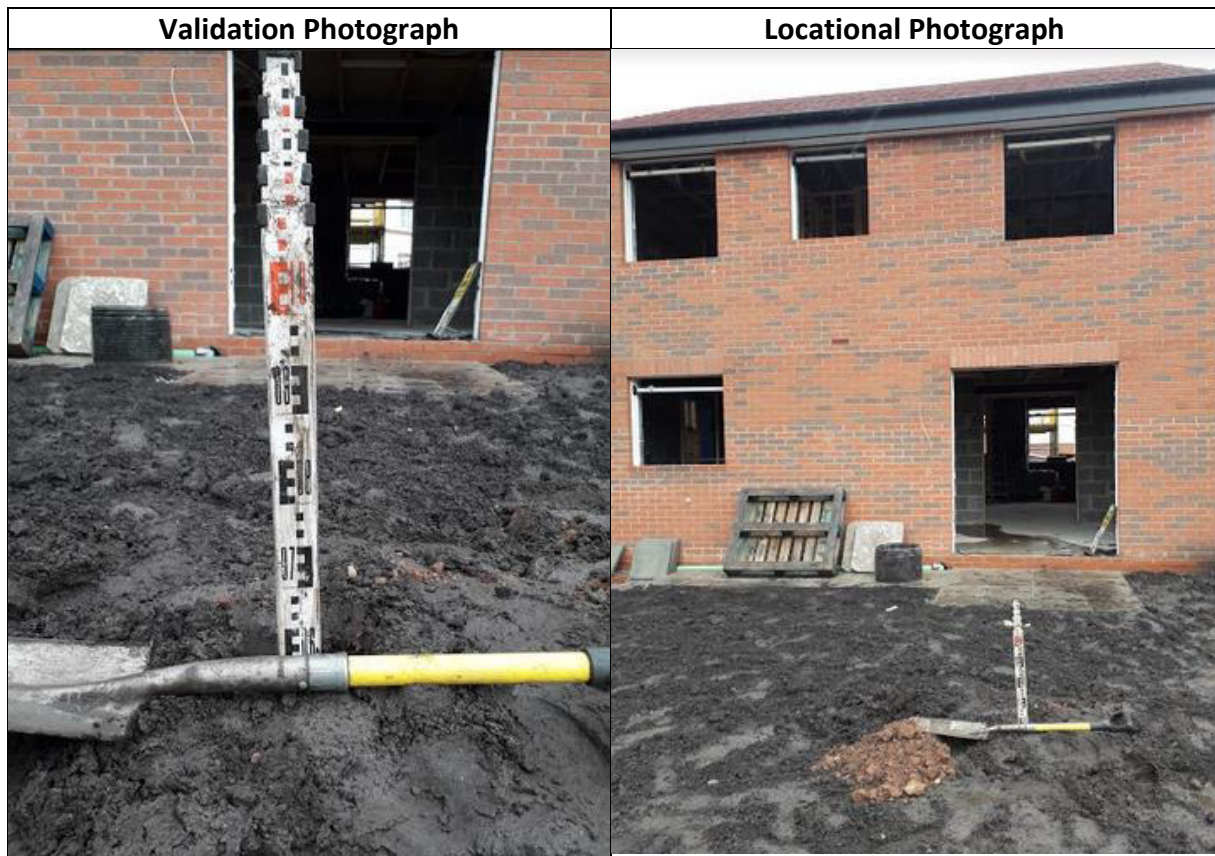
GARDEN VALIDATION: PASS

PLOT NUMBER: 76

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 27/07/2020
Consultant: M.De

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	300 mm bgl
Subsoil	> 450mm bgl	Subsoil	600 mm bgl
Break Layer	N/A	Break Layer	N /A
TOTAL DEPTH	> 600mm bgl	TOTAL DEPTH	600 mm bgl



Additional Comments:
Sampled at 0.20m bgl and 0.40m bgl

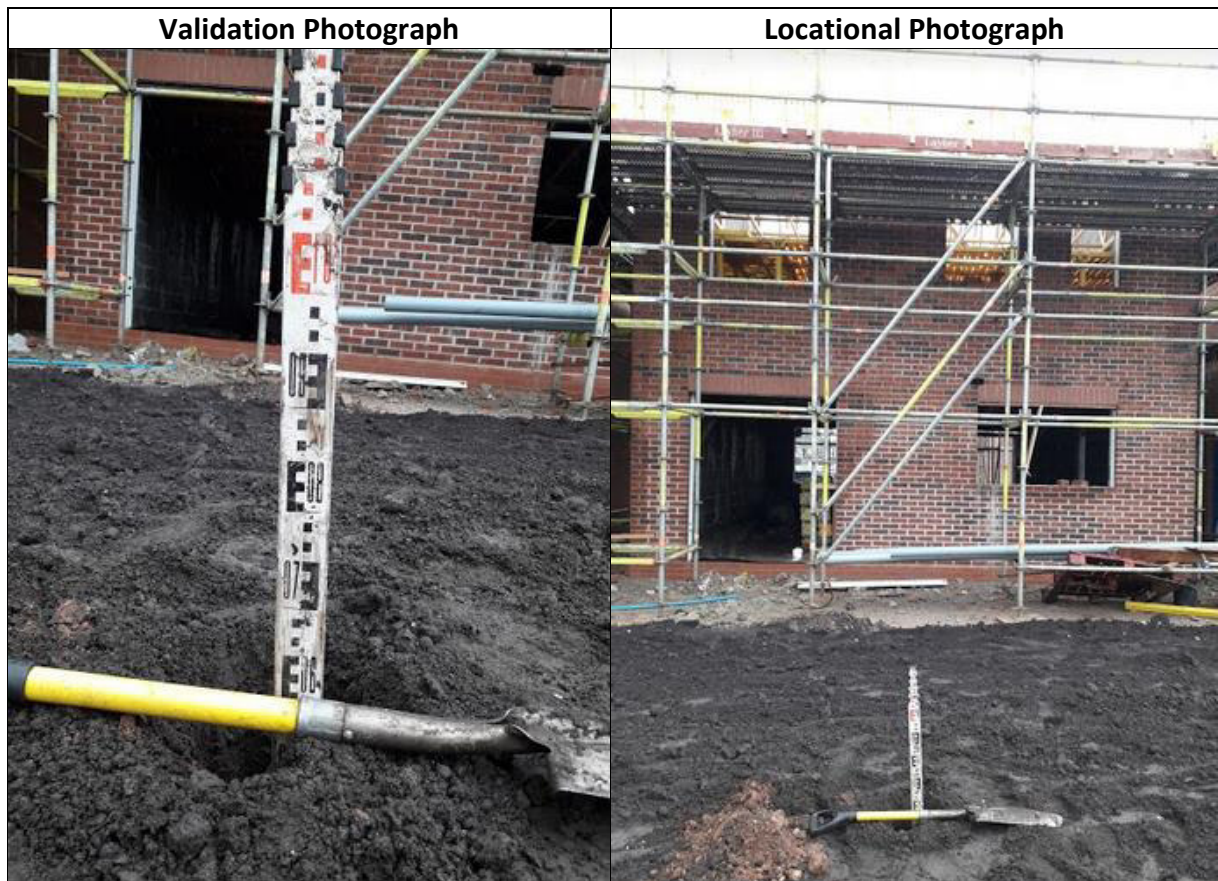
GARDEN VALIDATION: PASS

PLOT NUMBER: 77

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 27/07/2020
Consultant: M. Dee

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	300 mm bgl
Subsoil	> 450mm bgl	Subsoil	600 mm bgl
Break Layer	N/A	Break Layer	N /A
TOTAL DEPTH	> 600mm bgl	TOTAL DEPTH	600 mm bgl



Additional Comments:
N/A

GARDEN VALIDATION: PASS

SUITABILITY CRITERIA

Table 3: Validation Testing Summary

Determinand	Units	Screening Value for Use within Private Gardens	Maximum Concentration within Topsoil	Maximum Concentration within Subsoil	Screening Value Source
Inorganics – Metals and Asbestos					
Arsenic	mg/kg	37	6.1	2.9	(i)
Cadmium	mg/kg	11	<0.2	<0.2	(i)
Chromium VI	mg/kg	6	< 1.2	< 1.2	(i)
Lead	mg/kg	200	26	9.8	(iv)
Inorganic Mercury	mg/kg	40	<0.3	<0.3	(i)
Nickel	mg/kg	130	11	11	(i)
Selenium	mg/kg	250	< 1.0	< 1.0	(i)
Copper	mg/kg	2,400	24	9.3	(i)
Zinc	mg/kg	3,700	46	29	(i)
Cyanide	mg/kg	3.4	< 1	< 1	(v)
Asbestos	%	Not Detected	Not Detected	Not Detected	N/A
Phenol	mg/kg	550	< 1.0	< 1.0	(ii)
Naphthalene	mg/kg	5.6	< 0.05	< 0.05	(ii)
Acenaphthylene	mg/kg	420	< 0.05	< 0.05	(ii)
Acenaphthene	mg/kg	510	< 0.05	< 0.05	(ii)
Fluorene	mg/kg	400	< 0.05	< 0.05	(ii)
Phenanthrene	mg/kg	220	< 0.05	< 0.05	(ii)
Anthracene	mg/kg	5,400	< 0.05	< 0.05	(ii)
Fluoranthene	mg/kg	560	< 0.05	< 0.05	(ii)
Pyrene	mg/kg	1,200	< 0.05	< 0.05	(ii)
Benzo(a)Anthracene	mg/kg	11	< 0.05	< 0.05	(ii)
Chrysene	mg/kg	22	< 0.05	< 0.05	(ii)
Benzo(b)Fluoranthene	mg/kg	3.3	< 0.05	< 0.05	(ii)
Benzo(k)Fluoranthene	mg/kg	93	< 0.05	< 0.05	(ii)
Benzo(a)Pyrene	mg/kg	2.7	< 0.05	< 0.05	(ii)
Indeno(123-cd)Pyrene	mg/kg	36	< 0.05	< 0.05	(ii)
Dibenzo(a,h)Anthracene	mg/kg	0.28	< 0.05	< 0.05	(ii)
Benzo(ghi)Perylene	mg/kg	340	< 0.05	< 0.05	(ii)
TPH C ₅ -C ₆	mg/kg	78	< 0.001	< 0.001	(iii)
TPH C ₆ -C ₈	mg/kg	230	< 0.001	< 0.001	(iii)
TPH C ₈ -C ₁₀	mg/kg	65	< 0.001	< 0.001	(iii)
TPH C ₁₀ -C ₁₂	mg/kg	180	< 1.0	< 1.0	(iii)
TPH C ₁₂ -C ₁₆	mg/kg	330	< 2.0	< 2.0	(iii)
TPH C ₁₆ -C ₂₁	mg/kg	540	< 8.0	< 8.0	(iii)
TPH C ₂₁ -C ₃₅	mg/kg	1,500	< 8.4	< 8.4	(iii)
TPH C ₃₅ -C ₄₄	mg/kg	1,500	< 8.4	< 8.4	(iii)
Screening Value Source					
(i) LQM/CI EH Suitable For Use Level (S4UL) (2015);					
(ii) S4UL –Assessment Approach of 2.5% SOM;					
(iii) S4UL –2.5% SOM and assumed worst case aliphatic / aromatic compound;					
(iv) Defra Category 4 Screening Level (2014);					
(v) CLEA v1.06 Derived Value.					

