



PLOT NUMBER: 31

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 10/04/2019
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: 32

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 10/06/2019
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:
Samples taken at 0.2m and 0.4m bgl

GARDEN VALIDATION: PASS





PLOT NUMBER: 33

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 10/06/2019
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





SUITABILITY CRITERIA





Table 4: Validation Testing Summary

Determinand	Units	Screening Value for Use within Private Gardens	Maximum Concentration within Upper Topsoil	Maximum Concentration within Lower Topsoil	Screening Value Source
Inorganics – Metals and Asbestos					
Arsenic	mg/kg	37	8	12	(i)
Cadmium	mg/kg	11	<1	2	(i)
Chromium (VI)	mg/kg	6	<1	<1	(i)
Lead	mg/kg	200	55	79	(iv)
Inorganic Mercury	mg/kg	40	<1	<1	(i)
Nickel	mg/kg	130	9	18	(i)
Selenium	mg/kg	250	<3	<3	(i)
Copper	mg/kg	2,400	28	88	(i)
Zinc	mg/kg	3,700	39	84	(i)
Cyanide	mg/kg	791	<1	<1	(v)
Asbestos	%	None Detected	N.D	N.D	N/A
Phenol	mg/kg	1100	<1	<1	(ii)
Naphthalene	mg/kg	13	<0.1	<0.1	(ii)
Acenaphthylene	mg/kg	920	<0.1	<0.1	(ii)
Acenaphthene	mg/kg	1100	0.1	<0.1	(ii)
Fluorene	mg/kg	860	<0.1	<0.1	(ii)
Phenanthrene	mg/kg	440	0.8	0.1	(ii)
Anthracene	mg/kg	11,000	0.2	<0.1	(ii)
Fluoranthene	mg/kg	560	0.8	0.3	(ii)
Pyrene	mg/kg	2000	0.7	0.3	(ii)
Benzo(a)Anthracene	mg/kg	13	0.3	0.2	(ii)
Chrysene	mg/kg	27	0.4	0.2	(ii)
Benzo(b)Fluoranthene	mg/kg	3.7	0.3	0.2	(ii)
Benzo(k)Fluoranthene	mg/kg	100	0.2	<0.1	(ii)
Benzo(a)Pyrene	mg/kg	3	0.3	0.2	(ii)
Indeno(123-cd)Pyrene	mg/kg	41	0.2	<0.1	(ii)
Dibenzo(a,h)Anthracene	mg/kg	0.3	<0.1	<0.1	(ii)
Benzo(ghi)Perylene	mg/kg	360	0.2	<0.1	(ii)
TPH C ₅ -C ₆	mg/kg	160	<0.1	<0.1	(iii)
TPH C ₆ -C ₈	mg/kg	530	<0.1	<0.1	(iii)
TPH C ₈ -C ₁₀	mg/kg	150	<0.1	<0.1	(iii)
TPH C ₁₀ -C ₁₂	mg/kg	380	⁽¹³⁾ <1	⁽¹³⁾ <1	(iii)
TPH C ₁₂ -C ₁₆	mg/kg	660	⁽¹³⁾ <1	⁽¹³⁾ <1	(iii)
TPH C ₁₆ -C ₂₁	mg/kg	930	⁽¹³⁾ 2	⁽¹³⁾ 2	(iii)
TPH C ₂₁ -C ₃₅	mg/kg	1,700	⁽¹³⁾ 17	⁽¹³⁾ 15	(iii)
TPH C ₃₅ -C ₄₄	mg/kg	1,700	⁽¹³⁾ 2	⁽¹³⁾ 3	(iii)
Screening Value Source					
(i) LQM/CIEH Suitable For Use Level (S4UL) (2015);					
(ii) S4UL –Assessment Approach of 6% SOM;					
(iii) S4UL –6% SOM and assumed worst case aliphatic / aromatic compound;					
(iv) Defra Category 4 Screening Level (2014);					
(v) CLEA v1.06 Derived Value.					
⁽¹³⁾ Results have been blank corrected.					





SOIL CHEMICAL ANALYSIS



Concept Life Sciences

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 827130-1

Date of Report: 24-Jun-2019

Customer: Resource Environmental Consultants Ltd
Osprey House
Pacific Quay
Broadway
Salford
M50 2UE

Customer Contact: Mr Martin Lucass

Customer Job Reference: 103358

Customer Purchase Order: 007025

Customer Site Reference: Scotchbarn Lane

Date Job Received at Concept: 10-Jun-2019

Date Analysis Started: 10-Jun-2019

Date Analysis Completed: 17-Jun-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Customers are responsible for information provided where, if incorrect, it could affect the validity of the results.

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

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with QMSection 15 of the Concept Life Sciences, Analytical Services Quality Manual



Report checked
and authorised by :
Aleksandra Pacula
Senior Customer Service
Advisor

Issued by :
Toni Morris
Customer Service Advisor

Concept Reference: 827130 Project Site: Scotchbarn Lane Customer Reference: 103358 Soil Analysed as Soil MCERTS Preparation						
Concept Reference				827130 001	827130 002	
Customer Sample Reference				Plot 32 TS01	Plot 32 SS01	
Top Depth				0.10	0.40	
Bottom Depth				0.20		
Date Sampled				10-JUN-2019	10-JUN-2019	
Matrix Class				Topsoil	Sandy Soil	
Determinand	Method	Test Sample	LOD	Units		
Moisture @105C	T162	AR	0.1	%	19	17
Retained on 10mm sieve	T2	M40	0.1	%	11.3	22.0

Concept Reference: 827130 Project Site: Scotchbarn Lane Customer Reference: 103358 Soil Analysed as Soil REC South Soil Suite						
Concept Reference				827130 001	827130 002	
Customer Sample Reference				Plot 32 TS01	Plot 32 SS01	
Top Depth				0.10	0.40	
Bottom Depth				0.20		
Date Sampled				10-JUN-2019	10-JUN-2019	
Matrix Class				Topsoil	Sandy Soil	
Determinand	Method	Test Sample	LOD	Units		
Antimony	T6	A40	1	mg/kg	<1	2
Arsenic	T6	M40	2	mg/kg	8	12
Barium	T6	A40	1	mg/kg	48	88
Beryllium	T6	A40	2	mg/kg	<2	<2
Boron (water-soluble)	T6	A40	1	mg/kg	<1	<1
Cadmium	T6	M40	1	mg/kg	<1	2
Chromium	T6	M40	1	mg/kg	8	21
Chromium VI	T6	A40	1	mg/kg	<1	<1
Copper	T6	M40	1	mg/kg	28	88
Lead	T6	M40	1	mg/kg	55	79
Mercury	T6	M40	1	mg/kg	<1	<1
Nickel	T6	M40	1	mg/kg	9	18
Selenium	T6	M40	3	mg/kg	<3	<3
Vanadium	T6	M40	1	mg/kg	11	23
Zinc	T6	M40	1	mg/kg	39	84
Asbestos ID	T27	A40			N.D.	N.D.
pH	T7	A40			6.8	7.9
Soil Organic Matter	T287	A40	0.1	%	5.3	4.6
(Water Soluble) SO4 expressed as SO4	T242	A40	0.05	g/l	<0.05	0.10
SO4(Total)	T102	A40	0.01	%	0.05	0.08
Cyanide(Total)	T921	M105	1	mg/kg	<1	<1
Phenols(Mono)	T921	M105	1	mg/kg	<1	<1
Moisture @40C	T277	AR	0.1	%	17	15

Concept Reference: 827130 Project Site: Scotchbarn Lane Customer Reference: 103358 Soil Analysed as Soil Total and Speciated USEPA16 PAH						
Concept Reference			827130 001		827130 002	
Customer Sample Reference			Plot 32 TS01		Plot 32 SS01	
Top Depth			0.10		0.40	
Bottom Depth			0.20			
Date Sampled			10-JUN-2019		10-JUN-2019	
Matrix Class			Topsoil		Sandy Soil	
Determinand	Method	Test Sample	LOD	Units		
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	0.1	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	0.8	0.1
Anthracene	T207	M105	0.1	mg/kg	0.2	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	0.8	0.3
Pyrene	T207	M105	0.1	mg/kg	0.7	0.3
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	0.3	0.2
Chrysene	T207	M105	0.1	mg/kg	0.4	0.2
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	0.3	0.2
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	0.2	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	0.3	0.2
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	0.2	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	0.2	<0.1
PAH(total)	T207	M105	0.1	mg/kg	4.4	1.3

Concept Reference: 827130 Project Site: Scotchbarn Lane Customer Reference: 103358 Soil Analysed as Soil TPH C5-C40 Banded						
Concept Reference			827130 001		827130 002	
Customer Sample Reference			Plot 32 TS01		Plot 32 SS01	
Top Depth			0.10		0.40	
Bottom Depth			0.20			
Date Sampled			10-JUN-2019		10-JUN-2019	
Matrix Class			Topsoil		Sandy Soil	
Determinand	Method	Test Sample	LOD	Units		
TPH (C5-C6)	T54	AR	0.10	mg/kg	<0.10	<0.10
TPH (C6-C8)	T54	AR	0.10	mg/kg	<0.10	<0.10
TPH (C8-C10)	T54	AR	0.10	mg/kg	<0.10	<0.10
TPH (C10-C12)	T206	M105	1	mg/kg	<1 ⁽¹³⁾	<1 ⁽¹³⁾
TPH (C12-C16)	T206	M105	1	mg/kg	<1 ⁽¹³⁾	<1 ⁽¹³⁾
TPH (C16-C21)	T206	M105	1	mg/kg	2⁽¹³⁾	2⁽¹³⁾
TPH (C21-C35)	T206	M105	1	mg/kg	17⁽¹³⁾	15⁽¹³⁾
TPH (C35-C40)	T8	M105	1	mg/kg	2⁽¹³⁾	3⁽¹³⁾
TPH C5-C40 (sum)	T85	M105	10	mg/kg	21⁽¹³⁾	20⁽¹³⁾

Index to symbols used in 827130-1

Value	Description
A40	Assisted dried < 40C
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
AR	As Received
N.D.	Not Detected

13	Results have been blank corrected.
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Asbestos testing was subcontracted to REC Asbestos.

