

GARDEN VALIDATION – ROYLE ROAD

Project Name: Royle Road
Project Number: 11-778
Client: Countryside Partnerships
Date: 16-05-2023
Project Manager: A. Garrity
E3P Engineer: R. Webster
Garden Validation Requirements: 600mm cover system (without break layer)
Plots: 194-201

OVERVIEW

An E3P engineer attended the above site to validate the thickness of the cover system placed within the rear garden of plots 194-201 at Royal Road, Rochdale.

In total 8 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 and again on the 24th April 2023 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 a greenfield site.

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 & 23-30437 (attached to this letter).

SUBSOIL

E3P attended the site on 13th December 2022 to obtain three samples of the stockpiled subsoil deposits and again on the 14th February 2023 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 a greenfield site.

Site won naturally occurring sands have also been utilised as subsoil.

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 (imported) and 22-13385 (site won) (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
Topsoil	off site	23-30437	TS104-TS106	Pass
Subsoil	On site	22-13385	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	44 Royle Road Rochdale England OL11 3ET United Kingdom (53.599629847028396, - 2.174047186415522)
Project Number	11778
Developer	Countryside
Project Manager	R. Walker
Conducted By	Richard Webster
Date of visit	16 May 2023 2:56 PM BST

Plot Number	201
Is Plot Ready	Yes
Installation Standard	Pass
Depth of Cover System Materials (record the depth and support with Photo down the hole)	600
	
Photo 1	
Depth of Topsoil (mm)	150
Depth of Subsoil (mm)	450
Depth of Cover System at Ground Level (Photo)	☒
	
Photo 2	
Depth of Cover System in Relation to Plot (Ensure the whole plot can be seen in the photo)	☒
	