SOIL CHEMICAL ANALYSIS



Matt Dee
Ensafe Consultants
Unit 47
1 Winnall Valley Road
Winchester
SO23 0LD

e: mdee@ensafe.co.uk

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 20-21900

Replaces Analytical Report Number : 20-21900, issue no. 1

Additional analysis undertaken.

Project / Site name:	Scotchbarn	Samples received on:	28/07/2020
Your job number:	103358	Sample instructed/ Analysis started on:	28/07/2020
Your order number:	8435	Analysis completed by:	12/08/2020
Report Issue Number:	2	Report issued on:	13/08/2020
Samples Analysed:	2 soil samples		

Signed:

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)

For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Iss No 20-21900-2 Scotchbarn 103358.XLS

This certificate should not be reproduced, except in full, without the express permission of the laboratory.

The results included within the report relate only to the sample(s) submitted for testing.

Page 1 of 5

Analytical Report Number: 20-21900

Project / Site name: Scotchbarn

Your Order No: 8435

Lab Sample Number				1576333	1576334			
Sample Reference				Plot 75 ES1	Plot 75 ES2			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.20	0.40			
Date Sampled				27/07/2020	27/07/2020			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	28	8.6			
Total mass of sample received	kg	0.001	NONE	0.40	0.40			

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected			
------------------	------	-----	-----------	--------------	--------------	--	--	--

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.6	8.1			
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	1100	550			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.54	0.27			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	535	274			
Organic Matter	%	0.1	MCERTS	8.0	1.1			
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.046	0.0064			

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0			
----------------------------	-------	---	--------	-------	-------	--	--	--

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80			
-----------------------------	-------	-----	--------	--------	--------	--	--	--

Heavy Metals / Metalloids

Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	< 1.0	1.0			
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.1	2.9			
Barium (aqua regia extractable)	mg/kg	1	MCERTS	63	140			
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.43	0.65			
Boron (water soluble)	mg/kg	0.2	MCERTS	0.7	0.3			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2			
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	14	11			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	24	9.3			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	26	9.8			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	11	11			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	16	12			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	46	29			

Analytical Report Number: 20-21900

Project / Site name: Scotchbarn

Your Order No: 8435

Lab Sample Number				1576333	1576334			
Sample Reference				Plot 75 ES1	Plot 75 ES2			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.20	0.40			
Date Sampled				27/07/2020	27/07/2020			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0			
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0			
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0			
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0			
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0			

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0			
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10			
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10			

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10			
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10			
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10			



Analytical Report Number : 20-21900

Project / Site name: Scotchbarn

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1576333	Plot 75 ES1	None Supplied	0.20	Brown loam and sand with vegetation and gravel.
1576334	Plot 75 ES2	None Supplied	0.40	Brown sand with gravel.

Analytical Report Number : 20-21900

Project / Site name: Scotchbarn

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Iss No 20-21900-2 Scotchbarn 103358.XLS

This certificate should not be reproduced, except in full, without the express permission of the laboratory.

The results included within the report relate only to the sample(s) submitted for testing.

Page 5 of 5

Richard Harris
Bellway Homes Limited (North West)
 2 Alderman Road
 Hunts Cross
 Liverpool
 Merseyside
 L24 9LR

Ref: 28v103358
 Date: 15th October 2020

By email only: Richard.Harris@bellway.co.uk

Dear Richard,

Garden Validation – Scotchbarn Lane, Knowsley – Plots 78 - 81

Background and Objectives

In accordance with the Remediation Strategy ref 103358p2r2, dated November 2017, the following remedial measures are required in all areas of the site:

Depth Requirement for Gardens

- A total clean cover system comprising a minimum thickness of 600 mm;
- A minimum topsoil thickness of 150 mm; and,
- The remainder of the clean cover system shall be comprised of subsoil.

Validation Requirement

- Independent validation of works by Geo-Environmental Consultant;
- Visual inspection and chemical laboratory validation sampling; and
- Production of validation letter reports for the clean cover system.

Required sample numbers for chemical validation are summarised in Table 1.

Table 1: Chemical Validation Testing Requirement

Source	Source of Material		
	Greenfield	Remediated	Brownfield / Unknown
Gardens	1 per 250m ³	1 per 100 m ³	1 per 50 m ³
Soft Landscaping		1 per 150 m ³	1 per 150 m ³
Other Fill Materials		1 per 250m ³	1 per 250m ³

Validation Works Completed

Table 2 summarises plots inspected as part of each visit and the corresponding letter.

Table 2: Summary of Validated Plots

Validated Plots [w/ 600mm Cover System]	Letter Reference
7-10	01v103358
1-2, 5	02v103358
6, 34-39, 118-119	03v103358
41-43 & 117	04v103358
11 & 40	05v103358
12-13	06v103358
14-16	07v103358
17-19	08v103358
120-123	09v103358
124-128	10v103358
20 – 26	11v103358
27, 31-33	12v103358
28-30	13v103358
50-55	14v103358
56-59	15v103358
48, 49, 60	16v103358
129, 130, 44 – 47, 59	17v103358
61 – 63	18v103358
65-67 (further action required)	19v103358
65-68 (further action required for Plot 66)	20v103358
112 – 116	21v103358
108 – 111	22v103358
104 – 108	23v103358
69, 103 – 105	24v103358
69 (re-validation)	25v103358
70 - 73	26v103358
74 - 77	27v103358
78 - 81	28v103358

Validation Visit – 2nd October 2020

Ensaf attended site on 2nd October 2020 to confirm the correct thickness of topsoil and subsoil has been used in the rear gardens of properties in Plots 78, 79, 80 and 81 and to collect samples for laboratory analysis.

One hand dug pit was completed in the rear garden of Plots 78 and 80 and the depths and descriptions of each strata encountered recorded.

Ensaf's independent inspection shows that the required 600mm of clean cover is present within the rear gardens of Plots 78 - 81.

A visual inspection of the topsoil and subsoil within each pit confirms them to be free of potentially deleterious or unsuitable materials discernible by the naked eye such as ceramic materials, metal objects, plastics, treated wood or textiles.

Topsoil and subsoil samples were collected and analysed for the constituents of concern noted in Table 3 (enclosed to this letter) to the correct frequency as specified in Table 1 above and have been subsequently assessed against their suitability for a residential with gardens and plant uptake end use development.

Laboratory Testing of Site Won Sub Soil

Ensafe attended site on 2nd October 2020, one sample of site won subsoil was tested at a frequency of 1 per 50m³ within Plots 78 – 81. Laboratory analysis confirms its suitability for use within the gardens (Table 3). Laboratory test certificates are attached to this report.

Laboratory Testing of Placed Topsoil

Topsoil has been purchased from the R Draper LTD soil merchant. One sample of topsoil was tested at a frequency of 1 per 50m³ within Plots 78 – 81. Laboratory analysis confirms its suitability for use within the gardens (Table 3). Laboratory test certificates are attached to this report.

Summary

Ensafe can confirm that the topsoil and subsoil installed in the rear garden of Plot 78 - 81 meet the specified requirements as a suitable growing medium and is suitable for its intended use.

Yours Sincerely,

For and on Ensaf Consultants



**Catarina Lima
Consultant**

Approved and Authorised



**Philip Thompson
Associate Director**

Enclosed:

Location Plan of Validated Plots

Plot Inspection Records (including photographs and description)

Table 3: Screening Values for Materials within Residential Soft Landscaping Areas

Chemical Analysis Certificates

Figure 1: Sketch Plot Validation Pit Location



PLOT INSPECTION RECORDS

PLOT NUMBER: 78

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 02/10/2020
Consultant: Liam M

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	400 mm bgl
Subsoil	> 450mm bgl	Subsoil	600 mm bgl
Break Layer	N/A	Break Layer	N /A
TOTAL DEPTH	> 600mm bgl	TOTAL DEPTH	600 mm bgl

Validation Photograph	Locational Photograph
	

Additional Comments:
N/A

GARDEN VALIDATION: PASS

PLOT NUMBER: 79

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 02/10/2020
Consultant: L. Moore

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	300 mm bgl
Subsoil	> 450mm bgl	Subsoil	600 mm bgl
Break Layer	N/A	Break Layer	N /A
TOTAL DEPTH	> 600mm bgl	TOTAL DEPTH	600 mm bgl

Validation Photograph	Locational Photograph
	

Additional Comments:
Sampled at 0.20m bgl and 0.40m bgl

GARDEN VALIDATION: PASS

PLOT NUMBER: 80

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 02/10/2020
Consultant: L. Moore

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	300 mm bgl
Subsoil	> 450mm bgl	Subsoil	600 mm bgl
Break Layer	N/A	Break Layer	N /A
TOTAL DEPTH	> 600mm bgl	TOTAL DEPTH	600 mm bgl

Validation Photograph	Locational Photograph
	

Additional Comments:
Sampled at 0.20m bgl and 0.40m bgl

GARDEN VALIDATION: PASS

PLOT NUMBER: 81

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 02/10/2020
Consultant: L. Moore

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	300 mm bgl
Subsoil	> 450mm bgl	Subsoil	600 mm bgl
Break Layer	N/A	Break Layer	N /A
TOTAL DEPTH	> 600mm bgl	TOTAL DEPTH	600 mm bgl

Validation Photograph	Locational Photograph
	

Additional Comments:
N/A

GARDEN VALIDATION: PASS

SUITABILITY CRITERIA

Table 3: Validation Testing Summary

Determinand	Units	Screening Value for Use within Private Gardens	Maximum Concentration within Topsoil	Maximum Concentration within Subsoil	Screening Value Source
Inorganics – Metals and Asbestos					
Arsenic	mg/kg	37	11	13	(i)
Cadmium	mg/kg	11	1.8	1.2	(i)
Chromium VI	mg/kg	6	< 1.2	< 1.2	(i)
Lead	mg/kg	200	74	100	(iv)
Inorganic Mercury	mg/kg	40	<0.3	<0.3	(i)
Nickel	mg/kg	130	19	13	(i)
Selenium	mg/kg	250	< 1.0	< 1.0	(i)
Copper	mg/kg	2,400	94	58	(i)
Zinc	mg/kg	3,700	100	68	(i)
Cyanide	mg/kg	3.4	< 1	< 1	(v)
Asbestos	%	Not Detected	Not Detected	Not Detected	N/A
Phenol	mg/kg	550	< 1.0	< 1.0	(ii)
Naphthalene	mg/kg	5.6	< 0.05	< 0.05	(ii)
Acenaphthylene	mg/kg	420	< 0.05	< 0.05	(ii)
Acenaphthene	mg/kg	510	< 0.05	< 0.05	(ii)
Fluorene	mg/kg	400	< 0.05	< 0.05	(ii)
Phenanthrene	mg/kg	220	0.51	0.53	(ii)
Anthracene	mg/kg	5,400	< 0.05	< 0.05	(ii)
Fluoranthene	mg/kg	560	1.2	0.74	(ii)
Pyrene	mg/kg	1,200	1.1	1.2	(ii)
Benzo(a)Anthracene	mg/kg	11	0.61	0.68	(ii)
Chrysene	mg/kg	22	0.54	0.51	(ii)
Benzo(b)Fluoranthene	mg/kg	3.3	0.64	0.64	(ii)
Benzo(k)Fluoranthene	mg/kg	93	0.44	0.4	(ii)
Benzo(a)Pyrene	mg/kg	2.7	0.66	0.57	(ii)
Indeno(123-cd)Pyrene	mg/kg	36	0.28	0.31	(ii)
Dibenzo(a,h)Anthracene	mg/kg	0.28	< 0.05	< 0.05	(ii)
Benzo(ghi)Perylene	mg/kg	340	0.3	0.35	(ii)
TPH C ₅ -C ₆	mg/kg	78	< 0.001	< 0.001	(iii)
TPH C ₆ -C ₈	mg/kg	230	< 0.001	< 0.001	(iii)
TPH C ₈ -C ₁₀	mg/kg	65	< 0.001	< 0.001	(iii)
TPH C ₁₀ -C ₁₂	mg/kg	180	< 1.0	< 1.0	(iii)
TPH C ₁₂ -C ₁₆	mg/kg	330	< 2.0	< 2.0	(iii)
TPH C ₁₆ -C ₂₁	mg/kg	540	< 8.0	< 8.0	(iii)
TPH C ₂₁ -C ₃₅	mg/kg	1,500	30	19	(iii)
TPH C ₃₅ -C ₄₄	mg/kg	1,500	< 8.4	< 8.4	(iii)
Screening Value Source					
(i) LQM/CIEH Suitable For Use Level (S4UL) (2015);					
(ii) S4UL –Assessment Approach of 2.5% SOM;					
(iii) S4UL –2.5% SOM and assumed worst case aliphatic / aromatic compound;					
(iv) Defra Category 4 Screening Level (2014);					
(v) CLEA v1.06 Derived Value.					

