

GARDEN VALIDATION – ROYLE ROAD

Project Name: Royle Road

Project Number: 11-778

Client: Countryside Partnerships

Date: 07-03-2023

Project Manager: A. Garrity

E3P Engineer: H. Mason

Garden Validation Requirements: 600mm cover system (without break layer)

Plots: 202-204, 206-209, 211, & 214-216

OVERVIEW

An E3P engineer attended the above site to validate the thickness of the cover system placed within the rear garden of plots 202-204, 206-209, 211, & 214-216 at Royal Road, Rochdale.

11 No. Hand-excavated trial pits were advanced, with the resulting strata detailed at 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 under the NHBC requirements for a site of this nature.



Geo-Environmental



Acoustics



Remediation and
Enabling Earthworks
Design



Arboriculture



Compliance
& Due Diligence



Ecology



Industrial Permitting



Geotechnical

TOPSOIL

E3P attended the site on 15th February 2023 to obtain three samples of the stockpiled topsoil deposits which were analysed in accordance the E3P Remediation Strategy. Chemical analysis confirmed that these topsoil deposits were chemically suitable for use within the proposed garden areas.

The topsoil has been imported from Summerhill Farm, Maghull, and a total volume of 243m³ is required for plots 260-222. Therefore, a total of 3 samples are necessary for these plots.

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

The chemical analysis suite comprises heavy metals, sulphates, phenols, speciated Polycyclic Aromatic Hydrocarbons (PAHs), speciated and total Petroleum Hydrocarbons (TPH) and asbestos. Sampling frequency following the agreed Remediation Strategy. Laboratory analysis certificates are attached to this validation certificate.

Chemical analysis results are included within lab report 23-18183 (attached to this letter).

SUBSOIL

E3P attended the site on 14th February 2023 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.

The subsoil has been imported from Marchington Stone Quarry, Glossop and a total volume of 792m³ is required for plots 206-222. Therefore, a total of 3 of samples are needed for these plots.

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

The chemical analysis suite comprises heavy metals, sulphates, phenols, speciated Polycyclic Aromatic Hydrocarbons (PAHs), speciated and total Petroleum Hydrocarbons (TPH) and asbestos. Sampling frequency following the agreed Remediation Strategy. Laboratory analysis certificates are attached to this validation certificate.

Chemical analysis results are included within lab report 23-18179 (attached to this letter).

CHEMICAL ANALYSIS

TOPSOIL/SUBSOIL	SOURCE	LAB REFERENCE	SAMPLE REFERENCE	PASS/FAIL
Topsoil	off-site	23-18183	TS101- TS103	Pass
Subsoil	off-site	23-18179	SS101- SS103	Pass

The cover system validation photographs are enclosed within this letter.

Garden Cover System Validation

		Complete
Score	100%	
Site Name	Royle Barn Road	
Location	6 Royle Road Rochdale England OL11 3ET United Kingdom (53.60110074671334, - 2.173604628228475)	
Project Number	11778	
Project Manager	AG	
Conducted By	Grads and consultants E3P	
Date of visit	7 Mar 2023 10:47 AM GMT	

Plot Validation - 100%	100%
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Plot Validation - 100%	100%
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Plot Validation 1 - 100%	100%
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Plot Number	216
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Is Plot Ready	Yes
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Installation Standard	Pass
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Depth of Cover System Materials (record the depth and support with Photo down the hole)	600
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Photo 1

Depth of Topsoil (mm)	150
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Photo 2

Depth of Subsoil (mm)	450
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Photo 3

Depth of Cover System at Ground Level (Photo)	☒
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Photo 4

Depth of Cover System in Relation to Plot (Ensure the whole plot can be seen in the photo)



Photo 5

Soil suitable	Yes
Geotextile membrane present	N/A

Plot Validation 2 - 100% 100%

Plot Number 215

Is Plot Ready Yes

Installation Standard Pass

Depth of Cover System Materials (record the depth and support with Photo down the hole) 600