Method Index

Value	Description
T8	GC/FID
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T6	ICP/OES
T7	Probe
T2	Grav
T27	PLM
T921	Colorimetry (CF) (MCERT)
T277	Grav (1 Dec) (40 C)
T287	Calc TOC/0.58
T162	Grav (1 Dec) (105 C)
T207	GC/MS (MCERTS)
T102	ICP/OES (HCl extract)
T206	GC/FID (MCERTS)
T54	GC/MS (Headspace)
T85	Calc

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Moisture @105C	T162	AR	0.1	%	N	001-002
Retained on 10mm sieve	T2	M40	0.1	%	N	001-002
Antimony	T6	A40	1	mg/kg	U	001-002
Arsenic	T6	M40	2	mg/kg	M	001-002
Barium	T6	A40	1	mg/kg	U	001-002
Beryllium	T6	A40	2	mg/kg	U	001-002
Boron (water-soluble)	T6	A40	1	mg/kg	N	001-002
Cadmium	T6	M40	1	mg/kg	M	001-002
Chromium	T6	M40	1	mg/kg	M	001-002
Chromium VI	T6	A40	1	mg/kg	N	001-002
Copper	T6	M40	1	mg/kg	M	001-002
Lead	T6	M40	1	mg/kg	M	001-002
Mercury	T6	M40	1	mg/kg	M	001-002
Nickel	T6	M40	1	mg/kg	M	001-002
Selenium	T6	M40	3	mg/kg	M	001-002
Vanadium	T6	M40	1	mg/kg	M	001-002
Zinc	T6	M40	1	mg/kg	M	001-002
Asbestos ID	T27	A40			SU	001-002
pH	T7	A40			M	001-002
Soil Organic Matter	T287	A40	0.1	%	N	001-002
(Water Soluble) SO4 expressed as SO4	T242	A40	0.05	g/l	M	001-002
SO4(Total)	T102	A40	0.01	%	M	001-002
Cyanide(Total)	T921	M105	1	mg/kg	M	001-002
Phenols(Mono)	T921	M105	1	mg/kg	M	001-002
Moisture @40C	T277	AR	0.1	%	N	001-002
TPH (C5-C6)	T54	AR	0.10	mg/kg	N	001-002
TPH (C6-C8)	T54	AR	0.10	mg/kg	N	001-002
TPH (C8-C10)	T54	AR	0.10	mg/kg	N	001-002
TPH (C10-C12)	T206	M105	1	mg/kg	M	001-002
TPH (C12-C16)	T206	M105	1	mg/kg	M	001-002
TPH (C16-C21)	T206	M105	1	mg/kg	M	001-002
TPH (C21-C35)	T206	M105	1	mg/kg	M	001-002
TPH (C35-C40)	T8	M105	1	mg/kg	N	001-002
TPH C5-C40 (sum)	T85	M105	10	mg/kg	N	001-002
Naphthalene	T207	M105	0.1	mg/kg	M	001-002
Acenaphthylene	T207	M105	0.1	mg/kg	U	001-002

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Acenaphthene	T207	M105	0.1	mg/kg	M	001-002
Fluorene	T207	M105	0.1	mg/kg	M	001-002
Phenanthrene	T207	M105	0.1	mg/kg	M	001-002
Anthracene	T207	M105	0.1	mg/kg	U	001-002
Fluoranthene	T207	M105	0.1	mg/kg	M	001-002
Pyrene	T207	M105	0.1	mg/kg	M	001-002
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	001-002
Chrysene	T207	M105	0.1	mg/kg	M	001-002
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	M	001-002
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	M	001-002
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	001-002
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	001-002
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	001-002
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	001-002
PAH(total)	T207	M105	0.1	mg/kg	U	001-002



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

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

Dear John,

Garden Validation – Scotchbarn Lane, Knowsley – Plots 28 - 30

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	1 per 50 m ³
Soft Landscaping	1 per 250m ³	1 per 150 m ³	1 per 150 m ³	1 per 150 m ³
Other Fill Materials	1 per 250m ³	1 per 250m ³	1 per 250m ³	1 per 250m ³



Validation Works Completed

Table 2 summarises plots validated.

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

Table 3 summarises approximate volumes of soil validated to date within the rear gardens.

Table 3: Approximate total soil volumes of rear gardens

Material	Volume (m ³)
Topsoil	2,300
Subsoil	6,900

Validation Visit - 5th July 2019

REC attended site on 5th July 2019 to confirm the correct thickness of topsoil and subsoil has been used in the rear gardens of properties in Plots 28-30 and to collect samples for laboratory analysis.

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

REC's independent inspection shows that the required 600mm of clean cover is present within the rear gardens of Plots 28-30.

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 4 (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 Topsoil

REC visited site on the 17th- 19th May 2016 and 15th March 2017 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**

One sample of topsoil and one sample of subsoil were tested at a frequency of 1 per 50m³ within Plots 28-30. Laboratory analysis confirms its suitability for use within the gardens. Laboratory test certificates are attached to this report.

Summary

REC can confirm that the topsoil and subsoil installed in the rear gardens of Plots 28-30 meet the specified requirements as a suitable growing medium and is suitable for its intended use.

Yours Sincerely,

For and on behalf of REC Ltd

Matthew Dee
Consultant

Approved and Authorised

Martin Lucass
Associate Director

Enclosed:

Location Plan of Validated Plots

Plot Inspection Records (including photographs and description)

Table 4: Screening Values for Materials within Residential Soft Landscaping Areas

Chemical Analysis Certificates



Figure 1: Sketch Plot Validation Pit Location





PLOT INSPECTION RECORDS



PLOT NUMBER: 28

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 05/07/2019
Consultant: M. Dee

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	300 mm bgl
Subsoil	> 450mm bgl	Subsoil	>300 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: 29

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 05/07/2019
Consultant: M. Dee

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	300 mm bgl
Subsoil	> 450mm bgl	Subsoil	>300 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:
Samples taken at 0.2m and 0.5m bgl

GARDEN VALIDATION: PASS



PLOT NUMBER: 30

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 05/07/2019
Consultant: M. Dee

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	400 mm bgl
Subsoil	> 450mm bgl	Subsoil	>200mm 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 4: 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	8	6	(i)
Cadmium	mg/kg	11	<1	<1	(i)
Chromium (VI)	mg/kg	6	<1	<1	(i)
Lead	mg/kg	200	56	15	(iv)
Inorganic Mercury	mg/kg	40	<1	<1	(i)
Nickel	mg/kg	130	8	14	(i)
Selenium	mg/kg	250	<3	<3	(i)
Copper	mg/kg	2,400	28	15	(i)
Zinc	mg/kg	3,700	37	24	(i)
Cyanide	mg/kg	791	<1	<1	(v)
Asbestos	%	None Detected	N.D	N.D	N/A
Phenol	mg/kg	1100	<1	<1	(ii)
Naphthalene	mg/kg	13	<0.1	<0.1	(ii)
Acenaphthylene	mg/kg	920	<0.1	<0.1	(ii)
Acenaphthene	mg/kg	1100	<0.1	<0.1	(ii)
Fluorene	mg/kg	860	<0.1	<0.1	(ii)
Phenanthrene	mg/kg	440	1.0	0.1	(ii)
Anthracene	mg/kg	11,000	0.2	<0.1	(ii)
Fluoranthene	mg/kg	560	1.3	<0.1	(ii)
Pyrene	mg/kg	2000	1.0	<0.1	(ii)
Benzo(a)Anthracene	mg/kg	13	0.5	<0.1	(ii)
Chrysene	mg/kg	27	0.6	<0.1	(ii)
Benzo(b)Fluoranthene	mg/kg	3.7	0.4	<0.1	(ii)
Benzo(k)Fluoranthene	mg/kg	100	0.4	<0.1	(ii)
Benzo(a)Pyrene	mg/kg	3	0.4	<0.1	(ii)
Indeno(123-cd)Pyrene	mg/kg	41	0.3	<0.1	(ii)
Dibenzo(a,h)Anthracene	mg/kg	0.3	<0.1	<0.1	(ii)
Benzo(ghi)Perylene	mg/kg	360	0.3	<0.1	(ii)
TPH C ₅ -C ₆	mg/kg	160	<0.1	<0.1	(iii)
TPH C ₆ -C ₈	mg/kg	530	<0.1	<0.1	(iii)
TPH C ₈ -C ₁₀	mg/kg	150	<0.1	<0.1	(iii)
TPH C ₁₀ -C ₁₂	mg/kg	380	⁽¹³⁾ <1	⁽¹³⁾ <1	(iii)
TPH C ₁₂ -C ₁₆	mg/kg	660	⁽¹³⁾ <1	⁽¹³⁾ <1	(iii)
TPH C ₁₆ -C ₂₁	mg/kg	930	⁽¹³⁾ 4	⁽¹³⁾ <1	(iii)
TPH C ₂₁ -C ₃₅	mg/kg	1,700	⁽¹³⁾ 47	⁽¹³⁾ 4	(iii)
TPH C ₃₅ -C ₄₄	mg/kg	1,700	⁽¹³⁾ 62	⁽¹³⁾ <10	(iii)
Screening Value Source					
(i) LQM/CIEH Suitable For Use Level (S4UL) (2015);					
(ii) S4UL –Assessment Approach of 6% SOM;					
(iii) S4UL –6% SOM and assumed worst case aliphatic / aromatic compound;					
(iv) Defra Category 4 Screening Level (2014);					
(v) CLEA v1.06 Derived Value.					
⁽¹³⁾ Results have been blank corrected.					



SOIL CHEMICAL ANALYSIS

Concept Life Sciences

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 832770-1

Date of Report: 15-Jul-2019

Customer: Resource Environmental Consultants Ltd
Osprey House
Pacific Quay
Broadway
Salford
M50 2UE

Customer Contact: Mr Martin Lucass

Customer Job Reference: 103358

Customer Purchase Order: 7143

Customer Site Reference: Scotchbarn Lane

Date Job Received at Concept: 05-Jul-2019

Date Analysis Started: 08-Jul-2019

Date Analysis Completed: 15-Jul-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Customers are responsible for information provided where, if incorrect, it could affect the validity of the results.