SOIL CHEMICAL ANALYSIS



Liam Moore
Ensafe Consultants
Osprey House
Pacific Quay
Manchester
M50 2UE

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

e:

Analytical Report Number : 20-33864

Project / Site name:	Scotchbarn	Samples received on:	05/10/2020
Your job number:	103358	Samples instructed on/ Analysis started on:	05/10/2020
Your order number:	008553	Analysis completed by:	12/10/2020
Report Issue Number:	1	Report issued on:	12/10/2020
Samples Analysed:	4 soil samples		

Signed:

Joanna Wawrzeczko
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.



Analytical Report Number: 20-33864

Project / Site name: Scotchbarn

Your Order No: 008553

Lab Sample Number	1640659	1640660	1640661	1640662
Sample Reference	TP01	TP01	TP02	TP02
Sample Number	Plot 81	Plot 81	Plot 79	Plot79
Depth (m)	0.20-0.30	0.40-0.50	0.10-0.20	0.50-0.60
Date Sampled	02/10/2020	02/10/2020	02/10/2020	02/10/2020
Time Taken	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	N/A	NONE	19
Total mass of sample received	kg	0.001	NONE	1

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.5	7.4	7.7	7.7
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	170	170	110	140
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.086	0.087	0.056	0.071
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	86.4	86.9	55.6	71
Organic Matter	%	0.1	MCERTS	4.9	4.7	2.3	3.6
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.028	0.028	0.013	0.021

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
----------------------------	-------	---	--------	-------	-------	-------	-------

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.51	0.53	0.26	0.38
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	1.2	1.2	0.42	0.74
Pyrene	mg/kg	0.05	MCERTS	1.1	1.2	0.43	0.71
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.61	0.68	0.22	0.38
Chrysene	mg/kg	0.05	MCERTS	0.54	0.51	0.21	0.36
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.64	0.64	0.24	0.46
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.44	0.4	0.12	0.21
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.66	0.57	0.23	0.4
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.28	0.31	< 0.05	0.19
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.3	0.35	< 0.05	0.2

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	6.22	6.3	2.13	4.03
-----------------------------	-------	-----	--------	------	-----	------	------

Heavy Metals / Metalloids

Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	2.8	3.1	1.4	2.2
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	11	13	7	9.2
Barium (aqua regia extractable)	mg/kg	1	MCERTS	92	100	53	78
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.72	0.87	0.45	0.61
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5	1	0.4	0.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	1.8	2.2	0.2	1.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	20	21	14	17
Copper (aqua regia extractable)	mg/kg	1	MCERTS	78	94	20	58
Lead (aqua regia extractable)	mg/kg	1	MCERTS	74	100	49	66
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	19	22	13	17
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	24	27	17	21
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	93	100	35	68

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
---------	-------	---	--------	-------	-------	-------	-------



Analytical Report Number: 20-33864

Project / Site name: Scotchbarn

Your Order No: 008553

Lab Sample Number					1640659	1640660	1640661	1640662
Sample Reference					TP01	TP01	TP02	TP02
Sample Number					Plot 81	Plot 81	Plot 79	Plot79
Depth (m)					0.20-0.30	0.40-0.50	0.10-0.20	0.50-0.60
Date Sampled					02/10/2020	02/10/2020	02/10/2020	02/10/2020
Time Taken					None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Toluene	µg/kg	1	MCERTS		< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS		< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS		< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS		< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS		< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	30	19	< 10	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4	< 8.4
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	39	26	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	39	26	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample



Analytical Report Number : 20-33864

Project / Site name: Scotchbarn

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1640659	TP01	Plot 81	0.20-0.30	Brown loam and sand with vegetation and gravel.
1640660	TP01	Plot 81	0.40-0.50	Brown loam and sand with vegetation and gravel.
1640661	TP02	Plot 79	0.10-0.20	Brown sandy loam with gravel.
1640662	TP02	Plot79	0.50-0.60	Brown loam and clay with gravel.



Analytical Report Number : 20-33864

Project / Site name: Scotchbarn

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS



Analytical Report Number : 20-33864
Project / Site name: Scotchbarn

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
----------------------	-------------------------------	-----------------------------	---------------	--------------------	----------------------

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
 For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
 Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.



CERTIFICATE OF ANALYSIS

Certificate Number: J115388

Client:	Bellway Homes, Bellway House, Bury Street, Ruislip, Middlesex, HA4 7SD
Site:	Scotchbarn,

Date Received:	06/10/2020	Date Sampled:	N/A	Date Analysed:	13/10/2020
Sampled By:	Bellway Homes			Analysed By:	Joanna Cannon

Certificate Number: J115388				
Sample Number	Location	Material	Description	Asbestos Fibre Type(s) Detected
BS004181	1	Soil	TP01: Plot 81, 0.20 - 0.30m	No Asbestos Detected
BS004182	2	Soil	TP02: Plot 81, 0.40 - 0.50m	No Asbestos Detected
BS004183	3	Soil	TP02: Plot 79, 0.10 - 0.20m	No Asbestos Detected
BS004184	4	Soil	TP02: Plot 79, 0.50 - 0.60m	No Asbestos Detected

J. Cannon

Laboratory Manager
Issue Date: 13/10/2020

*Sample analysis was conducted at Manchester (Osprey)
The methodology is based on procedures within the HSE Document HSG248 'Asbestos: The analysts' guide for sampling, analysis and clearance procedures' and in-house procedures.
Where samples have been supplied by the Client (as specified within the Sampled By section), Ensaf Consultants have no responsibility for any sampling carried out and can only make reference to information supplied by the Client. Ensaf Consultants cannot be held responsible for any errors that occurred during sampling or data handling by the Client.
The opinions and interpretations indicated on this certificate are outside the scope of UKAS accreditation.*



Richard Harris
Bellway Homes Limited (North West)
 2 Alderman Road
 Hunts Cross
 Liverpool
 Merseyside
 L24 9LR

14th January 2021

Dear Richard,

**Garden Validation – Scotchbarn Lane, Knowsley
 Plot 100**

Background and Objectives

In accordance with the Remediation Strategy ref 103358p2r2, dated November 2017, the following remedial measures are required in all areas of the site:

Depth Requirement for Gardens

- A total clean cover system comprising a minimum thickness of 600 mm;
- A minimum topsoil thickness of 150 mm; and,
- The remainder of the clean cover system shall be comprised of subsoil.

Validation Requirement

- Independent validation of works by Geo-Environmental Consultant;
- Visual inspection and chemical laboratory validation sampling; and
- Production of validation letter reports for the clean cover system.

Required sample numbers for chemical validation are summarised in Table 1.

Table 1: Chemical Validation Testing Requirement

Source	Source of Material		
	Greenfield	Remediated	Brownfield / Unknown
Gardens	1 per 250m ³	1 per 100 m ³	1 per 50 m ³
Soft Landscaping		1 per 150 m ³	1 per 150 m ³
Other Fill Materials		1 per 250m ³	1 per 250m ³

Validation Works Completed

Table 2 summarises plots inspected as part of each visit and the corresponding letter.

Table 2: Summary of Validated Plots

Validated Plots [w/ 600mm Cover System]	Letter Reference
7-10	01v103358
1-2, 5	02v103358
6, 34-39, 118-119	03v103358
41-43 & 117	04v103358
11 & 40	05v103358
12-13	06v103358
14-16	07v103358
17-19	08v103358
120-123	09v103358
124-128	10v103358
20 – 26	11v103358
27, 31-33	12v103358
28-30	13v103358
50-55	14v103358
56-59	15v103358
48, 49, 60	16v103358
129, 130, 44 – 47, 59	17v103358
61 – 63	18v103358
65-67 (further action required)	19v103358
65-68 (further action required for Plot 66)	20v103358
112 – 116	21v103358
108 – 111	22v103358
104 – 108	23v103358
69, 103 – 105	24v103358
69 (re-validation)	25v103358
70 - 73	26v103358
74 - 77	27v103358
78 - 81	28v103358
82-85, 101 - 102	29v103358
100	30v103358

Validation Visit – 6th January 2021

Ensaf attended site on 6th January 2021 to confirm the correct thickness of topsoil and subsoil has been used in the rear gardens of the property in Plot 100 to collect samples for laboratory analysis.

A Hand dug pit was completed in the rear garden of Plot 100 and the depths and descriptions of each strata encountered recorded.

Ensaf's independent inspection shows that the required 600mm of clean cover is present within the rear garden of Plot 100.

A visual inspection of the topsoil and subsoil within the pit confirmed it to be free of potentially deleterious or unsuitable materials discernible by the naked eye such as ceramic materials, metal objects, plastics, treated wood or textiles.

Topsoil and subsoil samples were collected and analysed for the constituents of concern noted in Table 3 (enclosed to this letter) to the correct frequency as specified in Table 1 above and have been subsequently assessed against their suitability for a residential with gardens and plant uptake end use development.

Laboratory Testing of Site Won Sub Soil

Ensafe attended site on 6th January 2021, one sample of site won subsoil was tested at a frequency of 1 per 50m³. Laboratory analysis confirms its suitability for use within the gardens (Table 3). Laboratory test certificates are attached to this report.

Laboratory Testing of Placed Topsoil

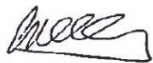
Topsoil has been purchased from the R Draper LTD soil merchant. One sample of topsoil was tested at a frequency of 1 per 50m³. Laboratory analysis confirms its suitability for use within the gardens (Table 3). Laboratory test certificates are attached to this report.

Summary

Ensafe can confirm that the topsoil and subsoil installed in the rear garden of Plot 100 meets the specified requirements as a suitable growing medium and is suitable for its intended use.

