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Ref: 14-000-V1
Date: 24th March 2020

Ben Walton
Gleeson Homes
Sandringham House
Hollinsbrook Park
Little 66 (off Roach Bank Road)
Bury
BL9 8RN

BY Email

Dear Ben,

GARDEN VALIDATION BALDERSTONE ROAD, ROCHDALE

An E3P engineer attended the above site to validate the thickness of the cover system that had been placed within the rear garden of plots 83-85 & 91 of Balderstone road, Rochdale.

In total four hand excavated trial pits were advanced with the resulting strata detailed to the rear of this letter. All trial pits were completed to highlight the required cover system of 600mm (150mm topsoil and 450mm subsoil).

E3P can confirm that our independent validation demonstrates that all gardens have been installed with 150mm of certified topsoil and at least 450mm subsoil in accordance with the NHBC requirements for a site of this nature.

TOPSOIL

E3P attended site on 12th March 2020 to obtain three samples of the stockpiled topsoil deposits which were analysed in accordance with the E3P Remediation Strategy. Chemical analysis confirmed that these topsoil deposits were chemically suitable for use within the proposed garden areas.

Chemical analysis results are included within lab report 20-92854 (attached to this letter).

SUBSOIL

E3P attended site on 12th March 2020 to obtain three samples of the stockpiled subsoil deposits which were analysed in accordance with the E3P Remediation Strategy. Chemical analysis confirmed that these subsoil deposits were chemically suitable for use within the proposed garden areas.

Chemical analysis results are included within lab report 20-92854 (attached to this letter).



Cover system validation photographs are enclosed within this letter.

I trust this information is satisfactory to your requirements, and should I be able to be of any further assistance, please do not hesitate to contact me.

Yours sincerely,

For and on behalf of E3P Ltd



Alex Smith
Principal Geo-Environemntal Consultant



Site: Balderstone Road, Rochdale

Date: 09-03-2020

Project Number: 14-000

Project Manager: A. Smith

E3P Engineer: T. Preston

Plot Numbers Validated: 83-85 & 91

Chemical Laboratory Analysis

Analysis for topsoil and subsoil undertaken by I2 Analytical Laboratory using UKAS accredited methods where applicable.

Chemical analysis suite comprises heavy metals, sulphates, phenols, speciated Polycyclic Aromatic Hydrocarbons (PAHs), speciated and total Petroleum Hydrocarbons (TPH) and asbestos.

Sampling frequency in accordance with the agreed Remediation Strategy. Laboratory analysis certificates attached to this validation certificate.

	Topsoil	Subsoil
<i>Chemical analysis confirmed materials suitable?</i>	Pass	Pass
<i>Further Comments</i>	N/A	N/A



Plot No: 83

Depth of Strata (m bgl)	0.15	Validated TOPSOIL
	0.45	Validated SUBSOIL

Depth of Cover System Materials



Depth of Cover System Materials



Depth of Cover System at Ground Level



Depth of Cover System in Relation to Plot



Plot No: 84

Depth of Strata (m bgl)	0.15	Validated TOPSOIL
	0.45	Validated SUBSOIL

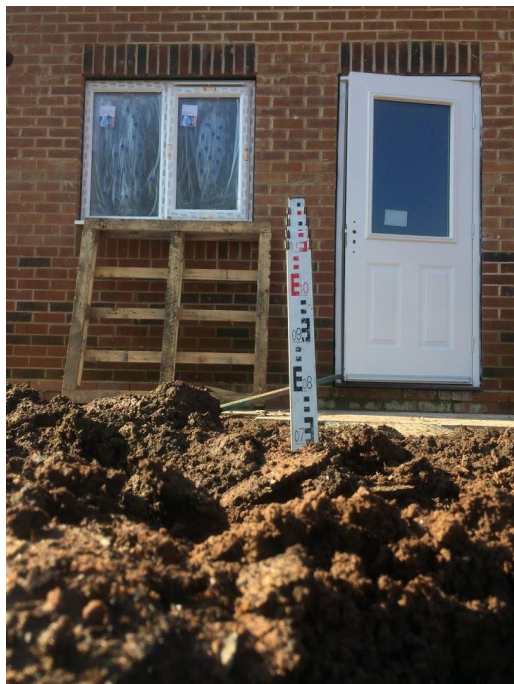
Depth of Cover System Materials



Depth of Cover System Materials



Depth of Cover System at Ground Level



Depth of Cover System in Relation to Plot



Plot No: 85

Depth of Strata (m bgl)	0.15	Validated TOPSOIL
	0.45	Validated SUBSOIL

Depth of Cover System Materials



Depth of Cover System Materials



Depth of Cover System at Ground Level



Depth of Cover System in Relation to Plot



Plot No: 91

Depth of Strata (m bgl)	0.15	Validated TOPSOIL
	0.45	Validated SUBSOIL

Depth of Cover System Materials



Depth of Cover System Materials



Depth of Cover System at Ground Level



Depth of Cover System in Relation to Plot



**Alex Smith**

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Analytical Report Number : 20-92854

Project / Site name:	Balderstones	Samples received on:	12/03/2020
Your job number:	14-000	Samples instructed on:	16/03/2020
Your order number:		Analysis completed by:	23/03/2020
Report Issue Number:	1	Report issued on:	23/03/2020
Samples Analysed:	6 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 20-92854-1 Balderstones 14-000.XLS

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

The results included within the report are representative of the samples submitted for analysis.