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

This report should not be reproduced except in full without the written approval of the laboratory

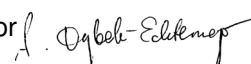
Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with QMSection 15 of the Concept Life Sciences, Analytical Services Quality Manual



Report checked
and authorised by :
Ms Jeanette Abbott
Customer Services Manager

Issued by :
Aneta Dybek-Echtermeyer
Customer Service Advisor



Concept Reference: 832770 Project Site: Scotchbarn Lane Customer Reference: 103358						
Soil Analysed as Soil MCERTS Preparation						
Concept Reference				832770 001	832770 002	
Customer Sample Reference				Plot 29 TS01	Plot 29 SS01	
Depth				0.20	0.50	
Date Sampled				05-JUL-2019	05-JUL-2019	
Matrix Class				Topsoil	Sandy Soil	
Determinand	Method	Test Sample	LOD	Units		
Moisture @40C	T277	AR	0.1	%	8.7	11
Moisture @105C	T162	AR	0.1	%	15	13
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1

Concept Reference: 832770 Project Site: Scotchbarn Lane Customer Reference: 103358						
Soil Analysed as Soil REC South Soil Suite						
Concept Reference				832770 001	832770 002	
Customer Sample Reference				Plot 29 TS01	Plot 29 SS01	
Depth				0.20	0.50	
Date Sampled				05-JUL-2019	05-JUL-2019	
Matrix Class				Topsoil	Sandy Soil	
Determinand	Method	Test Sample	LOD	Units		
Antimony	T6	A40	1	mg/kg	1	2
Arsenic	T6	M40	2	mg/kg	8	6
Barium	T6	A40	1	mg/kg	51	34
Beryllium	T6	A40	2	mg/kg	<2	<2
Boron (water-soluble)	T6	A40	1	mg/kg	<1	<1
Cadmium	T6	M40	1	mg/kg	<1	<1
Chromium	T6	M40	1	mg/kg	8	25
Chromium VI	T6	A40	1	mg/kg	<1	<1
Copper	T6	M40	1	mg/kg	28	15
Lead	T6	M40	1	mg/kg	56	15
Mercury	T6	M40	1	mg/kg	<1	<1
Nickel	T6	M40	1	mg/kg	8	14
Selenium	T6	M40	3	mg/kg	<3	<3
Vanadium	T6	M40	1	mg/kg	9	22
Zinc	T6	M40	1	mg/kg	37	24
pH	T7	A40			6.6	7.2
Soil Organic Matter	T287	A40	0.1	%	6.6	1.3
(Water Soluble) SO4 expressed as SO4	T242	A40	0.05	g/l	<0.05	<0.05
SO4(Total)	T102	A40	0.01	%	0.05	0.02
Cyanide(Total)	T921	M105	1	mg/kg	<1	<1
Phenols(Mono)	T921	M105	1	mg/kg	<1	<1
Asbestos ID	T27	A40			Asbestos not detected	Asbestos not detected

Concept Reference: 832770 Project Site: Scotchbarn Lane Customer Reference: 103358 Soil Analysed as Soil Total and Speciated USEPA16 PAH						
Concept Reference		832770 001		832770 002		
Customer Sample Reference		Plot 29 TS01		Plot 29 SS01		
Depth		0.20		0.50		
Date Sampled		05-JUL-2019		05-JUL-2019		
Matrix Class		Topsoil		Sandy Soil		
Determinand	Method	Test Sample	LOD	Units		
Naphthalene	T207	M105	0.1	mg/kg	<0.1	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	<0.1	<0.1
Fluorene	T207	M105	0.1	mg/kg	<0.1	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	1.0	<0.1
Anthracene	T207	M105	0.1	mg/kg	0.2	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	1.3	<0.1
Pyrene	T207	M105	0.1	mg/kg	1.0	<0.1
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	0.5	<0.1
Chrysene	T207	M105	0.1	mg/kg	0.6	<0.1
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	0.4	<0.1
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	0.4	<0.1
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	0.4	<0.1
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	0.3	<0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	<0.1	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	0.3	<0.1
PAH(total)	T207	M105	0.1	mg/kg	6.3	<0.1

Concept Reference: 832770 Project Site: Scotchbarn Lane Customer Reference: 103358 Soil Analysed as Soil TPH C5-C40 Banded						
Concept Reference		832770 001		832770 002		
Customer Sample Reference		Plot 29 TS01		Plot 29 SS01		
Depth		0.20		0.50		
Date Sampled		05-JUL-2019		05-JUL-2019		
Matrix Class		Topsoil		Sandy Soil		
Determinand	Method	Test Sample	LOD	Units		
TPH (C5-C6)	T54	M105	0.10	mg/kg	<0.10	<0.10
TPH (C6-C8)	T54	M105	0.10	mg/kg	<0.10	<0.10
TPH (C8-C10)	T54	M105	0.10	mg/kg	<0.10	<0.10
TPH (C10-C12)	T206	M105	1	mg/kg	<1 ⁽¹³⁾	<1 ⁽¹³⁾
TPH (C12-C16)	T206	M105	1	mg/kg	<1 ⁽¹³⁾	<1 ⁽¹³⁾
TPH (C16-C21)	T206	M105	1	mg/kg	4⁽¹³⁾	<1 ⁽¹³⁾
TPH (C21-C35)	T206	M105	1	mg/kg	47⁽¹³⁾	4⁽¹³⁾
TPH (C35-C40)	T8	M105	1	mg/kg	11⁽¹³⁾	1⁽¹³⁾
TPH C5-C40 (sum)	T85	M105	10	mg/kg	62⁽¹³⁾	<10 ⁽¹³⁾

Index to symbols used in 832770-1

Value	Description
AR	As Received
A40	Assisted dried < 40C
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
13	Results have been blank corrected.
S	Analysis was subcontracted
M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited

N	Analysis is not UKAS accredited
---	---------------------------------

Method Index

Value	Description
T85	Calc
T162	Grav (1 Dec) (105 C)
T7	Probe
T206	GC/FID (MCERTS)
T277	Grav (1 Dec) (40 C)
T2	Grav
T6	ICP/OES
T54	GC/MS (Headspace)
T921	Colorimetry (CF) (MCERT)
T8	GC/FID
T207	GC/MS (MCERTS)
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T27	PLM
T287	Calc TOC/0.58
T102	ICP/OES (HCl extract)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Antimony	T6	A40	1	mg/kg	U	001-002
Arsenic	T6	M40	2	mg/kg	M	001-002
Barium	T6	A40	1	mg/kg	U	001-002
Beryllium	T6	A40	2	mg/kg	U	001-002
Boron (water-soluble)	T6	A40	1	mg/kg	N	001-002
Cadmium	T6	M40	1	mg/kg	M	001-002
Chromium	T6	M40	1	mg/kg	M	001-002
Chromium VI	T6	A40	1	mg/kg	N	001-002
Copper	T6	M40	1	mg/kg	M	001-002
Lead	T6	M40	1	mg/kg	M	001-002
Mercury	T6	M40	1	mg/kg	M	001-002
Nickel	T6	M40	1	mg/kg	M	001-002
Selenium	T6	M40	3	mg/kg	M	001-002
Vanadium	T6	M40	1	mg/kg	M	001-002
Zinc	T6	M40	1	mg/kg	M	001-002
pH	T7	A40			M	001-002
Soil Organic Matter	T287	A40	0.1	%	N	001-002
(Water Soluble) SO4 expressed as SO4	T242	A40	0.05	g/l	M	001-002
SO4(Total)	T102	A40	0.01	%	M	001-002
Cyanide(Total)	T921	M105	1	mg/kg	M	001-002
Phenols(Mono)	T921	M105	1	mg/kg	M	001-002
Asbestos ID	T27	A40			SU	001-002
TPH (C5-C6)	T54	M105	0.10	mg/kg	N	001-002
TPH (C6-C8)	T54	M105	0.10	mg/kg	N	001-002
TPH (C8-C10)	T54	M105	0.10	mg/kg	N	001-002
TPH (C10-C12)	T206	M105	1	mg/kg	M	001-002
TPH (C12-C16)	T206	M105	1	mg/kg	M	001-002
TPH (C16-C21)	T206	M105	1	mg/kg	M	001-002
TPH (C21-C35)	T206	M105	1	mg/kg	M	001-002
TPH (C35-C40)	T8	M105	1	mg/kg	N	001-002
TPH C5-C40 (sum)	T85	M105	10	mg/kg	N	001-002
Naphthalene	T207	M105	0.1	mg/kg	M	001-002
Acenaphthylene	T207	M105	0.1	mg/kg	U	001-002
Acenaphthene	T207	M105	0.1	mg/kg	M	001-002
Fluorene	T207	M105	0.1	mg/kg	M	001-002
Phenanthrene	T207	M105	0.1	mg/kg	M	001-002
Anthracene	T207	M105	0.1	mg/kg	U	001-002
Fluoranthene	T207	M105	0.1	mg/kg	M	001-002
Pyrene	T207	M105	0.1	mg/kg	M	001-002
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	001-002
Chrysene	T207	M105	0.1	mg/kg	M	001-002
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	M	001-002
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	M	001-002
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	001-002
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	001-002

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	001-002
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	001-002
PAH(total)	T207	M105	0.1	mg/kg	U	001-002
Moisture @40C	T277	AR	0.1	%	N	001-002
Moisture @105C	T162	AR	0.1	%	N	001-002
Retained on 10mm sieve	T2	M40	0.1	%	N	001-002



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

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

Dear John,

Garden Validation – Scotchbarn Lane, Knowsley – Plots 50-55

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	1 per 50 m ³
Soft Landscaping	1 per 250m ³	1 per 150 m ³	1 per 150 m ³	1 per 150 m ³
Other Fill Materials	1 per 250m ³	1 per 250m ³	1 per 250m ³	1 per 250m ³



Validation Works Completed

Table 2 summarises plots validated.

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

Table 3 summarises approximate volumes of soil validated to date within the rear gardens.

Table 3: Approximate total soil volumes of rear gardens

Material	Volume (m ³)
Topsoil	2,300
Subsoil	6,900

Validation Visit – 23rd July 2019

REC attended site on 23rd July 2019 to confirm the correct thickness of topsoil and subsoil has been used in the rear gardens of properties in Plots 50-55 and to collect samples for laboratory analysis.

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

REC's independent inspection shows that the required 600mm of clean cover is present within the rear gardens of Plots 50-55.

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 4 (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

REC visited site on the 17th- 19th May 2016 and 15th March 2017 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 imported from the Bellway Homes site Lathom Pastures located on Firwood Road, Lathom, Skelmersdale WN8 8UP. One sample of topsoil and one sample of subsoil were tested at a frequency of 1 per 50m³ within Plots 50-55. Laboratory analysis confirms its suitability for use within the gardens. Laboratory test certificates are attached to this report.

Summary

REC can confirm that the topsoil and subsoil installed in the rear gardens of Plots 50-55 meet the specified requirements as a suitable growing medium and is suitable for its intended use.