Yours Sincerely,

For and on Ensaf Consultants



Liam Moore
Consultant

Approved and Authorised



Philip Thompson
Associate Director

Enclosed:

Location Plan of Validated Plots

Plot Inspection Records (including photographs and description)

Table 3: Screening Values for Materials within Residential Soft Landscaping Areas

Chemical Analysis Certificates

Figure 1: Sketch Plot Validation Pit Location



PLOT INSPECTION RECORDS

PLOT NUMBER: 100

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 6/01/2021
Consultant: L. Moore

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	400 mm bgl
Subsoil	> 450mm bgl	Subsoil	600 mm bgl
Break Layer	N/A	Break Layer	N /A
TOTAL DEPTH	> 600mm bgl	TOTAL DEPTH	600 mm bgl

Validation Photograph	Locational Photograph
	

Additional Comments:
Sampled at 0.20m bgl and 0.50m bgl

GARDEN VALIDATION: PASS

SUITABILITY CRITERIA

Table 3: Validation Testing Summary

Determinand	Units	Screening Value for Use within Private Gardens	Maximum Concentration within Topsoil	Maximum Concentration within Subsoil	Screening Value Source
Inorganics – Metals and Asbestos					
Arsenic	mg/kg	37	6.5	10	(i)
Cadmium	mg/kg	11	< 0.2	1.4	(i)
Chromium VI	mg/kg	6	< 1.2	< 1.2	(i)
Lead	mg/kg	200	39	74	(iv)
Inorganic Mercury	mg/kg	40	< 0.3	< 0.3	(i)
Nickel	mg/kg	130	9	17	(i)
Selenium	mg/kg	250	< 1.0	< 1.0	(i)
Copper	mg/kg	2,400	24	76	(i)
Zinc	mg/kg	3,700	34	98	(i)
Cyanide	mg/kg	3.4	< 1	< 1	(v)
Asbestos	%	Not Detected	None Detected	None Detected	N/A
PAHs					
Phenol	mg/kg	550	< 1.0	< 1.0	(ii)
Naphthalene	mg/kg	5.6	< 0.05	< 0.05	(ii)
Acenaphthylene	mg/kg	420	< 0.05	< 0.05	(ii)
Acenaphthene	mg/kg	510	< 0.05	< 0.05	(ii)
Fluorene	mg/kg	400	< 0.05	< 0.05	(ii)
Phenanthrene	mg/kg	220	< 0.05	0.68	(ii)
Anthracene	mg/kg	5,400	< 0.05	< 0.05	(ii)
Fluoranthene	mg/kg	560	< 0.05	1.4	(ii)
Pyrene	mg/kg	1,200	< 0.05	1.5	(ii)
Benzo(a)Anthracene	mg/kg	11	< 0.05	0.79	(ii)
Chrysene	mg/kg	22	< 0.05	0.68	(ii)
Benzo(b)Fluoranthene	mg/kg	3.3	< 0.05	1	(ii)
Benzo(k)Fluoranthene	mg/kg	93	< 0.05	0.33	(ii)
Benzo(a)Pyrene	mg/kg	2.7	< 0.05	0.9	(ii)
Indeno(123-cd)Pyrene	mg/kg	36	< 0.05	0.46	(ii)
Dibenzo(a,h)Anthracene	mg/kg	0.28	< 0.05	< 0.05	(ii)
Benzo(ghi)Perylene	mg/kg	340	< 0.05	0.55	(ii)
Total Petroleum Hydrocarbons					
TPH C ₅ -C ₆	mg/kg	78	< 0.001	< 0.001	(iii)
TPH C ₆ -C ₈	mg/kg	230	< 0.001	< 0.001	(iii)
TPH C ₈ -C ₁₀	mg/kg	65	< 0.001	< 0.001	(iii)
TPH C ₁₀ -C ₁₂	mg/kg	180	< 1.0	< 1.0	(iii)
TPH C ₁₂ -C ₁₆	mg/kg	330	< 2.0	< 2.0	(iii)
TPH C ₁₆ -C ₂₁	mg/kg	540	15	24	(iii)
TPH C ₂₁ -C ₃₅	mg/kg	1,500	25	54	(iii)
TPH C ₃₅ -C ₄₄	mg/kg	1,500	53	78	(iii)
Screening Value Source					
(i) LQM/CIEH Suitable For Use Level (S4UL) (2015);					
(ii) S4UL –Assessment Approach of 2.5% SOM;					
(iii) S4UL –2.5% SOM and assumed worst case aliphatic / aromatic compound;					
(iv) Defra Category 4 Screening Level (2014);					
(v) CLEA v1.06 Derived Value.					

SOIL CHEMICAL ANALYSIS

Liam Moore
 Ensafe Consultants
 Osprey House
 Pacific Quay
 Manchester
 M50 2UE

i2 Analytical Ltd.
 7 Woodshots Meadow,
 Croxley Green
 Business Park,
 Watford,
 Herts,
 WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

e:

Analytical Report Number : 21-49840

Project / Site name:	Scotchbarn	Samples received on:	06/01/2021
Your job number:	103358	Samples instructed on/ Analysis started on:	07/01/2021
Your order number:	008828	Analysis completed by:	14/01/2021
Report Issue Number:	1	Report issued on:	14/01/2021
Samples Analysed:	2 soil samples		

Signed: *A. Czerwińska*

Agnieszka Czerwińska
 Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
 leachates - 2 weeks from reporting
 waters - 2 weeks from reporting
 asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
 Application of uncertainty of measurement would provide a range within which the true result lies.
 An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 21-49840

Project / Site name: Scotchbarn

Your Order No: 008828

Lab Sample Number				1731524	1731525
Sample Reference				Plot 100 TS	Plot 100 SS
Sample Number				None Supplied	None Supplied
Depth (m)				0.20	0.50
Date Sampled				05/01/2021	05/01/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	20	17
Total mass of sample received	kg	0.001	NONE	1.2	1.2

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected
------------------	------	-----	-----------	--------------	--------------

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.2	7.8
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	150	270
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivale	g/l	0.00125	MCERTS	0.076	0.13
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivale	mg/l	1.25	MCERTS	75.5	134
Organic Matter	%	0.1	MCERTS	3.9	6.4
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.023	0.037

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0
----------------------------	-------	---	--------	-------	-------

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.68
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	1.4
Pyrene	mg/kg	0.05	MCERTS	< 0.05	1.5
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.79
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.68
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	1
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.33
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.9
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.46
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.55

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	8.3
-----------------------------	-------	-----	--------	--------	-----

Analytical Report Number: 21-49840

Project / Site name: Scotchbarn

Your Order No: 008828

Lab Sample Number				1731524	1731525
Sample Reference				Plot 100 TS	Plot 100 SS
Sample Number				None Supplied	None Supplied
Depth (m)				0.20	0.50
Date Sampled				05/01/2021	05/01/2021
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		

Heavy Metals / Metalloids

Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	< 1.0	< 1.0
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.5	10
Barium (aqua regia extractable)	mg/kg	1	MCERTS	47	91
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.34	0.67
Boron (water soluble)	mg/kg	0.2	MCERTS	0.9	0.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	1.4
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	10	19
Copper (aqua regia extractable)	mg/kg	1	MCERTS	24	76
Lead (aqua regia extractable)	mg/kg	1	MCERTS	39	74
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	9	17
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	13	23
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	34	98

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	31
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	9.5
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	38
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	< 10	48

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	15	24
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	25	54
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	13	< 8.4
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	40	78
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	53	78

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 21-49840

Project / Site name: Scotchbarn

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1731524	Plot 100 TS	None Supplied	0.2	Brown sandy loam with vegetation.
1731525	Plot 100 SS	None Supplied	0.5	Brown clay and loam with vegetation.

Analytical Report Number : 21-49840

Project / Site name: Scotchbarn

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS



Analytical Report Number : 21-49840
Project / Site name: Scotchbarn

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
----------------------	-------------------------------	-----------------------------	---------------	--------------------	----------------------

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.



ASBESTOS SURVEYING, PROJECT MANAGEMENT,
HEALTH & SAFETY AND TRAINING

CERTIFICATE OF ANALYSIS

Certificate Number: J119043

Client:	Bellway Homes, Bellway House, Bury Street, Ruislip, Middlesex, HA4 7SD
Site:	1CO103358 Scotchbarn Lane,

Date Received:	12/01/2021	Date Sampled:	N/A	Date Analysed:	12/01/2021
Sampled By:	Bellway Homes			Analysed By:	Joanna Cannon

Certificate Number: J119043				
Sample Number	Location	Material	Description	Asbestos Fibre Type(s) Detected
BS004881	1	Soil	Top soil 0.20m	No Asbestos Detected
BS004882	2	Soil	Sub soil 0.50m	No Asbestos Detected

J. Cannon

Laboratory Manager
Issue Date: 12/01/2021

*Sample analysis was conducted at Manchester (Osprey)
The methodology is based on procedures within the HSE Document HSG248 'Asbestos: The analysts' guide for sampling, analysis and clearance procedures' and in-house procedures.
Where samples have been supplied by the Client (as specified within the Sampled By section), Ensaf Consultants have no responsibility for any sampling carried out and can only make reference to information supplied by the Client. Ensaf Consultants cannot be held responsible for any errors that occurred during sampling or data handling by the Client.
The opinions and interpretations indicated on this certificate are outside the scope of UKAS accreditation.*



Richard Harris
Bellway Homes Limited (North West)
 2 Alderman Road
 Hunts Cross
 Liverpool
 Merseyside
 L24 9LR

10th March 2021

Dear Richard,

Garden Validation – Scotchbarn Lane, Knowsley
Plots 89 - 90

Background and Objectives

In accordance with the Remediation Strategy ref 103358p2r2, dated November 2017, the following remedial measures are required in all areas of the site:

Depth Requirement for Gardens

- A total clean cover system comprising a minimum thickness of 600 mm;
- A minimum topsoil thickness of 150 mm; and,
- The remainder of the clean cover system shall be comprised of subsoil.

Validation Requirement

- Independent validation of works by Geo-Environmental Consultant;
- Visual inspection and chemical laboratory validation sampling; and
- Production of validation letter reports for the clean cover system.

Required sample numbers for chemical validation are summarised in Table 1.

Table 1: Chemical Validation Testing Requirement

Source	Source of Material		
	Greenfield	Remediated	Brownfield / Unknown
Gardens	1 per 250m ³	1 per 100 m ³	1 per 50 m ³
Soft Landscaping		1 per 150 m ³	1 per 150 m ³
Other Fill Materials		1 per 250m ³	1 per 250m ³

Validation Works Completed

Table 2 summarises plots inspected as part of each visit and the corresponding letter.

Table 2: Summary of Validated Plots

Validated Plots [w/ 600mm Cover System]	Letter Reference
7-10	01v103358
1-2, 5	02v103358
6, 34-39, 118-119	03v103358
41-43 & 117	04v103358
11 & 40	05v103358
12-13	06v103358
14-16	07v103358
17-19	08v103358
120-123	09v103358
124-128	10v103358
20 – 26	11v103358
27, 31-33	12v103358
28-30	13v103358
50-55	14v103358
56-59	15v103358
48, 49, 60	16v103358
129, 130, 44 – 47, 59	17v103358
61 – 63	18v103358
65-67 (further action required)	19v103358
65-68 (further action required for Plot 66)	20v103358
112 – 116	21v103358
108 – 111	22v103358
104 – 108	23v103358
69, 103 – 105	24v103358
69 (re-validation)	25v103358
70 - 73	26v103358
74 - 77	27v103358
78 - 81	28v103358
82-85, 101 - 102	29v103358
100	30v103358
96 – 99	31v103358
86 – 88 & 97 (re-test)	32v103358
89 - 90	33v103358

Validation Visit – 24th February 2021

Ensafe attended site on 24th February 2021 to confirm the correct thickness of topsoil and subsoil has been used in the rear gardens of the properties in Plots 89 – 90.

Hand dug pits were completed in the rear gardens of Plots 89 - 90 and the depths and descriptions of each strata encountered recorded.

Ensafe's independent inspection shows that the required 600mm of clean cover is present within the rear gardens of plots 89 – 90.

A visual inspection of the topsoil and subsoil within the pits confirmed them to be free of potentially deleterious or unsuitable materials discernible by the naked eye such as ceramic materials, metal objects, plastics, treated wood or textiles.