Page 1 of 7

Analytical Report Number: 20-92854

Project / Site name: Balderstones

Lab Sample Number	1473701	1473702	1473703	1473704	1473705
Sample Reference	SS101	SS102	SS103	TS101	TS102
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled	10/03/2020	10/03/2020	10/03/2020	10/03/2020	10/03/2020
Time Taken	None Supplied	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
Moisture Content	%	N/A	NONE	24	33
Total mass of sample received	kg	0.001	NONE	0.56	0.50

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

pH - Automated	pH Units	N/A	MCERTS	8.6	8.2	8.1	8.6	8.5
Total Sulphate as SO ₄	mg/kg	50	MCERTS	560	620	510	280	340
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.18	0.18	0.099	0.050	0.060

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	0.23	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	0.23	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.67	2.3	0.72	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	0.14	0.53	0.20	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	1.0	3.7	1.3	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	0.92	3.2	1.1	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.55	2.1	0.79	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	0.61	1.9	0.73	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	0.46	2.0	0.71	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.37	1.2	0.39	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.50	1.7	0.68	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.23	0.89	0.31	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.26	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.25	0.99	0.34	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	5.70	21.1	7.28	< 0.80	< 0.80
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.6	7.8	6.9	2.5	2.6
Boron (water soluble)	mg/kg	0.2	MCERTS	0.7	0.7	0.4	2.1	2.1
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	19	19	19	13	12
Copper (aqua regia extractable)	mg/kg	1	MCERTS	20	19	19	10	12
Lead (aqua regia extractable)	mg/kg	1	MCERTS	47	75	41	13	15
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	18	16	19	9.2	9.1
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	2.3	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	54	51	53	38	40

Petroleum Hydrocarbons

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	12	14	< 1.0	< 1.0	< 1.0
TPH (C21 - C35)	mg/kg	1	MCERTS	16	44	< 1.0	< 1.0	< 1.0
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	30	60	< 10	< 10	< 10



Analytical Report Number: 20-92854

Project / Site name: Balderstones

Lab Sample Number				1473701	1473702	1473703	1473704	1473705
Sample Reference				SS101	SS102	SS103	TS101	TS102
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				10/03/2020	10/03/2020	10/03/2020	10/03/2020	10/03/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)				Units	Limit of detection	Accreditation Status		

Analytical Report Number: 20-92854

Project / Site name: Balderstones

Lab Sample Number				1473706				
Sample Reference				TS103				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				10/03/2020				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	31				
Total mass of sample received	kg	0.001	NONE	0.53				

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

pH - Automated	pH Units	N/A	MCERTS	8.6				
Total Sulphate as SO ₄	mg/kg	50	MCERTS	270				
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.041				

Speciated PAHs

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

Total PAH

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

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	2.4				
Boron (water soluble)	mg/kg	0.2	MCERTS	2.2				
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2				
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	14				
Copper (aqua regia extractable)	mg/kg	1	MCERTS	12				
Lead (aqua regia extractable)	mg/kg	1	MCERTS	14				
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3				
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	10				
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0				
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	41				

Petroleum Hydrocarbons

TPH (C5 - C6)	mg/kg	1	NONE	< 1.0				
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1				
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1				
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0				
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0				
TPH (C16 - C21)	mg/kg	1	MCERTS	< 1.0				
TPH (C21 - C35)	mg/kg	1	MCERTS	< 1.0				
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10				
TPH Total C5 - C40	mg/kg	10	MCERTS	< 10				



Analytical Report Number: 20-92854

Project / Site name: Balderstones

Lab Sample Number				1473706				
Sample Reference				TS103				
Sample Number				None Supplied				
Depth (m)				None Supplied				
Date Sampled				10/03/2020				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					



Analytical Report Number : 20-92854

Project / Site name: Balderstones

* 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 *
1473701	SS101	None Supplied	None Supplied	Grey clay and sand with gravel.
1473702	SS102	None Supplied	None Supplied	Brown clay and sand with gravel.
1473703	SS103	None Supplied	None Supplied	Brown clay and sand with gravel.
1473704	TS101	None Supplied	None Supplied	Brown clay and sand with gravel.
1473705	TS102	None Supplied	None Supplied	Brown clay and sand with gravel.
1473706	TS103	None Supplied	None Supplied	Brown clay and sand with gravel.

Analytical Report Number : 20-92854

Project / Site name: Balderstones

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
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
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 sulphate (as SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	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	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.