Yours Sincerely,

For and on behalf of REC Ltd

Matthew Dee
Consultant

Approved and Authorised

Martin Lucass
Associate Director

Enclosed:

Location Plan of Validated Plots

Plot Inspection Records (including photographs and description)

Table 4: Screening Values for Materials within Residential Soft Landscaping Areas

Chemical Analysis Certificates



Figure 1: Sketch Plot Validation Pit Location





PLOT INSPECTION RECORDS



PLOT NUMBER: 50

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 23/07/2019
Consultant: M. Dee

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	300 mm bgl
Subsoil	> 450mm bgl	Subsoil	>300 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: 51

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 23/07/2019
Consultant: M. Dee

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	300 mm bgl
Subsoil	> 450mm bgl	Subsoil	>300 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:
Samples taken at 0.1m and 0.4m bgl

GARDEN VALIDATION: PASS

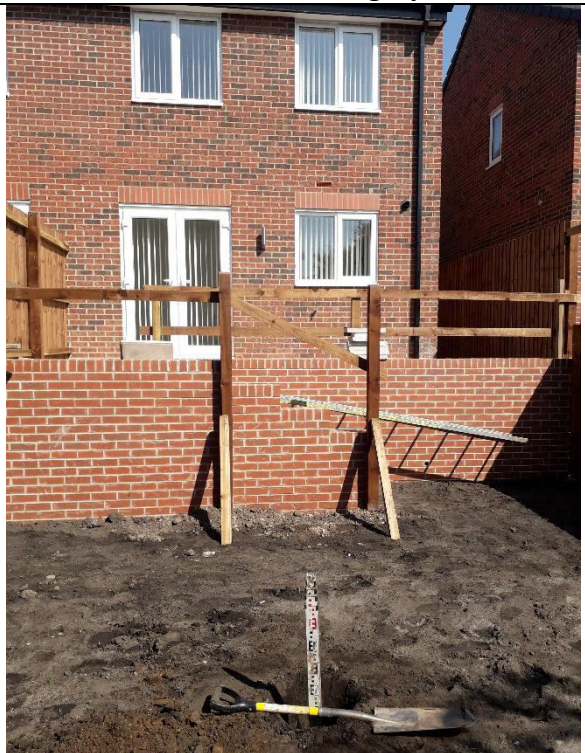


PLOT NUMBER: 52

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 23/07/2019
Consultant: M. Dee

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	300 mm bgl
Subsoil	> 450mm bgl	Subsoil	>300 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: 53

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 23/07/2019
Consultant: M. Dee

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	300 mm bgl
Subsoil	> 450mm bgl	Subsoil	>300 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: 54

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 23/07/2019
Consultant: M. Dee

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

Validation Photograph	Locational Photograph
	

Additional Comments:
Samples taken at 0.1m and 0.4m bgl

GARDEN VALIDATION: PASS



PLOT NUMBER: 55

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 23/07/2019
Consultant: M. Dee

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	250 mm bgl
Subsoil	> 450mm bgl	Subsoil	>350mm 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 4: 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	15	9	(i)
Cadmium	mg/kg	11	2	<1	(i)
Chromium (VI)	mg/kg	6	<1	<1	(i)
Lead	mg/kg	200	95	59	(iv)
Inorganic Mercury	mg/kg	40	<1	<1	(i)
Nickel	mg/kg	130	21	23	(i)
Selenium	mg/kg	250	<3	<3	(i)
Copper	mg/kg	2,400	85	34	(i)
Zinc	mg/kg	3,700	89	45	(i)
Cyanide	mg/kg	791	<1	<1	(v)
Asbestos	%	None Detected	N.D	N.D	N/A
Phenol	mg/kg	1100	<1	<1	(ii)
Naphthalene	mg/kg	13	<0.1	<0.1	(ii)
Acenaphthylene	mg/kg	920	<0.1	<0.1	(ii)
Acenaphthene	mg/kg	1100	<0.1	0.2	(ii)
Fluorene	mg/kg	860	<0.1	<0.1	(ii)
Phenanthrene	mg/kg	440	1.2	0.2	(ii)
Anthracene	mg/kg	11,000	<0.1	0.3	(ii)
Fluoranthene	mg/kg	560	1.8	0.3	(ii)
Pyrene	mg/kg	2000	1.5	0.3	(ii)
Benzo(a)Anthracene	mg/kg	13	0.8	0.2	(ii)
Chrysene	mg/kg	27	0.9	0.2	(ii)
Benzo(b)Fluoranthene	mg/kg	3.7	0.7	0.2	(ii)
Benzo(k)Fluoranthene	mg/kg	100	0.6	0.1	(ii)
Benzo(a)Pyrene	mg/kg	3	0.7	0.2	(ii)
Indeno(123-cd)Pyrene	mg/kg	41	0.4	0.1	(ii)
Dibenzo(a,h)Anthracene	mg/kg	0.3	0.2	<0.1	(ii)
Benzo(ghi)Perylene	mg/kg	360	0.5	0.1	(ii)
TPH C ₅ -C ₆	mg/kg	160	<0.1	<0.1	(iii)
TPH C ₆ -C ₈	mg/kg	530	<0.1	<0.1	(iii)
TPH C ₈ -C ₁₀	mg/kg	150	<0.1	<0.1	(iii)
TPH C ₁₀ -C ₁₂	mg/kg	380	⁽¹³⁾ <1	⁽¹³⁾ <1	(iii)
TPH C ₁₂ -C ₁₆	mg/kg	660	⁽¹³⁾ 5	⁽¹³⁾ 4	(iii)
TPH C ₁₆ -C ₂₁	mg/kg	930	⁽¹³⁾ 25	⁽¹³⁾ 28	(iii)
TPH C ₂₁ -C ₃₅	mg/kg	1,700	⁽¹³⁾ 190	⁽¹³⁾ 250	(iii)
TPH C ₃₅ -C ₄₄	mg/kg	1,700	⁽¹³⁾ 15	⁽¹³⁾ 30	(iii)
Screening Value Source					
(i) LQM/CIEH Suitable For Use Level (S4UL) (2015);					
(ii) S4UL –Assessment Approach of 6% SOM;					
(iii) S4UL –6% SOM and assumed worst case aliphatic / aromatic compound;					
(iv) Defra Category 4 Screening Level (2014);					
(v) CLEA v1.06 Derived Value.					
⁽¹³⁾ Results have been blank corrected.					



SOIL CHEMICAL ANALYSIS

Concept Life Sciences

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 836344-1

Date of Report: 01-Aug-2019

Customer: Resource Environmental Consultants Ltd
Osprey House
Pacific Quay
Broadway
Salford
M50 2UE

Customer Contact: Mr Martin Lucass

Customer Job Reference: 103358

Customer Purchase Order: 007214

Customer Site Reference: Scotchbarn Lane

Date Job Received at Concept: 24-Jul-2019

Date Analysis Started: 25-Jul-2019

Date Analysis Completed: 01-Aug-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Customers are responsible for information provided where, if incorrect, it could affect the validity of the results.

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

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with QMSection 15 of the Concept Life Sciences, Analytical Services Quality Manual



Report checked
and authorised by :
Toni Morris
Customer Service Advisor

Issued by :
Toni Morris
Customer Service Advisor



Concept Reference: 836344 Project Site: Scotchbarn Lane Customer Reference: 103358	
Soil MCERTS Preparation	Analysed as Soil

Concept Reference					836344 001	836344 002	836344 003	836344 004
Customer Sample Reference					Plot 54 TS	Plot 54 SS	Plot 51 TS	Plot 51 SS
Depth					0.1	0.4	0.1	0.4
Date Sampled					23-JUL-2019	23-JUL-2019	23-JUL-2019	23-JUL-2019
Matrix Class					Topsoil	Topsoil	Topsoil	Topsoil
Determinand	Method	Test Sample	LOD	Units				
Moisture @105C	T162	AR	0.1	%	13	13	47	13
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1	<0.1	<0.1

Concept Reference: 836344	
Project Site: Scotchbarn Lane	
Customer Reference: 103358	
Soil	Analysed as Soil
REC South Soil Suite	

Concept Reference					836344 001	836344 002	836344 003	836344 004
Customer Sample Reference					Plot 54 TS	Plot 54 SS	Plot 51 TS	Plot 51 SS
Depth					0.1	0.4	0.1	0.4
Date Sampled					23-JUL-2019	23-JUL-2019	23-JUL-2019	23-JUL-2019
Matrix Class					Topsoil	Topsoil	Topsoil	Topsoil
Determinand	Method	Test Sample	LOD	Units				
Antimony	T6	A40	1	mg/kg	3	1	2	2
Arsenic	T6	M40	2	mg/kg	15	9	11	9
Barium	T6	A40	1	mg/kg	100	55	70	56
Beryllium	T6	A40	2	mg/kg	<2	<2	<2	<2
Boron (water-soluble)	T6	A40	1	mg/kg	<1	<1	<1	<1
Cadmium	T6	M40	1	mg/kg	2	<1	<1	<1
Chromium	T6	M40	1	mg/kg	24	9	14	33
Chromium VI	T6	A40	1	mg/kg	<1	<1	<1	<1
Copper	T6	M40	1	mg/kg	85	34	60	32
Lead	T6	M40	1	mg/kg	95	59	81	33
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1
Nickel	T6	M40	1	mg/kg	21	10	14	23
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3
Vanadium	T6	M40	1	mg/kg	29	12	16	33
Zinc	T6	M40	1	mg/kg	89	41	62	45
Asbestos ID	T27	A40			N.D.	N.D.	N.D.	N.D.
pH	T7	A40			7.5	6.6	6.9	6.2
Soil Organic Matter	T287	A40	0.1	%	4.4	6.9	6.0	2.0
(Water Soluble) SO4 expressed as SO4	T242	A40	0.05	g/l	0.06	<0.05	<0.05	<0.05
SO4(Total)	T102	A40	0.01	%	0.06	0.05	0.07	0.04
Cyanide(Total)	T921	M105	1	mg/kg	<1	<1	<1	<1
Phenols(Mono)	T921	M105	1	mg/kg	<1	<1	<1	<1
Moisture @40C	T277	AR	0.1	%	20	3.4	14	13

M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Asbestos testing was subcontracted to REC Asbestos.