Laboratory Testing of Placed Topsoil

Topsoil has been purchased from the R Draper LTD soil merchant. Ensafe have been provided with testing results for the material, carried out by Coopers (Reference number 210215) dated February 2021 and enclosed within this letter. The results of the testing show that the imported topsoil is suitable for use in private residential gardens with plant uptake.

Summary

Ensafe can confirm that the topsoil and subsoil installed in the rear gardens of Plots 89 - 90 meet the specified requirements as a suitable growing medium and is suitable for its intended use.

Yours Sincerely,

For and on Ensafe Consultants



**Catarina Lima
Consultant**

Approved and Authorised



**Philip Thompson
Associate Director**

Enclosed:

Location Plan of Validated Plots

Plot Inspection Records (including photographs and description)

Imported material chemical certificates

Figure 1: Sketch Plot Validation Pit Location



PLOT INSPECTION RECORDS

PLOT NUMBER: 89

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 24/02/2021
Consultant: C. Lima

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	400 mm bgl
Subsoil	> 450mm bgl	Subsoil	600 mm bgl
Break Layer	N/A	Break Layer	N /A
TOTAL DEPTH	> 600mm bgl	TOTAL DEPTH	600 mm bgl

Validation Photograph	Locational Photograph
	

GARDEN VALIDATION: PASS

PLOT NUMBER: 90

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 24/02/2021
Consultant: C. Lima

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	400 mm bgl
Subsoil	> 450mm bgl	Subsoil	600 mm bgl
Break Layer	N/A	Break Layer	N /A
TOTAL DEPTH	> 600mm bgl	TOTAL DEPTH	600 mm bgl

Validation Photograph	Locational Photograph
	

Additional Comments:

GARDEN VALIDATION: PASS

CHEMICAL CERTIFICATES

CERTIFICATE FOR TOPSOIL

REFERENCE NUMBER 210215

Developer:	Bellway Homes (North West)
Source Location:	Tollgate Road, Burscough
Volume:	800m ³ (approx.)
Supplied By:	R. Draper Ltd
Sampled at:	Drapers Topsoil Yard, Bickerstaffe
Date of Inspections:	15 th February 2021
Previous Revisions:	N/A
Report Date:	18 th February 2021

This is to certify that the imported topsoil is within the Coopers generic criteria as suitable for use in private residential gardens with plant uptake.

Source Location and Stockpile Control:

The sampled stockpile comprised of one stockpile source; the provenance is discussed below:

Tollgate Road, Burscough

This source site was a scraping of topsoil from a greenfield site. The nature of the source was verified by inspection of the first edition historical maps produced in 1885-1900 (refer to Figure 1) and the 1955-1961 edition map (refer to Figure 2) as well as recent satellite/aerial photography and ordnance survey maps (refer to Figures 3 & 4) confirming the site has remained undeveloped for over 130 years. The topsoil was stripped from the northern portion of the source location and transported to R. Draper Ltd.'s storage yard off Stopgate Lane, Bickerstaffe for grading. The material was stockpiled specifically for Bellway Homes North West and verified as suitable for use by Coopers (refer to chemical analysis section for details). Coopers visual assessment of the topsoil confirmed the material was within the textural classification as topsoil in accordance with BS3882 (2015).

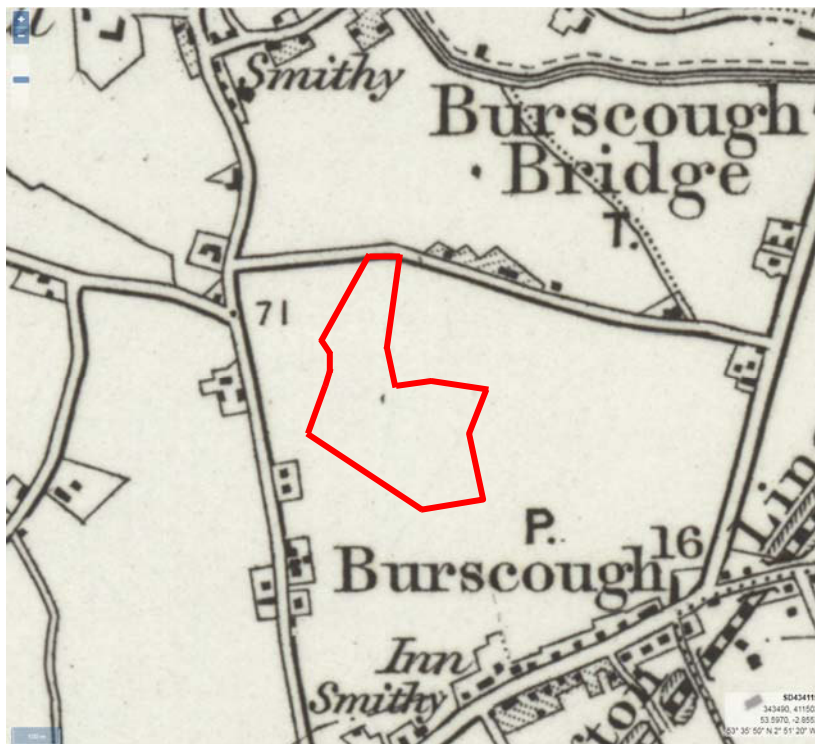


Figure 1: First Edition Historical Ordnance Survey Map from 1885-1900 showing that the site was comprised of fields and there was no development on the site at that time.

- 2 -

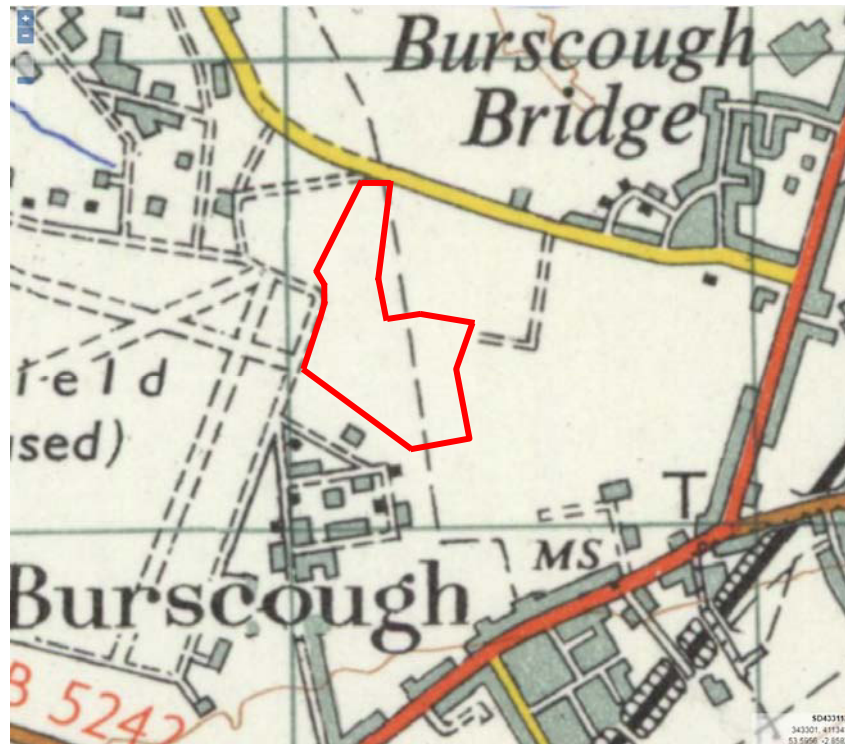


Figure 2: Historical Ordnance Survey Map from 1955-1961 that the site still comprised of fields and there was no development on the site at that time.



Figure 3: Satellite image taken from close to present day showing no development on this site at this time.

- 3 -

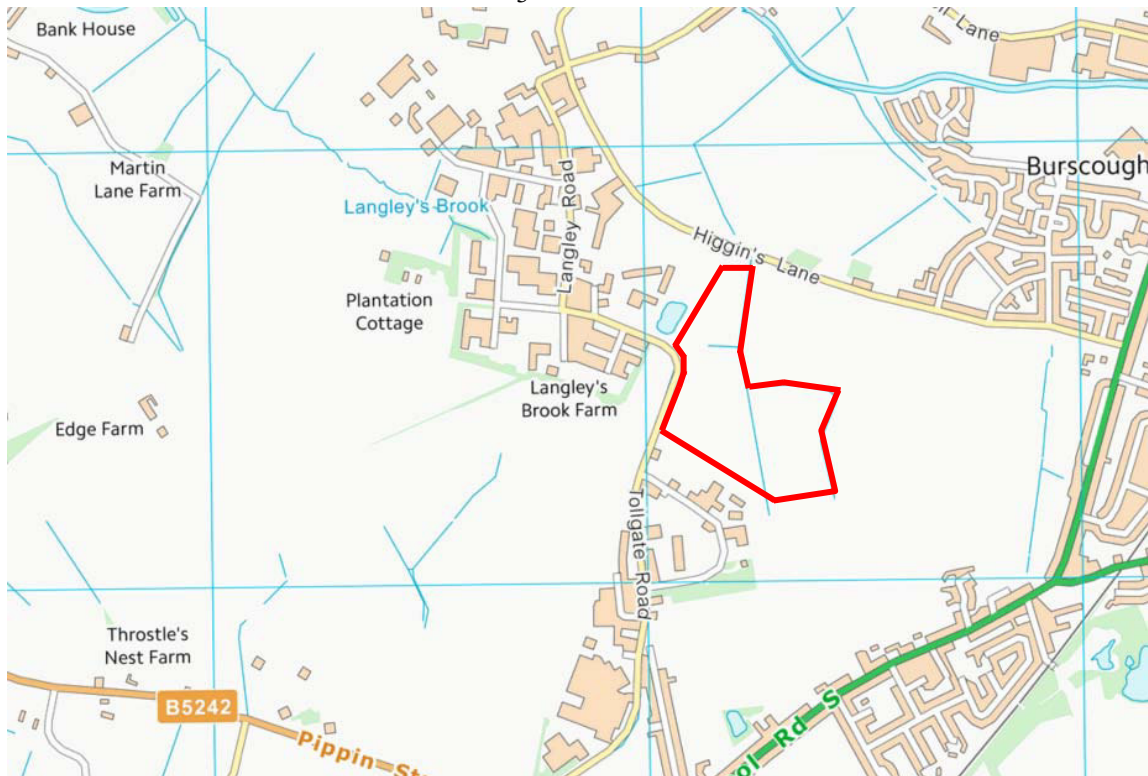


Figure 4: Ordnance Survey Map taken from close to present day showing no development on this site at this time.



Figure 5: Satellite image taken from close to present day, with the hatched area showing the part of the site where this stockpile has originated.