Photo 6

Depth of Topsoil (mm) 150



Photo 7

Depth of Subsoil (mm) 450



Photo 8

Depth of Cover System at Ground Level (Photo) ☒



Photo 9

Depth of Cover System in Relation to Plot (Ensure the whole plot can be seen in the photo) ☒



Photo 10

Soil suitable	Yes
Geotextile membrane present	N/A

Plot Validation 3 - 100% 100%

Plot Number 214

Is Plot Ready Yes

Installation Standard Pass

Depth of Cover System Materials (record the depth and support with Photo down the hole) 600

Depth of Topsoil (mm) 150



Photo 11

Depth of Subsoil (mm) 450



Photo 12

Depth of Cover System at Ground Level (Photo) ☒



Photo 13

Depth of Cover System in Relation to Plot (Ensure the whole plot can be seen in the photo) ☒



Photo 14

Soil suitable Yes

Geotextile membrane present

N/A

Plot Validation 4 - 100% 100%

Plot Number 211

Is Plot Ready Yes

Installation Standard Pass

Depth of Cover System Materials (record the depth and support with Photo down the hole) 600



Photo 15

Depth of Topsoil (mm) 150



Photo 16

Depth of Subsoil (mm) 450



Photo 17

Depth of Cover System at Ground Level (Photo) ☒



Photo 18

Depth of Cover System in Relation to Plot (Ensure the whole plot can be seen in the photo) ☒



Photo 19

Soil suitable

Yes

Geotextile membrane present

N/A

Plot Validation 5 - 100% 100%

Plot Number 209

Is Plot Ready Yes

Installation Standard Pass

Depth of Cover System Materials (record the depth and support with Photo down the hole) 600



Photo 20

Depth of Topsoil (mm) 150



Photo 21

Depth of Subsoil (mm) 450



Photo 22

Depth of Cover System at Ground Level (Photo) ☒

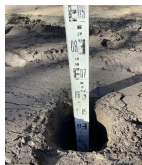


Photo 23

Depth of Cover System in Relation to Plot (Ensure the whole plot can be seen in the photo) ☒



Photo 24

Soil suitable	Yes
Geotextile membrane present	N/A

Plot Validation 6 - 100% 100%

Plot Number 208

Is Plot Ready Yes

Installation Standard Pass

Depth of Cover System Materials (record the depth and support with Photo down the hole) 600



Photo 25

Depth of Topsoil (mm) 150



Photo 26

Depth of Subsoil (mm) 450



Photo 27

Depth of Cover System at Ground Level (Photo) ☒



Photo 28

Depth of Cover System in Relation to Plot (Ensure the whole plot can be seen in the photo) ☒



Photo 29

Soil suitable	Yes
Geotextile membrane present	N/A

Plot Validation 7 - 100% 100%

Plot Number 207

Is Plot Ready Yes

Installation Standard Pass

Depth of Cover System Materials (record the depth and support with Photo down the hole) 600



Photo 30

Depth of Topsoil (mm) 150



Photo 31

Depth of Subsoil (mm) 450



Photo 32

Depth of Cover System at Ground Level (Photo) ☐



Photo 33

Depth of Cover System in Relation to Plot (Ensure the whole plot can be seen in the photo) ☐



Photo 34

Soil suitable	Yes
Geotextile membrane present	N/A

Plot Validation 8 - 100% 100%

Plot Number 206

Is Plot Ready Yes

Installation Standard Pass

Depth of Cover System Materials (record the depth and support with Photo down the hole) 600



Photo 35

Depth of Topsoil (mm) 150



Photo 36

Depth of Subsoil (mm) 450



Photo 37

Depth of Cover System at Ground Level (Photo) ☒



Photo 38

Depth of Cover System in Relation to Plot (Ensure the whole plot can be seen in the photo) ☒



Photo 39

Soil suitable	Yes
Geotextile membrane present	N/A

Plot Validation 9 - 100% 100%

Plot Number 204

Is Plot Ready Yes

Installation Standard Pass

Depth of Cover System Materials (record the depth and support with Photo down the hole) 600