Photo 3	
Soil suitable	Yes
Geotextile membrane present	N/A

Plot Validation	100%
-----------------	------

Plot Number	200
-------------	-----

Is Plot Ready	Yes
---------------	-----

Installation Standard	Pass
-----------------------	------

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



Photo 4

Depth of Topsoil (mm)	150
-----------------------	-----

Depth of Subsoil (mm)	450
-----------------------	-----

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



Photo 5

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



Photo 6

Soil suitable	Yes
---------------	-----

Geotextile membrane present	N/A
-----------------------------	-----

Plot Validation	100%
-----------------	------

Plot Number	199
-------------	-----

Is Plot Ready	Yes
---------------	-----

Installation Standard	Pass
-----------------------	------

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



Photo 7

Depth of Topsoil (mm)	150
-----------------------	-----

Depth of Subsoil (mm)	450
-----------------------	-----

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



Photo 8

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



Photo 9

Soil suitable	Yes
---------------	-----

Geotextile membrane present	N/A
-----------------------------	-----

Plot Validation 100%

Plot Number 198

Is Plot Ready Yes

Installation Standard Pass

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



Photo 10

Depth of Topsoil (mm) 150

Depth of Subsoil (mm) 450

Depth of Cover System at
Ground Level (Photo) ☒



Photo 11

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



Photo 12

Soil suitable Yes

Geotextile membrane present N/A

Plot Validation	100%
-----------------	------

Plot Number	197
-------------	-----

Is Plot Ready	Yes
---------------	-----

Installation Standard	Pass
-----------------------	------

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



Photo 13

Depth of Topsoil (mm)	150
-----------------------	-----

Depth of Subsoil (mm)	450
-----------------------	-----

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



Photo 14

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



Photo 15

Soil suitable	Yes
---------------	-----

Geotextile membrane present	N/A
-----------------------------	-----

Plot Validation 100%

Plot Number 196

Is Plot Ready Yes

Installation Standard Pass

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



Photo 16

Depth of Topsoil (mm) 150

Depth of Subsoil (mm) 450

Depth of Cover System at
Ground Level (Photo) ☒



Photo 17

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



Photo 18

Soil suitable Yes

Geotextile membrane present N/A

Plot Validation	100%
-----------------	------

Plot Number	195
-------------	-----

Is Plot Ready	Yes
---------------	-----

Installation Standard	Pass
-----------------------	------

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



Photo 19

Depth of Topsoil (mm)	150
-----------------------	-----

Depth of Subsoil (mm)	450
-----------------------	-----

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



Photo 20

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



Photo 21

Soil suitable	Yes
---------------	-----

Geotextile membrane present	N/A
-----------------------------	-----

Plot Validation 100%

Plot Number 194

Is Plot Ready Yes

Installation Standard Pass

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



Photo 22

Depth of Topsoil (mm) 150

Depth of Subsoil (mm) 450

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

Site Manager or Representative

Name

Darryl

Signature

Darryl
16 May 2023 3:17 PM BST

Media summary



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

Andy Garrity

e3p
Taylor Road
Urmston
Manchester
M41 7JQ

e: agarrity@e3p.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 : 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

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: 23-18179
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
----------------------------	-------	---	--------	-------	-------	-------

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
-----------------------------	-------	-----	-----------	------	--------	--------

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			

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

Analytical Report Number : 23-18179

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 *
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.

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
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
----------------------	-------------------------------	-----------------------------	---------------	--------------------	----------------------

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

Andy Garrity
e3p
Taylor Road
Urmston
Manchester
M41 7JQ

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

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

e: agarrity@e3p.co.uk

Analytical Report Number : 22-13385

Project / Site name:	Royle Barn Road	Samples received on:	14/12/2022
Your job number:	11 778	Samples instructed on/ Analysis started on:	15/12/2022
Your order number:	003738	Analysis completed by:	22/12/2022
Report Issue Number:	1	Report issued on:	22/12/2022
Samples Analysed:	3 soil samples		


Signed:

Adam Fenwick
Technical Reviewer
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: 22-13385
Project / Site name: Royle Barn Road
Your Order No: 003738

Lab Sample Number				2534244	2534245	2534246
Sample Reference				SS101	SS102	SS103
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				13/12/2022	13/12/2022	13/12/2022
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	11	12
Total mass of sample received	kg	0.001	NONE	0.5	0.5	0.5

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.9	7.7	8.2
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	240	260	260
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.093	0.069	0.08
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	190	140	160
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	92.8	68.5	79.6
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Total Sulphur	mg/kg	50	MCERTS	140	120	140
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.3	0.6	0.5

Total Phenols

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

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.12	0.11	0.14
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.24	0.21	0.23
Pyrene	mg/kg	0.05	MCERTS	0.21	0.2	0.2
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.13*	0.12*	0.14*
Chrysene	mg/kg	0.05	MCERTS	0.1	0.09	0.11
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.09	0.12	0.13
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.11*	0.05*	0.05*
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.11	0.11	0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.06	< 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	0.06	< 0.05	0.06

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	1.23*	1.01*	1.21*
-----------------------------	-------	-----	-----------	-------	-------	-------

Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	5.9	5	6.2
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	9.1	8.6	9.6
Copper (aqua regia extractable)	mg/kg	1	MCERTS	21	18	17
Lead (aqua regia extractable)	mg/kg	1	MCERTS	18	14	18
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

Analytical Report Number: 22-13385
Project / Site name: Royle Barn Road
Your Order No: 003738

Lab Sample Number				2534244	2534245	2534246
Sample Reference				SS101	SS102	SS103
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				13/12/2022	13/12/2022	13/12/2022
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	41	32	41

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
Data reported uncorrected due to quality control parameter failure associated with this result; other checks applied prior to reporting the data have been accepted and the failure justified as having no significant impact on sample data reported.

Analytical Report Number : 22-13385

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 *
2534244	SS101	None Supplied	None Supplied	Brown loam and sand with gravel.
2534245	SS102	None Supplied	None Supplied	Brown loam and sand with gravel.
2534246	SS103	None Supplied	None Supplied	Brown loam and sand with gravel.