Soil Tier 1 Threshold Values (mg/kg) Residential and POS

		Elements and compounds	S4UL	Small Terrace	Med/Large Terrace	Semi-detached	Detached	Residential (without Veg)	POS (Resi)	POS (Park)
				White, yellow & green values are NOAEL with orange values C4SL				C4SL (S4UL) (1% SOM)		
Silty clay	Metals/Semi-metals	Arsenic	37	37 (32.4 CLEA)				40 (40)	79 (79)	168 (170)
		Beryllium	1.7 (inh.)	51 (to be used with caution and superseded)				(1.7)	(2.2)	(63)
		Boron	290	291				(11,000)	(21,000)	(46,000)
		Cadmium	11	22 (11 CLEA)				150 (85)	220 (120)	880 (532)
		Chromium (III)	910	3000				(910)	(1,500)	(33,000)
		Chromium (VI)	6	21 (4.3)				21 (6)	51 (7.7)	250 (220)
		Copper	2,400	2,330 (Phytotoxic pH <6 = 100, pH6-7 = 135, pH >7 = 200)				(7,100)	(12,000)	(44,000)
		Lead	-	200				310	630	1,300
		Mercury (methyl)	11	7.4				(15)	(40)	(68)
		Mercury (inorganic)	40	169				(56)	(120)	(240)
		Mercury (Hg)	1.2	1.2				(1.2)	(16)	(30vap (25.8))
		Nickel	130	(130 S4UL) (Phytotoxic pH <6 = 60, pH6-7 = 75, pH >7 = 110)				(180)	(230)	(800)
		Selenium	250	351				(430)	(1,100)	(1,800)
		Vanadium	410	79				(1,200)	(2,000)	(5,000)
		Zinc	3,700	3,750 (Phytotoxic pH <6 = 200, pH6-7 = 200, pH >7 = 300)				(40,000)	(81,000)	(170,000)
	PAH	Acenaphthene	210	205				(3,000 – 57 s)	(15,000)	(29,000)
		Acenaphthylene	170	168				(2,900 – 86.1 s)	(15,000)	(29,000)
		Anthracene	2,400	2,260				(31,000 – 1.17 v)	(74,000)	(150,000)
		Benzo(a)anthracene	7.2	3.1				(11)	(29)	(49)
		Benzo(a)pyrene	2.2	5 (6% SOM) (0.83 CLEA)				5.3 (3.2)	10 (5.7)	21 (11)
		Benzo(b)fluoranthene	2.6	5.56				(3.9)	(7.1)	(13)
		Benzo(ghi)perylene	320	10.7				(360)	(640)	(1,400)
		Benzo(k)fluoranthene	7.7	8.5				(110)	(190)	(370)
		Chrysene	15	6.0				(30)	(57)	(93)
		Dibenz(ah)anthracene	0.24	0.76				(0.31)	(0.57)	(1.1)
		Fluoranthene	280	257				(1,500)	(3,100)	(6,300)
		Fluorene	170	163				(2,800 – 30.9 s)	(9,900)	(20,000)
		Indeno(123-cd)pyrene	27	3.18				(45)	(82)	(150)
		Phenanthrene	95	91.8				(1,300 – 36 s)	(3,100)	(6,200)
		Pyrene	620	563				(3,700)	(7,400)	(15,000)
		Naphthalene	2.3	1.54	1.71	1.7	1.97	(2.3)	(4,900)	(1,200 – 76.4 s)
Sandy loam	BTEX	Benzene	0.087	0.2 (1%) (0.079 CLEA)	0.082	0.082	0.085	0.89 (0.38)	140 (72)	190 (90)
		Toluene	130	119	122	122	125	(869)	(56,000)	(87,000 v)
		Ethylbenzene	47	62.5	68	67.9	71.6	(83)	(24,000)	(17,000 v)
		Xylene (based on p)	56	41.7	45.5	45.3	50.9	(70)	(41,000)	(17,000 v)
		Phenol	280	184	207	206	224	(750)	(760)	(760)
	Aliphatic	5-6	42	30				(42)	(570,000 – 304 s)	(95,000 – 304 s)
		6-8	100	73				(100)	(600,000)	(150,000 – 144 s)
		8-10	27	19				(27)	(13,000)	(14,000 – 78 s)
		10-12	130 (48)	93 (48) ^{vap}				(130 – 48 v)	(13,000)	(21,000 – 48 s)
		12-16	1,100 (24)	740 (24) ^{sol}				(1,100 – 24 v)	(13,000)	(25,000 – 24 s)
		16-35	65,000 (8.48)	45,000 (8.48) ^{sol}				(65,000)	(250,000)	(450,000)
		35-44	65,000 (8.48)	45,000 (8.48) ^{sol}				(65,000)	(250,000)	(450,000)
	Aromatic	8-10	34	27				(47)	(5,000)	(7,200 – 613 v)
		10-12	74	69				(250)	(5,000)	(9,200 – 364 s)
		12-16	140	140				(1,800)	(5,100)	(10,000)
		16-21	260 (	250				(1,900)	(3,800)	(7,600)
		21-35	1,100	890				(1,900)	(3,800)	(7,600)

Notes:

The soil organic matter has been assumed to be 1% as this is the most conservative value for organic compounds. Inorganic compounds unaffected by this parameter. Silty clay strata appears to prove more conservative threshold values for metals, semi-metals and several PAH compounds. Sandy loam strata appears to prove more conservative threshold values for TPH compounds, phenol and naphthalene.

The assessment of hydrocarbon fractions should be completed additively to determine the total risk of the whole range of compounds present as well as by single TPH fractional units, however this should be undertaken on a sample by sample basis where significant hydrocarbon concentrations have been encountered to derive a compound TPH concentration.

Although benzene has a C4SL value, this has been calculated for small terraced housing and not other housing stock, therefore other housing stock should either adopt the more conservative CLEA thresholds or that of a small terraced property. All thresholds not coloured orange (C4SL) for different housing stock have utilised LQM/CIEH Generic Assessment Criteria for Human Health Risk assessment, 2nd edition, 2009. CLEA values in brackets where C4SL values are available.

Vap denotes where the threshold is exceeded beyond the vapour saturation limit. Sol denotes where the threshold is exceeded beyond the solubility saturation limit.

It should be noted that these threshold values only relate to human health risk assessment and an assessment for potential groundwater risk should be undertaken as a separate risk assessment.

Chemical Analysis and Assessment

The topsoil was stripped from the source location, graded by R. Draper Ltd. and put into a stockpile dedicated for use solely on Bellway Homes (North West) residential developments. Coopers attended Drapers' compound on 15th February 2021 and paced out the stockpile to be approximately 800m³. 8 No. samples were collected from within the stockpile of which all were submitted to Element Materials Technology's laboratory for chemical analysis ensuring a quota of at least 1 No. sample per 100m³ of topsoil was achieved in testing. All samples are referenced in Element Materials Technology report reference 21-2046, dated 18th February 2021. The report relating to these samples confirms them to be within the criteria for inert material as detailed in this certificate.

Photographic records

Below are photographs documenting our stockpile inspection and sampling and any periodic inspections of the stockpile, ensuring the material remains free from cross mixing. Coopers are satisfied that the quality of this stockpile has been maintained and prevented from any cross mixing.

This report should be updated every three months with a selection of photographs to demonstrate the periodic inspections confirming the stockpile management practices.

Stockpile Sampling and Inspection – 15th February 2021



Photographs 1 to 4: Showing the status and composition of the Bellway Homes (North West) Topsoil stockpile during sampling and inspection on 15th February 2021.

Documents appended:

1. Element Materials Technology Report reference 21-2046, dated 18th February 2021.

Coopers
Park House
Sandpiper Court
Chester Business Park
Chester
CH4 9QU



Attention :	Stephanie Dodd
Date :	18th February, 2021
Your reference :	7123 (P/O 8929 - SD)
Our reference :	Test Report 21/2046 Batch 1
Location :	R.Draper Ltd - Bellway North West
Date samples received :	15th February, 2021
Status :	Final report
Issue :	1

Eight samples were received for analysis on 15th February, 2021 of which eight were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:



Bruce Leslie
Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Coopers
Reference: 7123 (P/O 8929 - SD)
Location: R.Draper Ltd - Bellway North West
Contact: Stephanie Dodd
EMT Job No: 21/2046

Report : Solid

Solids: V=60g VOC jar. J=250g glass jar. T=plastic tub

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24			Please see attached notes for all abbreviations and acronyms		
Sample ID	SP1 S1	SP1 S2	SP1 S3	SP1 S4	SP1 S5	SP1 S6	SP1 S7	SP1 S8					
Depth													
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J	V J					
Sample Date	15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021			LOD/LOR	Units	Method No.
Arsenic #	9.8	8.2	8.1	8.8	7.5	9.1	8.6	9.5			<0.5	mg/kg	TM30/PM15
Barium #	60	43	44	45	46	51	51	52			<1	mg/kg	TM30/PM15
Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	mg/kg	TM30/PM15
Cadmium #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM30/PM15
Chromium #	35.2	33.3	35.2	37.1	40.1	37.7	36.6	41.1			<0.5	mg/kg	TM30/PM15
Copper #	14	12	14	14	13	15	14	17			<1	mg/kg	TM30/PM15
Lead #	38	35	42	43	35	65	55	60			<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1			<0.1	mg/kg	TM30/PM15
Nickel #	7.9	7.1	8.1	9.4	7.8	8.0	8.0	10.8			<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	<1	<1	<1	<1	<1	<1			<1	mg/kg	TM30/PM15
Total Sulphate as SO4 BRE	0.04	0.03	0.03	0.03	0.03	0.04	0.04	0.04			<0.01	%	TM50/PM25
Vanadium	15	14	15	15	15	15	15	16			<1	mg/kg	TM30/PM15
Water Soluble Boron #	0.5	0.4	0.4	0.5	0.4	0.6	0.6	0.6			<0.1	mg/kg	TM74/PM3
Zinc #	35	32	34	38	33	42	38	42			<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.09	0.42	0.12	0.09	0.08	0.20	0.08	0.17			<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	0.10	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.17	0.50	0.23	0.20	0.16	0.29	0.19	0.32			<0.03	mg/kg	TM4/PM8
Pyrene #	0.17	0.43	0.21	0.19	0.15	0.26	0.18	0.29			<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.11	0.24	0.14	0.15	0.13	0.21	0.13	0.21			<0.06	mg/kg	TM4/PM8
Chrysene #	0.10	0.22	0.13	0.13	0.09	0.15	0.09	0.19			<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.18	0.38	0.23	0.21	0.17	0.26	0.20	0.29			<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.09	0.19	0.12	0.11	0.09	0.12	0.09	0.15			<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	0.06	0.12	0.08	0.08	0.06	0.09	0.07	0.10			<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.07	0.13	0.08	0.08	0.07	0.09	0.07	0.11			<0.04	mg/kg	TM4/PM8
PAH 16 Total	1.0	2.9	1.3	1.2	1.0	1.7	1.1	1.8			<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.13	0.27	0.17	0.15	0.12	0.19	0.14	0.21			<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.05	0.11	0.06	0.06	0.05	0.07	0.06	0.08			<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	91	90	91	91	90	93	91	91			<0	%	TM4/PM8

Element Materials Technology

Client Name: Coopers
Reference: 7123 (P/O 8929 - SD)
Location: R.Draper Ltd - Bellway North West
Contact: Stephanie Dodd
EMT Job No: 21/2046

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24			Please see attached notes for all abbreviations and acronyms		
Sample ID	SP1 S1	SP1 S2	SP1 S3	SP1 S4	SP1 S5	SP1 S6	SP1 S7	SP1 S8					
Depth													
COC No / misc													
Containers	V J	V J	V J	V J	V J	V J	V J	V J					
Sample Date	15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021	15/02/2021			LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	<4	<4	<4	<4	<4	<4			<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	18	19	22	20	26	22	32	24			<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	<19	19	22	20	26	22	32	24			<19	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4	<4	<4	<4	<4	<4	<4			<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	<7	11	<7	8	10	<7	9	11			<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	54	75	45	66	79	55	84	87			<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 #	54	86	45	74	89	55	93	98			<19	mg/kg	TM5/PM8/PM16
Total aliphatics and aromatics(C5-35)	54	105	67	94	115	77	125	122			<38	mg/kg	TM5/PM8/PM16
MTBE #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
Benzene #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
Toluene #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
Ethylbenzene #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
m/p-Xylene #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
o-Xylene #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
Total Phenols HPLC	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15			<0.15	mg/kg	TM26/PM21B
Natural Moisture Content	11.5	10.3	15.4	18.4	14.9	22.4	18.1	19.0			<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3			<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	0.0520	0.0320	0.0402	0.0535	0.0438	0.0891	0.0965	0.0648			<0.0015	g/l	TM38/PM20
Chromium III	35.2	33.3	35.2	37.1	40.1	37.7	36.6	41.1			<0.5	mg/kg	NONE/NONE
Total Cyanide #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	mg/kg	TM89/PM45
Total Organic Carbon #	2.24	1.63	1.49	1.55	1.65	2.05	1.97	2.05			<0.02	%	TM21/PM24
pH #	7.07	7.01	7.26	7.51	7.18	7.74	7.71	7.49			<0.01	pH units	TM73/PM11