Photo 40

Depth of Topsoil (mm) 150



Photo 41

Depth of Subsoil (mm) 450



Photo 42

Depth of Cover System at Ground Level (Photo) ☒



Photo 43

Depth of Cover System in Relation to Plot (Ensure the whole plot can be seen in the photo) ☒



Photo 44

Soil suitable	Yes
Geotextile membrane present	N/A

Plot Validation 10 - 100% 100%

Plot Number 203

Is Plot Ready Yes

Installation Standard Pass

Depth of Cover System Materials (record the depth and support with Photo down the hole) 600



Photo 45

Depth of Topsoil (mm) 150



Photo 46

Depth of Subsoil (mm) 450



Photo 47

Depth of Cover System at Ground Level (Photo) ☒



Photo 48

Depth of Cover System in Relation to Plot (Ensure the whole plot can be seen in the photo) ☒



Photo 49

Soil suitable

Yes

Geotextile membrane present

N/A

Plot Validation 11 - 100% 100%

Plot Number 202

Is Plot Ready Yes

Installation Standard Pass

Depth of Cover System Materials (record the depth and support with Photo down the hole) 600



Photo 50

Depth of Topsoil (mm) 150



Photo 51

Depth of Subsoil (mm) 450



Photo 52

Depth of Cover System at Ground Level (Photo) ☒



Photo 53

Depth of Cover System in Relation to Plot (Ensure the whole plot can be seen in the photo) ☒



Photo 54

Soil suitable

Yes

Geotextile membrane present

N/A

Site Manager or Representative

Name

Mark Bucknall

Signature

7 Mar 2023 11:25 AM GMT

Appendix



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6



Photo 7



Photo 8



Photo 9



Photo 10



Photo 11



Photo 12



Photo 13



Photo 14



Photo 15



Photo 16



Photo 17



Photo 18



Photo 19



Photo 20



Photo 21



Photo 22



Photo 23



Photo 24



Photo 25



Photo 26



Photo 27



Photo 28



Photo 29



Photo 30



Photo 31



Photo 32



Photo 33



Photo 34



Photo 35



Photo 36



Photo 37



Photo 38



Photo 39



Photo 40



Photo 41



Photo 42



Photo 43



Photo 44



Photo 45



Photo 46



Photo 47



Photo 48



Photo 49



Photo 50



Photo 51



Photo 52



Photo 53



Photo 54

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Analytical Report Number : 23-18183

Project / Site name:	Royle Barn Road	Samples received on:	15/02/2023
Your job number:	13 778	Samples instructed on/ Analysis started on:	15/02/2023
Your order number:	004144	Analysis completed by:	24/02/2023
Report Issue Number:	1	Report issued on:	24/02/2023
Samples Analysed:	3 soil samples		


Signed:

Dominika Warjan
Junior Reporting 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.

Analytical Report Number: 23-18183
Project / Site name: Royle Barn Road
Your Order No: 004144

Lab Sample Number				2588985	2588986	2588987
Sample Reference				TS101	TS102	TS103
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				15/02/2023	15/02/2023	15/02/2023
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	12	12	13
Total mass of sample received	kg	0.001	NONE	0.4	0.4	0.4

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.3	6.2	7
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	290	290	410
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.011	0.012	0.026
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	22	23	53
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	10.9	11.7	26.4
Sulphide	mg/kg	1	MCERTS	7.7	6.1	4.1
Total Sulphur	mg/kg	50	MCERTS	180	180	190
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	2	1.9	2.1

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.15	0.21	0.18
Anthracene	mg/kg	0.05	MCERTS	< 0.05	0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.21	0.24	0.22
Pyrene	mg/kg	0.05	MCERTS	0.22	0.23	0.19
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.12	0.11
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.13	0.11
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.12	0.13	0.09
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	0.06	0.07
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	1.17	1.07
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Analytical Report Number: 23-18183
Project / Site name: Royle Barn Road
Your Order No: 004144

Lab Sample Number				2588985	2588986	2588987
Sample Reference				TS101	TS102	TS103
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				15/02/2023	15/02/2023	15/02/2023
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.1	7.1	7.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	10	9.3	9.8
Copper (aqua regia extractable)	mg/kg	1	MCERTS	26	25	29
Lead (aqua regia extractable)	mg/kg	1	MCERTS	48	45	47
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	11	10	11
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	37	34	39