Analytical Report Number : 22-13385
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 : 22-13385
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
----------------------	-------------------------------	-----------------------------	---------------	--------------------	----------------------

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

Andy Garrity

e3p
Taylor Road
Urmston
Manchester
M41 7JQ

e: agarrity@e3p.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 : 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

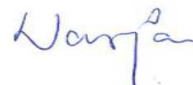
Analysis completed by: 24/02/2023

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
----------------------------	-------	---	--------	-------	-------	-------

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
-----------------------------	-------	-----	-----------	--------	------	------

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

Andy Garrity
e3p
Taylor Road
Urmston
Manchester
M41 7JQ

e: agarrity@e3p.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 : 23-30437

Replaces Analytical Report Number: 23-30437, issue no. 1
Client references/information amended.
Sampling date amended for all samples as per client's request

Project / Site name:	Royle Barn Road, Rochdale	Samples received on:	25/04/2023
Your job number:	11-778	Samples instructed on/ Analysis started on:	25/04/2023
Your order number:	004702	Analysis completed by:	04/05/2023
Report Issue Number:	2	Report issued on:	05/05/2023
Samples Analysed:	3 soil samples		

Signed:

Izabela Wójcik
Izabela Wójcik
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: 23-30437

Project / Site name: Royle Barn Road, Rochdale

Your Order No: 004702

Lab Sample Number				2659757	2659758	2659759
Sample Reference				TS104	TS105	TS106
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				24/04/2023	24/04/2023	24/04/2023
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	17	15	17
Total mass of sample received	kg	0.001	NONE	0.3	0.3	0.3

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.1	7.2	6.8
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	460	290	310
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.056	0.042	0.042
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	110	84	84
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	55.5	41.8	41.9
Sulphide	mg/kg	1	MCERTS	1.3	1.7	1
Total Sulphur	mg/kg	50	MCERTS	260	240	240
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	2.5	2.4	2.5

Total Phenols

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

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.1
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.07
Phenanthrene	mg/kg	0.05	MCERTS	0.44	0.2	0.92
Anthracene	mg/kg	0.05	MCERTS	0.08	< 0.05	0.16
Fluoranthene	mg/kg	0.05	MCERTS	0.83	0.32	1.3
Pyrene	mg/kg	0.05	MCERTS	0.81	0.33	1.3
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.4	0.2	0.64
Chrysene	mg/kg	0.05	MCERTS	0.5	0.17	0.75
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.61	0.24	0.75
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.15	0.1	0.32
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.38	0.19	0.66
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.24	< 0.05	0.34
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.3	< 0.05	0.46

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	4.74	1.75	7.78
-----------------------------	-------	-----	-----------	------	------	------

Analytical Report Number: 23-30437

Project / Site name: Royle Barn Road, Rochdale

Your Order No: 004702

Lab Sample Number				2659757	2659758	2659759
Sample Reference				TS104	TS105	TS106
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				24/04/2023	24/04/2023	24/04/2023
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	9.3	9.5	8.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	2.1
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	11	12	11
Copper (aqua regia extractable)	mg/kg	1	MCERTS	31	28	31
Lead (aqua regia extractable)	mg/kg	1	MCERTS	62	61	57
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	12	13	12
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	46	46	43

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	2.9	< 1.0	< 1.0
TPH (C21 - C35) EH_CU_ID_TOTAL	mg/kg	1	MCERTS	6.6	< 1.0	1.4
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 : 23-30437

Project / Site name: Royle Barn Road, Rochdale

* 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 *
2659757	TS104	None Supplied	None Supplied	Brown loam and sand with gravel and vegetation.
2659758	TS105	None Supplied	None Supplied	Brown loam and sand with gravel and vegetation.
2659759	TS106	None Supplied	None Supplied	Brown loam and sand with gravel and vegetation.

Analytical Report Number : 23-30437

Project / Site name: Royle Barn Road, Rochdale

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
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS

Analytical Report Number : 23-30437

Project / Site name: Royle Barn Road, Rochdale

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
----------------------	-------------------------------	-----------------------------	---------------	--------------------	----------------------

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