Method Index

Value	Description
T85	Calc
T27	PLM
T102	ICP/OES (HCl extract)
T162	Grav (1 Dec) (105 C)
T2	Grav
T207	GC/MS (MCERTS)
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T287	Calc TOC/0.58
T7	Probe
T206	GC/FID (MCERTS)
T277	Grav (1 Dec) (40 C)
T6	ICP/OES
T8	GC/FID
T54	GC/MS (Headspace)
T921	Colorimetry (CF) (MCERT)

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Antimony	T6	A40	1	mg/kg	U	001-004
Arsenic	T6	M40	2	mg/kg	M	001-004
Barium	T6	A40	1	mg/kg	U	001-004
Beryllium	T6	A40	2	mg/kg	U	001-004
Boron (water-soluble)	T6	A40	1	mg/kg	N	001-004
Cadmium	T6	M40	1	mg/kg	M	001-004
Chromium	T6	M40	1	mg/kg	M	001-004
Chromium VI	T6	A40	1	mg/kg	N	001-004
Copper	T6	M40	1	mg/kg	M	001-004
Lead	T6	M40	1	mg/kg	M	001-004
Mercury	T6	M40	1	mg/kg	M	001-004
Nickel	T6	M40	1	mg/kg	M	001-004
Selenium	T6	M40	3	mg/kg	M	001-004
Vanadium	T6	M40	1	mg/kg	M	001-004
Zinc	T6	M40	1	mg/kg	M	001-004
Asbestos ID	T27	A40			SU	001-004
pH	T7	A40			M	001-004
Soil Organic Matter	T287	A40	0.1	%	N	001-004
(Water Soluble) SO4 expressed as SO4	T242	A40	0.05	g/l	M	001-004
SO4(Total)	T102	A40	0.01	%	M	001-004
Cyanide(Total)	T921	M105	1	mg/kg	M	001-004
Phenols(Mono)	T921	M105	1	mg/kg	M	001-004
Moisture @40C	T277	AR	0.1	%	N	001-004
TPH (C5-C6)	T54	M105	0.10	mg/kg	N	001-004
TPH (C6-C8)	T54	M105	0.10	mg/kg	N	001-004
TPH (C8-C10)	T54	M105	0.10	mg/kg	N	001-004
TPH (C10-C12)	T206	M105	1	mg/kg	M	001-004
TPH (C12-C16)	T206	M105	1	mg/kg	M	001-004
TPH (C16-C21)	T206	M105	1	mg/kg	M	001-004
TPH (C21-C35)	T206	M105	1	mg/kg	M	001-004
TPH (C35-C40)	T8	M105	1	mg/kg	N	001-004
TPH C5-C40 (sum)	T85	M105	10	mg/kg	N	001-004
Naphthalene	T207	M105	0.1	mg/kg	M	001-004
Acenaphthylene	T207	M105	0.1	mg/kg	U	001-004
Acenaphthene	T207	M105	0.1	mg/kg	M	001-004
Fluorene	T207	M105	0.1	mg/kg	M	001-004
Phenanthrene	T207	M105	0.1	mg/kg	M	001-004
Anthracene	T207	M105	0.1	mg/kg	U	001-004

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Fluoranthene	T207	M105	0.1	mg/kg	M	001-004
Pyrene	T207	M105	0.1	mg/kg	M	001-004
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	001-004
Chrysene	T207	M105	0.1	mg/kg	M	001-004
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	M	001-004
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	M	001-004
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	001-004
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	001-004
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	001-004
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	001-004
PAH(total)	T207	M105	0.1	mg/kg	U	001-004
Moisture @105C	T162	AR	0.1	%	N	001-004
Retained on 10mm sieve	T2	M40	0.1	%	N	001-004



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

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

Dear John,

Garden Validation – Scotchbarn Lane, Knowsley – Plots 56-59

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	1 per 50 m ³
Soft Landscaping	1 per 250m ³	1 per 150 m ³	1 per 150 m ³	1 per 150 m ³
Other Fill Materials	1 per 250m ³	1 per 250m ³	1 per 250m ³	1 per 250m ³



Validation Works Completed

Table 2 summarises plots validated.

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

Table 3 summarises approximate volumes of soil validated to date within the rear gardens.

Table 3: Approximate total soil volumes of rear gardens

Material	Volume (m ³)
Topsoil	2,300
Subsoil	6,900

Validation Visit – 9th August 2019

REC attended site on 9th August 2019 to confirm the correct thickness of topsoil and subsoil has been used in the rear gardens of properties in Plots 56-59 and to collect samples for laboratory analysis.

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

REC's independent inspection shows that the required 600mm of clean cover is present within the rear gardens of Plots 56-59.

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 4 (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

REC visited site on the 17th- 19th May 2016 and 15th March 2017 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 imported from the Bellway Homes site Lathom Pastures located on Firwood Road, Lathom, Skelmersdale WN8 8UP. One sample of topsoil and one sample of subsoil were tested at a frequency of 1 per 50m³ within Plots 56-59. Laboratory analysis indicates exceedances of PAHs in topsoil materials in plot 59. Further testing is to be undertaken to confirm this result. Laboratory test certificates are attached to this report.

Summary

REC can confirm that the topsoil and subsoil installed in the rear gardens of Plots 56-58 meet the specified requirements as a suitable growing medium and is suitable for its intended use.

The results of the topsoil placed in garden 59 have exceeded the screening criteria and should be subject to further testing to confirm its suitability.

Yours Sincerely,

For and on behalf of REC Ltd

Matthew Dee
Consultant

Approved and Authorised

Martin Lucass
Associate Director

Enclosed:

Location Plan of Validated Plots

Plot Inspection Records (including photographs and description)

Table 4: Screening Values for Materials within Residential Soft Landscaping Areas

Chemical Analysis Certificates



Figure 1: Sketch Plot Validation Pit Location





PLOT INSPECTION RECORDS



PLOT NUMBER: 56

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 09/08/2019
Consultant: M. Dee

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	300 mm bgl
Subsoil	> 450mm bgl	Subsoil	>300 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: 57

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 09/08/2019
Consultant: M. Dee

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	300 mm bgl
Subsoil	> 450mm bgl	Subsoil	>300 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:
Samples taken at 0.1m and 0.3m bgl

GARDEN VALIDATION: PASS



PLOT NUMBER: 58

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 09/08/2019
Consultant: M. Dee

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	300 mm bgl
Subsoil	> 450mm bgl	Subsoil	>300 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: 59

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 09/08/2019
Consultant: M. Dee

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	300 mm bgl
Subsoil	> 450mm bgl	Subsoil	>300 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:
Samples taken at 0.1mbgl and 0.4mbgl.

GARDEN VALIDATION: FAIL



SUITABILITY CRITERIA



Table 4: 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	15	9	(i)
Cadmium	mg/kg	11	2	<1	(i)
Chromium (VI)	mg/kg	6	<1	<1	(i)
Lead	mg/kg	200	110	59	(iv)
Inorganic Mercury	mg/kg	40	<1	<1	(i)
Nickel	mg/kg	130	25	23	(i)
Selenium	mg/kg	250	<3	<3	(i)
Copper	mg/kg	2,400	110	34	(i)
Zinc	mg/kg	3,700	110	45	(i)
Cyanide	mg/kg	791	<1	<1	(v)
Asbestos	%	None Detected	N.D	N.D	N/A
Phenol	mg/kg	1100	<1	<1	(ii)
Naphthalene	mg/kg	13	0.2	<0.1	(ii)
Acenaphthylene	mg/kg	920	<0.1	<0.1	(ii)
Acenaphthene	mg/kg	1100	2.1	0.2	(ii)
Fluorene	mg/kg	860	1.5	<0.1	(ii)
Phenanthrene	mg/kg	440	21	0.2	(ii)
Anthracene	mg/kg	11,000	2.7	0.3	(ii)
Fluoranthene	mg/kg	560	16	0.3	(ii)
Pyrene	mg/kg	2000	14	0.3	(ii)
Benzo(a)Anthracene	mg/kg	13	4.5	0.2	(ii)
Chrysene	mg/kg	27	5.8	0.2	(ii)
Benzo(b)Fluoranthene	mg/kg	3.7	4.3	0.2	(ii)
Benzo(k)Fluoranthene	mg/kg	100	3.4	0.1	(ii)
Benzo(a)Pyrene	mg/kg	3	4.5	0.2	(ii)
Indeno(123-cd)Pyrene	mg/kg	41	2.6	0.1	(ii)
Dibenzo(a,h)Anthracene	mg/kg	0.3	1.1	<0.1	(ii)
Benzo(ghi)Perylene	mg/kg	360	3.3	0.1	(ii)
TPH C ₅ -C ₆	mg/kg	160	<0.1	<0.1	(iii)
TPH C ₆ -C ₈	mg/kg	530	<0.1	<0.1	(iii)
TPH C ₈ -C ₁₀	mg/kg	150	<0.1	<0.1	(iii)
TPH C ₁₀ -C ₁₂	mg/kg	380	⁽¹³⁾ <10	⁽¹³⁾ <1	(iii)
TPH C ₁₂ -C ₁₆	mg/kg	660	⁽¹³⁾ <10	⁽¹³⁾ 4	(iii)
TPH C ₁₆ -C ₂₁	mg/kg	930	⁽¹³⁾ <10	⁽¹³⁾ 28	(iii)
TPH C ₂₁ -C ₃₅	mg/kg	1,700	⁽¹³⁾ 28	⁽¹³⁾ 250	(iii)
TPH C ₃₅ -C ₄₄	mg/kg	1,700	⁽¹³⁾ <10	⁽¹³⁾ 30	(iii)
Screening Value Source					
(i) LQM/CIEH Suitable For Use Level (S4UL) (2015);					
(ii) S4UL –Assessment Approach of 6% SOM;					
(iii) S4UL –6% SOM and assumed worst case aliphatic / aromatic compound;					
(iv) Defra Category 4 Screening Level (2014);					
(v) CLEA v1.06 Derived Value.					
⁽¹³⁾ Results have been blank corrected.					



SOIL CHEMICAL ANALYSIS

Concept Life Sciences

Certificate of Analysis

Hadfield House
Hadfield Street
Cornbrook
Manchester
M16 9FE
Tel : 0161 874 2400
Fax : 0161 874 2468

Report Number: 839667-1

Date of Report: 16-Aug-2019

Customer: Resource Environmental Consultants Ltd
Osprey House
Pacific Quay
Broadway
Salford
M50 2UE

Customer Contact: Mr Martin Lucass

Customer Job Reference: 103358

Customer Purchase Order: 7343

Customer Site Reference: Scotchbarn Ln

Date Job Received at Concept: 09-Aug-2019

Date Analysis Started: 12-Aug-2019

Date Analysis Completed: 16-Aug-2019

The results reported relate to samples received in the laboratory and may not be representative of a whole batch.

Customers are responsible for information provided where, if incorrect, it could affect the validity of the results.