Petroleum Hydrocarbons

TPH (C5 - C6) HS_ID_TOTAL	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0
TPH (C6 - C8) HS_ID_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1
TPH (C8 - C10) HS_ID_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1
TPH (C10 - C12) EH_CU_ID_TOTAL	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0
TPH (C12 - C16) EH_CU_ID_TOTAL	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0
TPH (C16 - C21) EH_CU_ID_TOTAL	mg/kg	1	MCERTS	< 1.0	1.2	2
TPH (C21 - C35) EH_CU_ID_TOTAL	mg/kg	1	MCERTS	< 1.0	1.5	2.4
TPH (C35 - C40) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	< 10	< 10	< 10
TPH Total C5 - C40 EH_CU+HS_ID_TOTAL	mg/kg	10	NONE	< 10	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

Analytical Report Number : 23-18183
Project / Site name: Royle Barn Road

* 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 *
2588985	TS101	None Supplied	None Supplied	Brown loam and sand with vegetation.
2588986	TS102	None Supplied	None Supplied	Brown loam and sand with gravel and vegetation.
2588987	TS103	None Supplied	None Supplied	Brown loam and sand with gravel and vegetation.

Analytical Report Number : 23-18183
Project / Site name: Royle Barn Road

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
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

Analytical Report Number : 23-18183
Project / Site name: Royle Barn Road

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

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

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

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

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
-	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

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Analytical Report Number : 23-18179

Project / Site name:	Royle Barn Road	Samples received on:	15/02/2023
Your job number:	13-778	Samples instructed on/ Analysis started on:	15/02/2023
Your order number:	004145	Analysis completed by:	22/02/2023
Report Issue Number:	1	Report issued on:	22/02/2023
Samples Analysed:	3 soil samples		


Signed:

Joanna Wawrzeczko
Reporting 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

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

Analytical Report Number: 23-18179
 Project / Site name: Royle Barn Road
 Your Order No: 004145

Lab Sample Number				2588973	2588974	2588975
Sample Reference				SS101	SS102	SS103
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				14/02/2023	14/02/2023	14/02/2023
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	12	12	13
Total mass of sample received	kg	0.001	NONE	0.4	0.4	0.4

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1	8.2	8.3
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	210	92	400
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.05	0.01	0.048
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	100	21	96
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	50	10.4	47.9
Sulphide	mg/kg	1	MCERTS	1.5	< 1.0	< 1.0
Total Sulphur	mg/kg	50	MCERTS	130	< 50	120
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.6	0.4	0.7

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	0.43	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.1	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.12	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.77	0.06	0.1
Anthracene	mg/kg	0.05	MCERTS	0.18	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.95	0.06	0.17
Pyrene	mg/kg	0.05	MCERTS	0.76	< 0.05	0.16
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.46	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	0.38	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.36	< 0.05	0.1
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.21	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.33	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	5.05	< 0.80	< 0.80
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Project / Site name: Royle Barn Road
Your Order No: 004145

Lab Sample Number				2588973	2588974	2588975
Sample Reference				SS101	SS102	SS103
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				14/02/2023	14/02/2023	14/02/2023
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	3.2	2.3	2.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	0.3	0.3
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	16	16	15
Copper (aqua regia extractable)	mg/kg	1	MCERTS	17	9.6	13
Lead (aqua regia extractable)	mg/kg	1	MCERTS	15	11	13
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	16	17	15
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	48	49	48

Petroleum Hydrocarbons

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

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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* 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 *
2588973	SS101	None Supplied	None Supplied	Brown clay and sand with gravel.
2588974	SS102	None Supplied	None Supplied	Brown clay and sand with gravel.
2588975	SS103	None Supplied	None Supplied	Brown clay and sand with gravel.

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Project / Site name: Royle Barn Road

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
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
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS

Analytical Report Number : 23-18179
Project / Site name: Royle Barn Road

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
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For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).

For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).

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

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total