Client Name: Coopers
Reference: 7123 (P/O 8929 - SD)
Location: R.Draper Ltd - Bellway North West
Contact: Stephanie Dodd

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
21/2046	1	SP1 S1		3	16/02/2021	General Description (Bulk Analysis)	soil/stones
					16/02/2021	Asbestos Fibres	NAD
					16/02/2021	Asbestos ACM	NAD
					16/02/2021	Asbestos Type	NAD
					16/02/2021	Asbestos Level Screen	NAD
21/2046	1	SP1 S2		6	16/02/2021	General Description (Bulk Analysis)	soil/stones
					16/02/2021	Asbestos Fibres	NAD
					16/02/2021	Asbestos ACM	NAD
					16/02/2021	Asbestos Type	NAD
					16/02/2021	Asbestos Level Screen	NAD
21/2046	1	SP1 S3		9	16/02/2021	General Description (Bulk Analysis)	soil/stones
					16/02/2021	Asbestos Fibres	NAD
					16/02/2021	Asbestos ACM	NAD
					16/02/2021	Asbestos Type	NAD
					16/02/2021	Asbestos Level Screen	NAD
21/2046	1	SP1 S4		12	16/02/2021	General Description (Bulk Analysis)	soil/stones
					16/02/2021	Asbestos Fibres	NAD
					16/02/2021	Asbestos ACM	NAD
					16/02/2021	Asbestos Type	NAD
					16/02/2021	Asbestos Level Screen	NAD
21/2046	1	SP1 S5		15	16/02/2021	General Description (Bulk Analysis)	soil/stones
					16/02/2021	Asbestos Fibres	NAD
					16/02/2021	Asbestos ACM	NAD
					16/02/2021	Asbestos Type	NAD
					16/02/2021	Asbestos Level Screen	NAD
21/2046	1	SP1 S6		18	16/02/2021	General Description (Bulk Analysis)	Soil/Stone
					16/02/2021	Asbestos Fibres	NAD
					16/02/2021	Asbestos Fibres (2)	NAD
					16/02/2021	Asbestos ACM	NAD
					16/02/2021	Asbestos ACM (2)	NAD
					16/02/2021	Asbestos Type	NAD
					16/02/2021	Asbestos Type (2)	NAD
					16/02/2021	Asbestos Level Screen	NAD

Client Name: Coopers
Reference: 7123 (P/O 8929 - SD)
Location: R.Draper Ltd - Bellway North West
Contact: Stephanie Dodd

[illegible]

Client Name: Coopers
Reference: 7123 (P/O 8929 - SD)
Location: R.Draper Ltd - Bellway North West
Contact: Stephanie Dodd

Client Name: Coopers
Reference: 7123 (P/O 8929 - SD)
Location: R.Draper Ltd - Bellway North West
Contact: Stephanie Dodd

Client Name: Coopers
Reference: 7123 (P/O 8929 - SD)
Location: R.Draper Ltd - Bellway North West
Contact: Stephanie Dodd

Client Name: Coopers
Reference: 7123 (P/O 8929 - SD)
Location: R.Draper Ltd - Bellway North West
Contact: Stephanie Dodd

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 21/2046

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

EMT Job No: 21/2046

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21B	As Received samples are extracted in Methanol: Water (60:40) by reciprocal shaker.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes

EMT Job No: 21/2046

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	A hot hydrochloric acid digest is performed on a dried and ground sample, and the resulting liquor is analysed.			AD	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes



Richard Harris
Bellway Homes Limited (North West)
 2 Alderman Road
 Hunts Cross
 Liverpool
 Merseyside
 L24 9LR

17th May 2021

Dear Richard,

**Garden Validation – Scotchbarn Lane, Knowsley
 Plot 97 (re-test)**

Background and Objectives

In accordance with the Remediation Strategy ref 103358p2r2, dated November 2017, the following remedial measures are required in all areas of the site:

Depth Requirement for Gardens

- A total clean cover system comprising a minimum thickness of 600 mm;
- A minimum topsoil thickness of 150 mm; and,
- The remainder of the clean cover system shall be comprised of subsoil.

Validation Requirement

- Independent validation of works by Geo-Environmental Consultant;
- Visual inspection and chemical laboratory validation sampling; and
- Production of validation letter reports for the clean cover system.

Required sample numbers for chemical validation are summarised in Table 1.

Table 1: Chemical Validation Testing Requirement

Source	Source of Material		
	Greenfield	Remediated	Brownfield / Unknown
Gardens	1 per 250m ³	1 per 100 m ³	1 per 50 m ³
Soft Landscaping		1 per 150 m ³	1 per 150 m ³
Other Fill Materials		1 per 250m ³	1 per 250m ³

Validation Works Completed

Table 2 summarises plots inspected as part of each visit and the corresponding letter.

Table 2: Summary of Validated Plots

Validated Plots [w/ 600mm Cover System]	Letter Reference
7-10	01v103358
1-2, 5	02v103358
6, 34-39, 118-119	03v103358
41-43 & 117	04v103358
11 & 40	05v103358
12-13	06v103358
14-16	07v103358
17-19	08v103358
120-123	09v103358
124-128	10v103358
20 – 26	11v103358
27, 31-33	12v103358
28-30	13v103358
50-55	14v103358
56-59	15v103358
48, 49, 60	16v103358
129, 130, 44 – 47, 59	17v103358
61 – 63	18v103358
65-67 (further action required)	19v103358
65-68 (further action required for Plot 66)	20v103358
112 – 116	21v103358
108 – 111	22v103358
104 – 108	23v103358
69, 103 – 105	24v103358
69 (re-validation)	25v103358
70 – 73	26v103358
74 – 77	27v103358
78 – 81	28v103358
82-85, 101 – 102	29v103358
100	30v103358
96 – 99	31v103358
86 – 88	32v103358
89 – 90	33v103358
91, 95 and 131	34v103358
97 (re-test)	35v103358

Validation Visit – 14th April 2021

Ensafe attended site on 14th April 2021 to confirm the correct thickness of topsoil and subsoil has been used in the rear gardens of the properties in Plot 97 and retrieve samples of removed material for WAC testing. Ensaf initially attended site on the 21st January 2021 to validate plot 97. Asbestos fibres were identified within this material. Consequently, Ensaf attended site again for a delineation exercise on 10th February 2021.

During the delineation exercise four locations were investigated in the vicinity of the sample location where asbestos was identified, none of the samples tested recorded Ensafe therefore concluded that the extent of the asbestos contamination was limited in size, located around the original sampling location.

Ensafe Consultants returned to site on 14th April to witness the excavation of the contaminated material and record the depths and descriptions of each strata encountered recorded. A 1m x 1m square section of soil was excavated to a depth of 600mm, with validation samples taken from the sides of the excavation.

Ensafe's independent inspection shows that on completion of the works the required 600mm of clean cover was installed within the rear gardens of plot 97.

A visual inspection of the topsoil and subsoil confirmed them to be free of potentially deleterious or unsuitable materials discernible by the naked eye such as ceramic materials, metal objects, plastics, treated wood or textiles.

Laboratory Testing of Placed Topsoil

Topsoil has been purchased from the R Draper LTD soil merchant. Ensafe have been provided with testing results for the material, carried out by Coopers (Reference number 210215) dated February 2021 and enclosed within this letter. Furthermore, samples were collected from the border of the pit excavated to remove the affected material and tested for presence of asbestos. No asbestos fibres or fragments were recorded in any of the sample analysed. The results of the testing show that the imported topsoil is suitable for use in private residential gardens with plant uptake.

WAC test results

Laboratory results indicate the materials classify for disposal in an inert landfill.

Summary

Ensafe can confirm that the contaminated soils have been removed and that the topsoil and subsoil installed in the rear gardens of Plot 97 meet the specified requirements as a suitable growing medium and is suitable for its intended use.

Yours Sincerely,

For and on Ensafe Consultants



**Catarina Lima
Consultant**

Approved and Authorised



**Philip Thompson
Associate Director**

Enclosed:

Location Plan of Validated Plots

Plot Inspection Records (including photographs and description)

Imported material chemical certificates

WAC test results

Figure 1: Sketch Plot Validation Pit Location



PLOT INSPECTION RECORDS

PLOT NUMBER: 97

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 14/04/2021
Consultant: C. Lima

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	400 mm bgl
Subsoil	> 450mm bgl	Subsoil	600 mm bgl
Break Layer	N/A	Break Layer	N /A
TOTAL DEPTH	> 600mm bgl	TOTAL DEPTH	600 mm bgl

Validation Photograph	Locational Photograph
	

GARDEN VALIDATION: PASS

CHEMICAL CERTIFICATES

Catarina Lima
Ensafe Consultants
Osprey House
Pacific Quay
Manchester
M50 2UE

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

e:

Analytical Report Number : 21-66867

Project / Site name:	Scotchbarn	Samples received on:	06/04/2021
Your job number:	103358	Samples instructed on/ Analysis started on:	07/04/2021
Your order number:	9041	Analysis completed by:	14/04/2021
Report Issue Number:	1	Report issued on:	14/04/2021
Samples Analysed:	4 soil samples		

Signed: 

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :	soils	- 4 weeks from reporting
	leachates	- 2 weeks from reporting
	waters	- 2 weeks from reporting
	asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 21-66867
Project / Site name: Scotchbarn
Your Order No: 9041

Lab Sample Number				1827135	1827136	1827137	1827138
Sample Reference				Plot 97 A	Plot 97 B	Plot 97 C	Plot 97 D
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.20	0.20	0.20
Date Sampled				01/04/2021	01/04/2021	01/04/2021	01/04/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	13	16	17	13
Total mass of sample received	kg	0.001	NONE	0.50	0.50	0.50	0.50

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7	7.6	7.5	7.5
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	110	91	87	78
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.057	0.046	0.044	0.039
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	57.3	45.7	43.7	39.0
Organic Matter	%	0.1	MCERTS	2.0	2.5	3.9	2.2
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.012	0.014	0.022	0.013

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
----------------------------	-------	---	--------	-------	-------	-------	-------

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.34	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.51	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.52	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.60	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.23	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.45	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.09	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.53	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	3.27	< 0.80	< 0.80
-----------------------------	-------	-----	--------	--------	------	--------	--------

Analytical Report Number: 21-66867
Project / Site name: Scotchbarn
Your Order No: 9041

Lab Sample Number				1827135	1827136	1827137	1827138
Sample Reference				Plot 97 A	Plot 97 B	Plot 97 C	Plot 97 D
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20	0.20	0.20	0.20
Date Sampled				01/04/2021	01/04/2021	01/04/2021	01/04/2021
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status				

Heavy Metals / Metalloids

Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	2.3	< 1.0	< 1.0	< 1.0
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.6	6.5	6.1	6.9
Barium (aqua regia extractable)	mg/kg	1	MCERTS	42	41	41	47
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.37	0.37	0.37	0.39
Boron (water soluble)	mg/kg	0.2	MCERTS	< 0.2	0.4	0.4	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.2	MCERTS	< 1.2	< 1.2	< 1.2	< 1.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	11	10	11	11
Copper (aqua regia extractable)	mg/kg	1	MCERTS	28	26	25	28
Lead (aqua regia extractable)	mg/kg	1	MCERTS	38	35	36	39
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	10	9.5	9.8	11
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	14	13	14	14
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	41	41	40	41

Monoaromatics & Oxygenates

Benzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0

Petroleum Hydrocarbons

TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4	< 8.4
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10	< 10	< 10

TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4	< 8.4	< 8.4
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	< 10	< 10	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 21-66867

Project / Site name: Scotchbarn

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1827135	Plot 97 A	None Supplied	0.2	Brown loam and sand with gravel and vegetation.
1827136	Plot 97 B	None Supplied	0.2	Brown loam and sand with gravel and vegetation.
1827137	Plot 97 C	None Supplied	0.2	Brown loam and sand with gravel and vegetation.
1827138	Plot 97 D	None Supplied	0.2	Brown loam and sand with gravel and vegetation.