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

This report should not be reproduced except in full without the written approval of the laboratory

Tests covered by this certificate were conducted in accordance with Concept Life Sciences SOPs

All results have been reviewed in accordance with QMSection 15 of the Concept Life Sciences, Analytical Services Quality Manual



Report checked
and authorised by :
Toni Morris
Customer Service Advisor

Issued by :
Toni Morris
Customer Service Advisor



Concept Reference: 839667								
Project Site: Scotchbarn Ln								
Customer Reference: 103358								
Soil			Analysed as Soil					
MCERTS Preparation								
Concept Reference				839667 001	839667 002	839667 003	839667 004	
Customer Sample Reference				PLOT 59	PLOT 59	PLOT 57	PLOT 57	
Depth				0.4	0.1	0.3	0.1	
Date Sampled				09-AUG-2019	09-AUG-2019	09-AUG-2019	09-AUG-2019	
Matrix Class				Topsoil	Topsoil	Topsoil	Topsoil	
Determinand	Method	Test Sample	LOD	Units				
Moisture @105C	T162	AR	0.1	%	18	20	16	20
Retained on 10mm sieve	T2	M40	0.1	%	<0.1	<0.1	<0.1	<0.1

Concept Reference: 839667								
Project Site: Scotchbarn Ln								
Customer Reference: 103358								
Soil					Analysed as Soil			
REC South Soil Suite								
Concept Reference					839667 001	839667 002	839667 003	839667 004
Customer Sample Reference					PLOT 59	PLOT 59	PLOT 57	PLOT 57
Depth					0.4	0.1	0.3	0.1
Date Sampled					09-AUG-2019	09-AUG-2019	09-AUG-2019	09-AUG-2019
Matrix Class					Topsoil	Topsoil	Topsoil	Topsoil
Determinand	Method	Test Sample	LOD	Units				
Antimony	T6	A40	1	mg/kg	3	1	2	1
Arsenic	T6	M40	2	mg/kg	15	8	12	8
Barium	T6	A40	1	mg/kg	110	48	100	49
Beryllium	T6	A40	2	mg/kg	<2	<2	<2	<2
Boron (water-soluble)	T6	A40	1	mg/kg	<1	<1	<1	<1
Cadmium	T6	M40	1	mg/kg	2	<1	1	<1
Chromium	T6	M40	1	mg/kg	27	9	20	9
Chromium VI	T6	A40	1	mg/kg	<1	<1	<1	<1
Copper	T6	M40	1	mg/kg	110	29	67	30
Lead	T6	M40	1	mg/kg	110	54	73	58
Mercury	T6	M40	1	mg/kg	<1	<1	<1	<1
Nickel	T6	M40	1	mg/kg	21	10	25	10
Selenium	T6	M40	3	mg/kg	<3	<3	<3	<3
Vanadium	T6	M40	1	mg/kg	26	11	22	11
Zinc	T6	M40	1	mg/kg	110	40	78	42
Asbestos ID	T27	A40			N.D.	N.D.	N.D.	N.D.
pH	T7	A40			7.6	7.2	7.7	7.0
Soil Organic Matter	T287	A40	0.1	%	7.7	6.9	5.8	6.8
(Water Soluble) SO4 expressed as SO4	T242	A40	0.05	g/l	<0.05	<0.05	0.07	<0.05
SO4(Total)	T102	A40	0.01	%	0.07	0.05	0.07	0.05
Cyanide(Total)	T921	M105	1	mg/kg	<1	<1	<1	<1
Phenols(Mono)	T921	M105	1	mg/kg	<1	<1	<1	<1
Moisture @40C	T277	AR	0.1	%	18	19	12	17

Concept Reference: 839667 Project Site: Scotchbarn Ln Customer Reference: 103358									
Soil		Analysed as Soil							
TPH C5-C40 Banded									
Concept Reference					839667 001	839667 002	839667 003	839667 004	
Customer Sample Reference					PLOT 59	PLOT 59	PLOT 57	PLOT 57	
Depth					0.4	0.1	0.3	0.1	
Date Sampled					09-AUG-2019	09-AUG-2019	09-AUG-2019	09-AUG-2019	
Matrix Class					Topsoil	Topsoil	Topsoil	Topsoil	
Determinand	Method	Test Sample	LOD	Units					
TPH (C5-C6)	T54	AR	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	
TPH (C6-C8)	T54	AR	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	
TPH (C8-C10)	T54	AR	0.10	mg/kg	<0.10	<0.10	<0.10	<0.10	
TPH (C10-C12)	T206	M105	1	mg/kg	<10 ^(100,13)	<1 ⁽¹³⁾	<10 ^(13,100)	<1 ⁽¹³⁾	
TPH (C12-C16)	T206	M105	1	mg/kg	<10 ^(13,100)	<1 ⁽¹³⁾	<10 ^(13,100)	<1 ⁽¹³⁾	
TPH (C16-C21)	T206	M105	1	mg/kg	<10 ^(13,100)	2 ⁽¹³⁾	<10 ^(100,13)	2 ⁽¹³⁾	
TPH (C21-C35)	T206	M105	1	mg/kg	28 ⁽¹³⁾	18 ⁽¹³⁾	<10 ^(100,13)	8 ⁽¹³⁾	
TPH (C35-C40)	T8	M105	1	mg/kg	<10 ^(13,100)	4 ⁽¹³⁾	<10 ^(100,13)	2 ⁽¹³⁾	
TPH C5-C40 (sum)	T85	M105	10	mg/kg	28 ⁽¹³⁾	24 ⁽¹³⁾	<10 ⁽¹³⁾	12 ⁽¹³⁾	

Concept Reference: 839667 Project Site: Scotchbarn Ln Customer Reference: 103358								
Soil					Analysed as Soil			
Total and Speciated USEPA16 PAH								
Concept Reference					839667 001	839667 002	839667 003	839667 004
Customer Sample Reference					PLOT 59	PLOT 59	PLOT 57	PLOT 57
Depth					0.4	0.1	0.3	0.1
Date Sampled					09-AUG-2019	09-AUG-2019	09-AUG-2019	09-AUG-2019
Matrix Class					Topsoil	Topsoil	Topsoil	Topsoil
Determinand	Method	Test Sample	LOD	Units				
Naphthalene	T207	M105	0.1	mg/kg	0.2	<0.1	<0.1	<0.1
Acenaphthylene	T207	M105	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1
Acenaphthene	T207	M105	0.1	mg/kg	2.1	<0.1	<0.1	<0.1
Fluorene	T207	M105	0.1	mg/kg	1.5	<0.1	<0.1	<0.1
Phenanthrene	T207	M105	0.1	mg/kg	21	0.9	0.4	0.3
Anthracene	T207	M105	0.1	mg/kg	2.7	0.2	<0.1	<0.1
Fluoranthene	T207	M105	0.1	mg/kg	16	1.1	0.7	0.5
Pyrene	T207	M105	0.1	mg/kg	14	1.0	0.7	0.5
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	4.5	0.3	0.2	0.2
Chrysene	T207	M105	0.1	mg/kg	5.8	0.4	0.3	0.2
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	4.3	0.3	0.2	0.1
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	3.4 ⁽⁶⁸⁾	0.3 ⁽⁶⁸⁾	0.2 ⁽⁶⁸⁾	0.1 ⁽⁶⁸⁾
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	4.5	0.3	0.3	0.2
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	2.6	0.2	0.2	0.1
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	1.1	<0.1	<0.1	<0.1
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	3.3	0.2	0.2	0.1
PAH(total)	T207	M105	0.1	mg/kg	86	5.2	3.7	2.5

Index to symbols used in 839667-1

Value	Description
AR	As Received
A40	Assisted dried < 40C
M40	Analysis conducted on sample assisted dried at no more than 40C. Results are reported on a dry weight basis.
M105	Analysis conducted on an "as received" aliquot. Results are reported on a dry weight basis where moisture content was determined by assisted drying of sample at 105C
N.D.	Not Detected
13	Results have been blank corrected.
68	Outside scope of UKAS accreditation
100	LOD determined by sample aliquot used for analysis
S	Analysis was subcontracted

M	Analysis is MCERTS accredited
U	Analysis is UKAS accredited
N	Analysis is not UKAS accredited

Notes

Asbestos testing was subcontracted to REC Asbestos.
PAHs were analysed at our Braintree laboratory.

Method Index

Value	Description
T2	Grav
T162	Grav (1 Dec) (105 C)
T242	2:1 Extraction/ICP/OES (TRL 447 T1)
T206	GC/FID (MCERTS)
T207	GC/MS (MCERTS)
T8	GC/FID
T27	PLM
T287	Calc TOC/0.58
T7	Probe
T921	Colorimetry (CF) (MCERT)
T102	ICP/OES (HCl extract)
T277	Grav (1 Dec) (40 C)
T6	ICP/OES
T54	GC/MS (Headspace)
T85	Calc

Accreditation Summary

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Antimony	T6	A40	1	mg/kg	U	001-004
Arsenic	T6	M40	2	mg/kg	M	001-004
Barium	T6	A40	1	mg/kg	U	001-004
Beryllium	T6	A40	2	mg/kg	U	001-004
Boron (water-soluble)	T6	A40	1	mg/kg	N	001-004
Cadmium	T6	M40	1	mg/kg	M	001-004
Chromium	T6	M40	1	mg/kg	M	001-004
Chromium VI	T6	A40	1	mg/kg	N	001-004
Copper	T6	M40	1	mg/kg	M	001-004
Lead	T6	M40	1	mg/kg	M	001-004
Mercury	T6	M40	1	mg/kg	M	001-004
Nickel	T6	M40	1	mg/kg	M	001-004
Selenium	T6	M40	3	mg/kg	M	001-004
Vanadium	T6	M40	1	mg/kg	M	001-004
Zinc	T6	M40	1	mg/kg	M	001-004
Asbestos ID	T27	A40			SU	001-004
pH	T7	A40			M	001-004
Soil Organic Matter	T287	A40	0.1	%	N	001-004
(Water Soluble) SO4 expressed as SO4	T242	A40	0.05	g/l	M	001-004
SO4(Total)	T102	A40	0.01	%	M	001-004
Cyanide(Total)	T921	M105	1	mg/kg	M	001-004
Phenols(Mono)	T921	M105	1	mg/kg	M	001-004
Moisture @40C	T277	AR	0.1	%	N	001-004
TPH (C5-C6)	T54	AR	0.10	mg/kg	N	001-004
TPH (C6-C8)	T54	AR	0.10	mg/kg	N	001-004
TPH (C8-C10)	T54	AR	0.10	mg/kg	N	001-004
TPH (C10-C12)	T206	M105	1	mg/kg	M	001-004
TPH (C12-C16)	T206	M105	1	mg/kg	M	001-004
TPH (C16-C21)	T206	M105	1	mg/kg	M	001-004
TPH (C21-C35)	T206	M105	1	mg/kg	M	001-004
TPH (C35-C40)	T8	M105	1	mg/kg	N	001-004
TPH C5-C40 (sum)	T85	M105	10	mg/kg	N	001-004
Naphthalene	T207	M105	0.1	mg/kg	M	001-004
Acenaphthylene	T207	M105	0.1	mg/kg	U	001-004
Acenaphthene	T207	M105	0.1	mg/kg	M	001-004
Fluorene	T207	M105	0.1	mg/kg	M	001-004
Phenanthrene	T207	M105	0.1	mg/kg	M	001-004

Determinand	Method	Test Sample	LOD	Units	Symbol	Concept References
Anthracene	T207	M105	0.1	mg/kg	U	001-004
Fluoranthene	T207	M105	0.1	mg/kg	M	001-004
Pyrene	T207	M105	0.1	mg/kg	M	001-004
Benzo(a)Anthracene	T207	M105	0.1	mg/kg	M	001-004
Chrysene	T207	M105	0.1	mg/kg	M	001-004
Benzo(b)fluoranthene	T207	M105	0.1	mg/kg	M	001-004
Benzo(k)fluoranthene	T207	M105	0.1	mg/kg	M	001-004
Benzo(a)Pyrene	T207	M105	0.1	mg/kg	M	001-004
Indeno(123-cd)Pyrene	T207	M105	0.1	mg/kg	M	001-004
Dibenzo(ah)Anthracene	T207	M105	0.1	mg/kg	M	001-004
Benzo(ghi)Perylene	T207	M105	0.1	mg/kg	M	001-004
PAH(total)	T207	M105	0.1	mg/kg	U	001-004
Moisture @105C	T162	AR	0.1	%	N	001-004
Retained on 10mm sieve	T2	M40	0.1	%	N	001-004



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

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

Dear John,

Garden Validation – Scotchbarn Lane, Knowsley – Plots 48, 49 and 60

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	1 per 50 m ³
Soft Landscaping	1 per 250m ³	1 per 150 m ³	1 per 150 m ³	1 per 150 m ³
Other Fill Materials	1 per 250m ³	1 per 250m ³	1 per 250m ³	1 per 250m ³



Validation Works Completed

Table 2 summarises plots validated.

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

Table 3 summarises approximate volumes of soil validated to date within the rear gardens.

Table 3: Approximate total soil volumes of rear gardens

Material	Volume (m ³)
Topsoil	2,300
Subsoil	6,900

Validation Visit – 11th September 2019

REC attended site on 11th September 2019 to confirm the correct thickness of topsoil and subsoil has been used in the rear gardens of properties in Plots 48, 49 and 60 and to collect samples for laboratory analysis.

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

REC's independent inspection shows that the required 600mm of clean cover is present within the rear gardens of Plots 48, 49 and 60.

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 4 (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

REC visited site on the 17th- 19th May 2016 and 15th March 2017 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 imported from the Bellway Homes site Lathom Pastures located on Firwood Road, Lathom, Skelmersdale WN8 8UP. One sample of topsoil and one sample of subsoil were tested at a frequency of 1 per 50m³ within Plots 48, 49 and 60. Laboratory analysis indicates failings in sample obtained from topsoil materials in plot 59. Further testing is to be undertaken to confirm this result. Laboratory test certificates are attached to this report.

Summary

REC can confirm that the topsoil and subsoil installed in the rear gardens of Plots 48, 49 and 60 meet the specified requirements as a suitable growing medium and is suitable for its intended use.

Yours Sincerely,

For and on behalf of REC Ltd

Matthew Dee
Consultant

Approved and Authorised

Martin Lucass
Associate Director

Enclosed:

Location Plan of Validated Plots

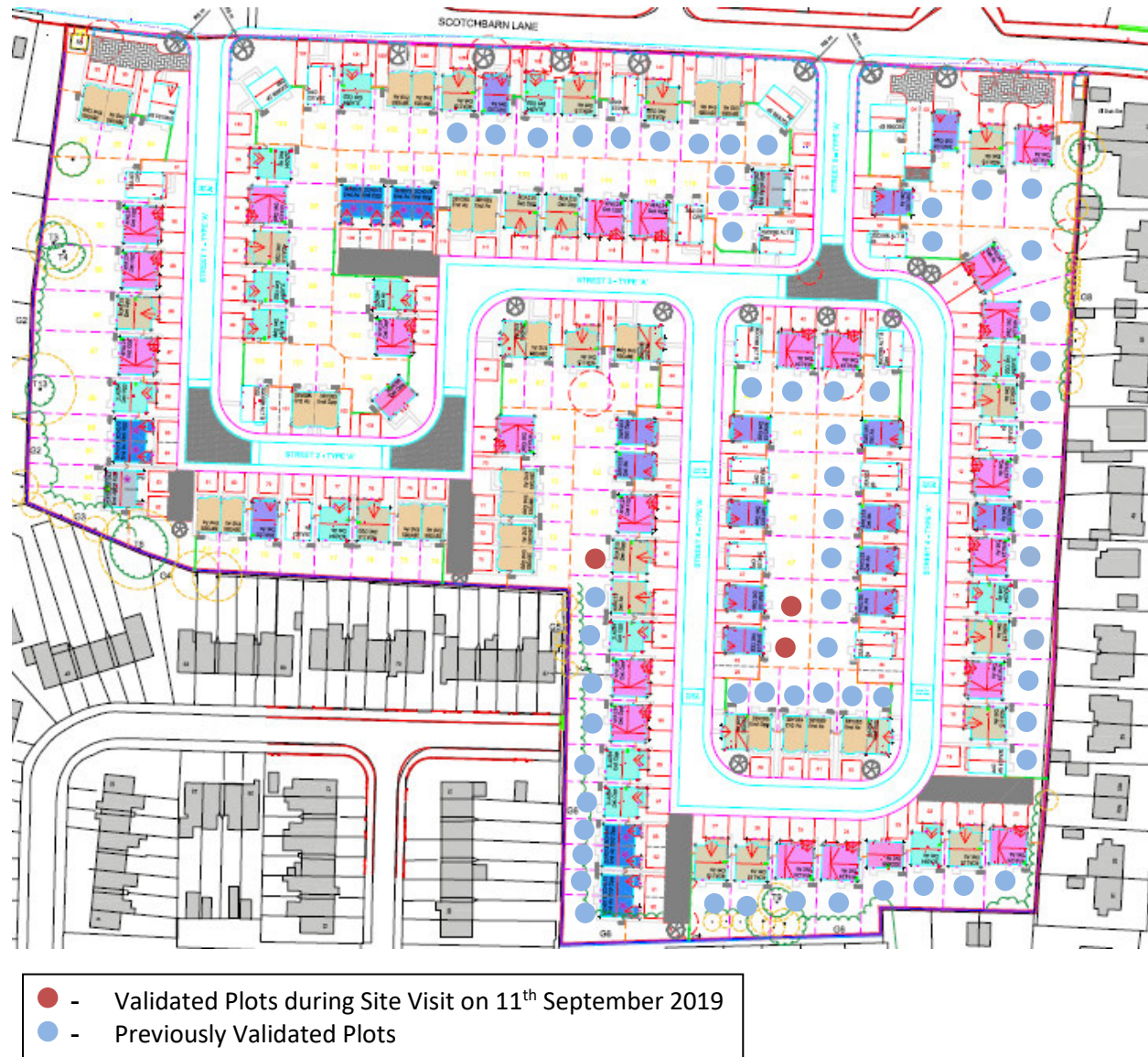
Plot Inspection Records (including photographs and description)

Table 4: Screening Values for Materials within Residential Soft Landscaping Areas

Chemical Analysis Certificates



Figure 1: Sketch Plot Validation Pit Location





PLOT INSPECTION RECORDS



PLOT NUMBER: 48

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 11/09/2019
Consultant: M. Dee

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

Validation Photograph	Locational Photograph
	

Additional Comments:
Samples taken at 0.20 and 0.50 mbgl

GARDEN VALIDATION: PASS

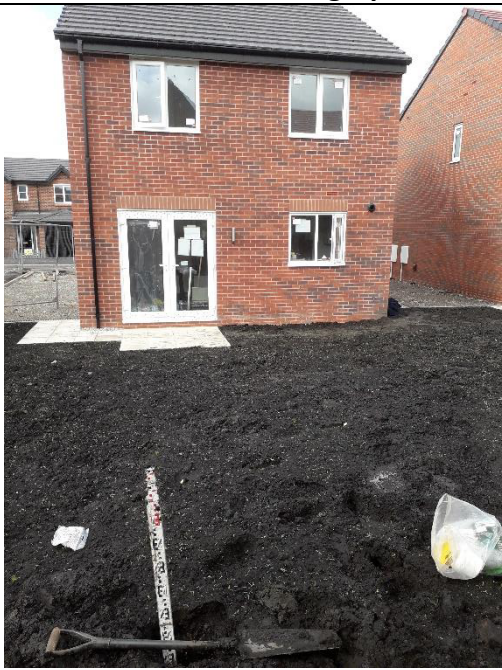


PLOT NUMBER: 49

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 11/09/2019
Consultant: M. Dee

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	300 mm bgl
Subsoil	> 450mm bgl	Subsoil	>300 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: 60

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 11/09/2019
Consultant: M. Dee

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	300 mm bgl
Subsoil	> 450mm bgl	Subsoil	>300 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 4: 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	<1	1.2	(i)
Cadmium	mg/kg	11	<0.2	<0.2	(i)
Chromium VI	mg/kg	6	<1.2	<1.2	(i)
Lead	mg/kg	200	9.3	15	(iv)
Inorganic Mercury	mg/kg	40	<0.3	<0.3	(i)
Nickel	mg/kg	130	4.3	20	(i)
Selenium	mg/kg	250	<1	<1	(i)
Copper	mg/kg	2,400	4.2	17	(i)
Zinc	mg/kg	3,700	22	33	(i)
Cyanide	mg/kg	3.4	<1	<1	(v)
Asbestos	%	Not Detected	Not Detected	Not Detected	N/A
Phenol	mg/kg	550	<1	<1	(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	0.47	<0.05	(ii)
Anthracene	mg/kg	2,400	<0.05	<0.05	(ii)
Fluoranthene	mg/kg	280	0.94	<0.05	(ii)
Pyrene	mg/kg	1200	0.87	<0.05	(ii)
Benzo(a)Anthracene	mg/kg	2.7	0.4	<0.05	(ii)
Chrysene	mg/kg	22	0.42	<0.05	(ii)
Benzo(b)Fluoranthene	mg/kg	3.3	0.45	<0.05	(ii)
Benzo(k)Fluoranthene	mg/kg	93	0.21	<0.05	(ii)
Benzo(a)Pyrene	mg/kg	2.7	0.35	<0.05	(ii)
Indeno(123-cd)Pyrene	mg/kg	36	0.19	<0.05	(ii)
Dibenzo(a,h)Anthracene	mg/kg	0.28	<0.05	<0.05	(ii)
Benzo(ghi)Perylene	mg/kg	340	0.28	<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	<1	(iii)
TPH C ₁₂ -C ₁₆	mg/kg	330	<2	<2	(iii)
TPH C ₁₆ -C ₂₁	mg/kg	540	<8	<8	(iii)
TPH C ₂₁ -C ₃₅	mg/kg	1,500	<8	<8	(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

**Philip Hill**

Resource Environmental Consultants Ltd
Osprey House
Pacific Quay
Broadway
Manchester
M50 2UE

e: phill@rectld.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 : 19-59473

Project / Site name:	Scotchbarn Lane	Samples received on:	12/09/2019
Your job number:	103358	Samples instructed on:	12/09/2019
Your order number:		Analysis completed by:	19/09/2019
Report Issue Number:	1	Report issued on:	19/09/2019
Samples Analysed:	2 soil samples		