Analytical Report Number : 21-66867
Project / Site name: Scotchbarn

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in soil (Lower Level)	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Fraction of Organic Carbon in soil	Determination of fraction of organic carbon in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	NONE
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

Analytical Report Number : 21-66867
Project / Site name: Scotchbam

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
----------------------	-------------------------------	-----------------------------	---------------	--------------------	----------------------

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.



Catarina Lima
Ensafe Consultants
105 Bothwell Road
Hamilton
ML3 0DW

t: 01698539460
e: clima@ensafe.co.uk

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS
t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 21-68852

Project / Site name:	Scotchbarn	Samples received on:	15/04/2021
Your job number:	103358	Samples instructed on/ Analysis started on:	15/04/2021
Your order number:	009070	Analysis completed by:	22/04/2021
Report Issue Number:	1	Report issued on:	22/04/2021
Samples Analysed:	2 10:1 WAC samples		

Signed: *A. Czerwińska*
Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

i2 Analytical

7 Woodshots Meadow
Croxley Green Business Park
Watford, WD18 8YS

Telephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com

Waste Acceptance Criteria Analytical Results							
Report No:	21-68852						
					Client: ENSAFE		
Location	Scotchbarn						
Lab Reference (Sample Number)	1838003 / 1838004				Landfill Waste Acceptance Criteria		
Sampling Date	14/04/2021				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill
Sample ID	WAC01						
Depth (m)							
Solid Waste Analysis							
TOC (%)**	2.1				3%	5%	6%
Loss on Ignition (%) **	3.8				--	--	10%
BTEX (µg/kg) **	< 10				6000	--	--
Sum of PCBs (mg/kg) **	< 0.007				1	--	--
Mineral Oil (mg/kg)	< 10				500	--	--
Total PAH (WAC-17) (mg/kg)	11.4				100	--	--
pH (units)**	7.9				--	>6	--
Acid Neutralisation Capacity (mol / kg)	2.6				--	To be evaluated	To be evaluated
Eluate Analysis	10:1			10:1	Limit values for compliance leaching test		
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)		
Arsenic *	0.0041			0.0392	0.5	2	25
Barium *	0.0315			0.303	20	100	300
Cadmium *	< 0.0001			< 0.0008	0.04	1	5
Chromium *	0.0030			0.029	0.5	10	70
Copper *	0.015			0.14	2	50	100
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2
Molybdenum *	0.0095			0.0911	0.5	10	30
Nickel *	0.0048			0.046	0.4	10	40
Lead *	0.0061			0.059	0.5	10	50
Antimony *	< 0.0017			< 0.017	0.06	0.7	5
Selenium *	< 0.0040			< 0.040	0.1	0.5	7
Zinc *	0.011			0.10	4	50	200
Chloride *	3.6			34	800	15000	25000
Fluoride	0.70			6.7	10	150	500
Sulphate *	27			260	1000	20000	50000
TDS*	93			890	4000	60000	100000
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-
DOC	14.7			142	500	800	1000
Leach Test Information							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.0						
Dry Matter (%)	98						
Moisture (%)	2.3						
Results are expressed on a dry weight basis, after correction for moisture content where applicable.					** = UKAS accredited (liquid eluate analysis only)		
Stated limits are for guidance only and I2 cannot be held responsible for any discrepancies with current legislation					** = MCFRTS accredited		

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

*= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation

** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

i2 Analytical

7 Woodshots Meadow
Croxley Green Business Park
Watford, WD18 8YS

Telephone: 01923 225404
Fax: 01923 237404
email:reception@i2analytical.com

Waste Acceptance Criteria Analytical Results								
Report No:	21-68852							
					Client: ENSAFE			
Location	Scotchbarn							
Lab Reference (Sample Number)	1838005 / 1838006				Landfill Waste Acceptance Criteria			
Sampling Date	14/04/2021				Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill	
Sample ID	WAC02							
Depth (m)								
Solid Waste Analysis								
TOC (%)**	1.1				3%	5%	6%	
Loss on Ignition (%) **	2.3				--	--	10%	
BTEX (µg/kg) **	< 10				6000	--	--	
Sum of PCBs (mg/kg) **	< 0.007				1	--	--	
Mineral Oil (mg/kg)	< 10				500	--	--	
Total PAH (WAC-17) (mg/kg)	18.3				100	--	--	
pH (units)**	8.0				--	>6	--	
Acid Neutralisation Capacity (mol / kg)	3.1				--	To be evaluated	To be evaluated	
Eluate Analysis								
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	10:1			10:1	Limit values for compliance leaching test			
	mg/l			mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)			
Arsenic *	0.0042			0.0397	0.5	2	25	
Barium *	0.0290			0.273	20	100	300	
Cadmium *	< 0.0001			< 0.0008	0.04	1	5	
Chromium *	0.0024			0.022	0.5	10	70	
Copper *	0.019			0.18	2	50	100	
Mercury *	< 0.0005			< 0.0050	0.01	0.2	2	
Molybdenum *	0.0115			0.109	0.5	10	30	
Nickel *	0.0043			0.040	0.4	10	40	
Lead *	0.0069			0.065	0.5	10	50	
Antimony *	< 0.0017			< 0.017	0.06	0.7	5	
Selenium *	< 0.0040			< 0.040	0.1	0.5	7	
Zinc *	0.011			0.10	4	50	200	
Chloride *	3.7			35	800	15000	25000	
Fluoride	0.76			7.1	10	150	500	
Sulphate *	33			310	1000	20000	50000	
TDS*	95			900	4000	60000	100000	
Phenol Index (Monohydric Phenols) *	< 0.010			< 0.10	1	-	-	
DOC	13.9			131	500	800	1000	
Leach Test Information								
Stone Content (%)	< 0.1							
Sample Mass (kg)	1.0							
Dry Matter (%)	98							
Moisture (%)	1.8							
Results are expressed on a dry weight basis, after correction for moisture content where applicable.					* = UKAS accredited (liquid eluate analysis only)			
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation					** = MCFRTS accredited			

Results are expressed on a dry weight basis, after correction for moisture content where applicable.

*= UKAS accredited (liquid eluate analysis only)

Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation

** = MCERTS accredited

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.



Analytical Report Number : 21-68852

Project / Site name: Scotchbarn

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1838003	WAC01	None Supplied	None Supplied	Brown clay and loam with gravel.
1838005	WAC02	None Supplied	None Supplied	Brown clay and loam with gravel.

Analytical Report Number : 21-68852

Project / Site name: Scotchbarn

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance an Sampling and Testing of Wastes to Meet Landfill Waste Acceptance""	L046-PL	W	NONE
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270. MCERTS accredited except Coronene.	L064-PL	D	NONE
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH at 20oC in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In house method.	L005-PL	W	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Total BTEX in soil (Poland)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073-PL	W	MCERTS
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L033B-PL	W	ISO 17025
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	ISO 17025

Analytical Report Number : 21-68852

Project / Site name: Scotchbarn

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

APPENDIX 5 - Limitations

Limitations

This contract was completed by Groundtech Consulting on the basis of a defined programme and scope of works and terms and conditions agreed with the client. This report was compiled with due skill and care, taking into consideration the project brief provided, project objectives, agreed scope of works, prevailing site conditions and budget allocation.

Other than that defined in the paragraph above, Groundtech Consulting provides no other accountability or warranty whether express or implied, is made in relation to the services. Unless otherwise agreed this report has been prepared exclusively for the use and reliance of the client in accordance with generally accepted industry practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon, or transferred to, by any other party without the written agreement of a Director of Groundtech Consulting. A third party who relies on this report, does so at their own and sole risk and no liability to such parties is provided by Groundtech Consulting.

It is the understanding of Groundtech Consulting that this report is to be used for the intended purpose as set out in the introduction. The purpose was instrumental in determining the scope and level of the services provided. Should the purpose of the report or the proposed end use of the site change, this report will no longer be directly applicable, and its validity readdressed. No reliance upon the report in the revised situation should be assumed by the client without the permission of Groundtech Consulting.

The report was written in 2019, later changes in legislation, statutory requirements and industry best practices have not been considered and this should be allowed for. Ground conditions can also change and should be investigated if there is any significant delay in acting on the findings of this report. The period of time may result in changes in site conditions, regulatory or other legal provisions, technology or economic conditions which could render the report inaccurate or unreliable. The information and conclusions in this report should not be relied upon in the future without the written confirmation from Groundtech Consulting that it is safe to do so.

The observations and conclusions outlined in this report are based exclusively on the services that were provided as set out in the agreement between the client and Groundtech Consulting.

Groundtech Consulting are not liable for the existence of any condition, the discovery of which would require additional investigation outside the agreed scope of works or core competency. The services provided are based upon Groundtech Consulting observations of existing physical conditions at the site gained from site reconnaissance together with interpretation of information including documentation, obtained from third parties and from the client on the history and usage of the site. The findings and recommendations contained in this report are based in part upon information provided by third parties, and Groundtech Consulting assume the information to be correct.

No responsibility can be accepted for errors for third party information presented in this report. Groundtech Consulting were not authorised to independently verify the accuracy or completeness of information, documentation or materials received from the client or third parties, including laboratories and information services, during the performance of the services. Groundtech Consulting are not liable for any inaccurate information, misrepresentation of data or conclusions, which may inform the scope of investigation undertaken by Groundtech Consulting and forms the contract with the client.

Where field investigations have been carried out these have been restricted to a level of detail required to achieve the stated objectives of the work. Ground conditions can also be variable due to its heterogeneous properties and as investigation exploratory locations only allow examination of the ground at discrete locations. The potential exists for ground conditions to be encountered which are different to those considered in this report, particularly between exploratory holes. The extent of the limited area depends on the soil and groundwater conditions, together with other constraints such as the position of any existing structures and underground utilities. Geo-Environmental testing was carried out for a limited number of parameters [as stipulated in the contract] based on an understanding of the available operational and historical information, and it should not be inferred that other chemical species are not present.

The groundwater conditions entered on the exploratory hole records are those observed at the time of investigation. The groundwater level often has not had time to reach equilibrium and a monitoring period is required. Furthermore,



groundwater levels are subject to seasonal variation or changes in local drainage conditions and higher groundwater levels may occur at other times of the year than were recorded during this investigation.

Any site drawings provided in this report are not meant to be an accurate base plan, but are preliminary and used to present the general relative locations of features on, and surrounding, the site.