Signed:

Zina Abdul Razzak
Senior Quality Specialist
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 19-59473-1 Scotchbarn Lane 103358

Analytical Report Number: 19-59473

Project / Site name: Scotchbarn Lane

Lab Sample Number				1315405	1315406			
Sample Reference				Plot 48 TS01	Plot 48 SS01			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.20	0.50			
Date Sampled				11/09/2019	11/09/2019			
Time Taken				1430	1500			
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	20	11			
Total mass of sample received	kg	0.001	NONE	1.3	1.2			

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7	7.6			
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Water Soluble Sulphate as SO ₄ 16hr extraction (2:1)	mg/kg	2.5	MCERTS	73	130			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.037	0.064			
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	36.7	63.7			
Organic Matter	%	0.1	MCERTS	5.4	0.5			
Fraction Organic Carbon (FOC)	N/A	0.001	MCERTS	0.031	0.0026			

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	0.47	< 0.05			
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Fluoranthene	mg/kg	0.05	MCERTS	0.94	< 0.05			
Pyrene	mg/kg	0.05	MCERTS	0.87	< 0.05			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.40	< 0.05			
Chrysene	mg/kg	0.05	MCERTS	0.42	< 0.05			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.45	< 0.05			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.21	< 0.05			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.35	< 0.05			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.19	< 0.05			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.28	< 0.05			

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	4.58	< 0.80			
-----------------------------	-------	-----	--------	------	--------	--	--	--

Heavy Metals / Metalloids

Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	< 1.0	2.0			
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	1.2			
Barium (aqua regia extractable)	mg/kg	1	MCERTS	21	90			
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.19	0.82			
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5	0.5			
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	3.1	27			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	4.2	17			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	9.3	15			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	4.3	20			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	7.0	27			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	22	33			

Analytical Report Number: 19-59473

Project / Site name: Scotchbarn Lane

Lab Sample Number				1315405	1315406			
Sample Reference				Plot 48 TS01	Plot 48 SS01			
Sample Number				None Supplied	None Supplied			
Depth (m)				0.20	0.50			
Date Sampled				11/09/2019	11/09/2019			
Time Taken				1430	1500			
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	33	< 10			
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	< 8.4	< 8.4			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	41	< 10			
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	41	< 10			



Analytical Report Number : 19-59473

Project / Site name: Scotchbarn Lane

* 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 *
1315405	Plot 48 TS01	None Supplied	0.20	Brown clay and sand with gravel and vegetation.
1315406	Plot 48 SS01	None Supplied	0.50	Brown clay and sand with gravel.

Analytical Report Number : 19-59473

Project / Site name: Scotchbarn Lane

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	L0738-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 based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	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.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	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.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	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 based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	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 based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	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 300c.

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

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

Dear John,

**Garden Validation – Scotchbarn Lane, Knowsley – Plots 129, 130; Plots 44 to 47 &
Revalidation of Plot 59**

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	1 per 50 m ³
Soft Landscaping	1 per 250m ³	1 per 150 m ³	1 per 150 m ³	1 per 150 m ³
Other Fill Materials	1 per 250m ³	1 per 250m ³	1 per 250m ³	1 per 250m ³



Validation Works Completed

Table 2 summarises plots validated.

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

Table 3 summarises approximate volumes of soil validated to date within the rear gardens.

Table 3: Approximate total soil volumes of rear gardens

Material	Volume (m ³)
Topsoil	2,300
Subsoil	6,900

Validation Visit – 25th September 2019

REC attended site on 25th September 2019 to confirm the correct thickness of topsoil and subsoil has been used in the rear gardens of properties in Plots 129, 130 and Plots 44 to 47 and to collect samples for laboratory analysis. During the site visit an additional 3no samples were taken from Plot 59 to revalidate this plot from earlier exceedances recorded in report 15v103358.

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

REC's independent inspection shows that the required 600mm of clean cover is present within the rear gardens of Plots 129, 130 and Plots 44 to 47.

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 4 (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

REC visited site on the 17th- 19th May 2016 and 15th March 2017 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 129, 130 and Plots 44 to 47. Laboratory analysis confirms its suitability for use within the gardens (Table 4). Laboratory test certificates are attached to this report.

Revalidation of Plot 59

The validation visit on 9th August 2019 (report 15v103358) identified exceedances in Benzo(b)Fluoranthene, Benzo(a)Pyrene and Dibenzo(a,h)Anthracene within the placed topsoil in Plot 59. As such during the validation visit on 25th September 2019 three additional shallow samples were taken across Plot 59 at varying depths and locations to determine the suitable for use within gardens. No exceedances were recorded within the additional samples. The geometric mean was calculated for each determinant exceeded (Table 5); all geometric means were calculated as below the required screening value. On review of the larger data set the previous exceedances recorded within report 15v103358 is not considered representative of the topsoil within Plot 59 and instead represents an isolated hotspot of contamination. Laboratory test certificates are attached to this report.

Summary

REC can confirm that the topsoil and subsoil installed in the rear gardens of Plots 129, 130 and Plots 44 to 47 meet the specified requirements as a suitable growing medium and is suitable for its intended use.

On review of a larger data set REC can confirm that the topsoil installed in the rear gardens of Plot 59 meets the specified requirements as a suitable growing medium and is suitable for its intended use.

Yours Sincerely,

For and on behalf of REC Ltd

Matthew Dee
Consultant

Approved and Authorised

Martin Lucass
Associate Director

Enclosed:

Location Plan of Validated Plots

Plot Inspection Records (including photographs and description)

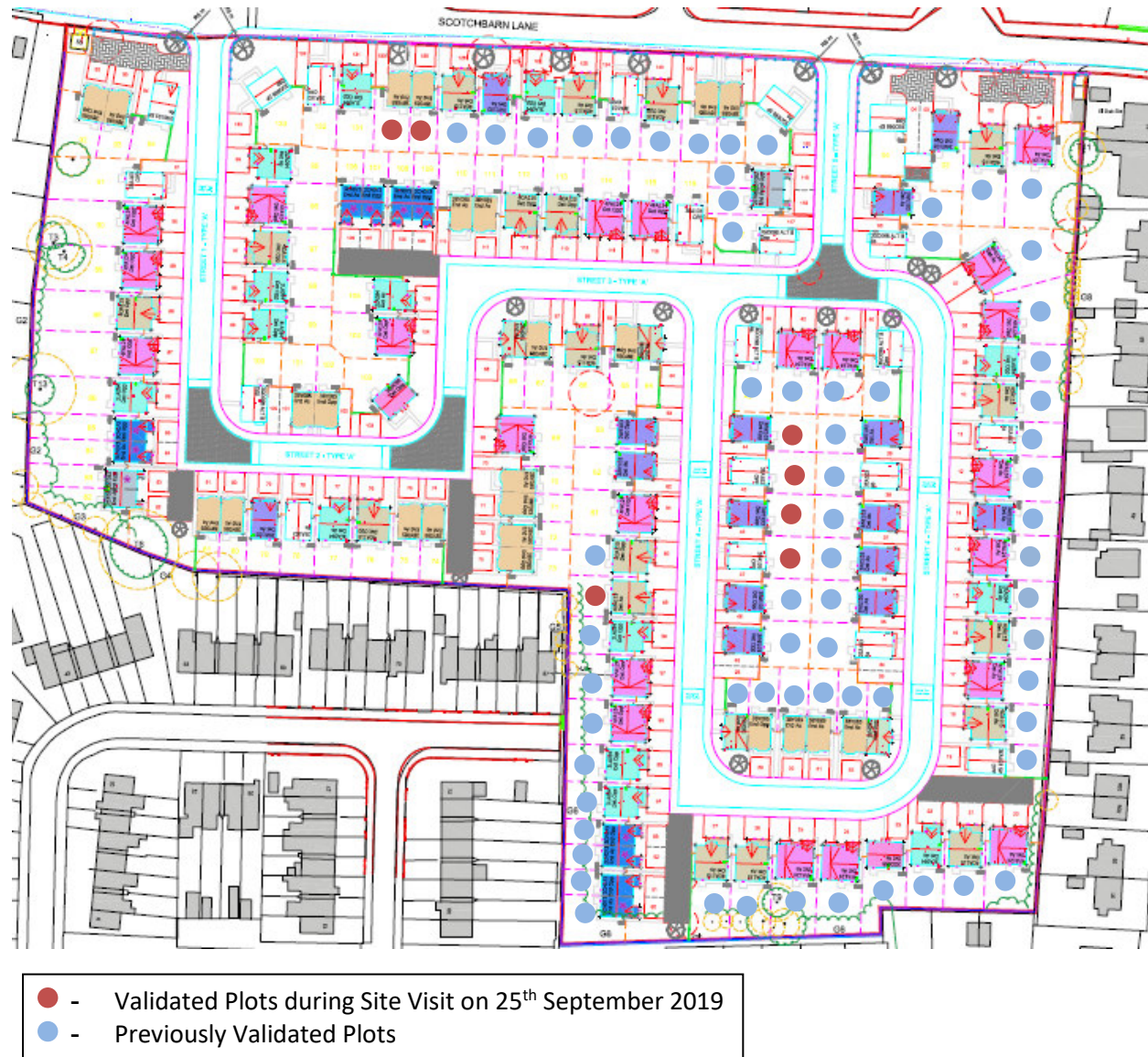
Table 4: Screening Values for Materials within Residential Soft Landscaping Areas

Table 5: Plot 59 exceedance summary

Chemical Analysis Certificates



Figure 1: Sketch Plot Validation Pit Location





PLOT INSPECTION RECORDS



PLOT NUMBER: 44

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 25/09/2019
Consultant: M. Dee

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	500 mm bgl
Subsoil	> 450mm bgl	Subsoil	>100 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:
Samples taken at 0.20 and 0.40 mbgl

GARDEN VALIDATION: PASS



PLOT NUMBER: 45

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 25/09/2019
Consultant: M. Dee

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	500 mm bgl
Subsoil	> 450mm bgl	Subsoil	>100 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: 46

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 25/09/2019
Consultant: M. Dee

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

Validation Photograph	Locational Photograph
	

Additional Comments:
Samples taken at 0.20 and 0.40 mbgl

GARDEN VALIDATION: PASS



PLOT NUMBER: 47

Developer: Bellway Homes
Pit Location: Rear Garden

Date: 25/09/2019
Consultant: M. Dee

Capping Requirements	Total Depth	Capping Observed	Total Depth
Topsoil	> 150 mm bgl	Topsoil	500 mm bgl
Subsoil	> 450mm bgl	Subsoil	>100 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