

GARDEN VALIDATION – ROYLE ROAD

Project Name: Royle Road

Project Number: 11-778

Client: Countryside Partnerships

Date: 06-02-2024

Project Manager: A. Garrity

E3P Engineer: S. Juhasz

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

Plots: 168 & 92

OVERVIEW

An E3P engineer attended the above site to validate the thickness of the cover system placed within the rear garden of plots 168 & 92 at Royle Road, Rochdale.

In total two 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, 24th April 2023, 16th May 2023, 22nd May 2023, 20th June 2023, 11th July 1st September 2023, 5th December 2023 to obtain 24 samples and again on the 16th January 2024 to obtain a further 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 Roundhill Gardens, Congleton, both greenfield sites.

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, 23-34765, 23-35593, 23-41042, 23-44707, 23-54569, 23-50111, 23-73361 and 24-78757 (attached to this letter).

SUBSOIL

E3P attended the site on 13th December 2022 to obtain three samples of the stockpiled subsoil deposits and 14th February 2023, the 9th of August 2023 and again on the 18th January 2024 to obtain a further three samples, 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 reports -23-18179, 23-56111 (imported) and 22-13385 and 23-50111 (site won) and 24-79200 (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
Topsoil	off-site	23-34765	TS107 – TS109	Pass
Topsoil	off-site	23-35593	TS110 – TS112	Pass
Topsoil	off-site	23-41042	TS113 – TS115	Pass
Topsoil	off-site	23-44707	TS116 – TS118	Pass
Subsoil	off-site	23-56111	SS107–SS112	Pass
Topsoil	off-site	23-54569	TS101–TS103	Pass
Subsoil	off-site	23-50111	SS104 – SS106	Pass
Topsoil	off-site	23-50111	TS119 – TS121	Pass
Topsoil	off-site (Congleton)	23-73361	TS101 – TS103	Pass
Topsoil	Off -Site	24-78757	TS101-TS103	Pass
Subsoil	Off -Site	24-79200	SS101 - SS103	Pass

The cover system validation photographs are enclosed within this letter.

Garden Cover System Validation

Complete

Site Name	Royle Barn Road
Location	36 Gazette Close Rochdale England OL11 3ET United Kingdom (53.60102116600945, - 2.1703230869045202)
Project Number	11778
Developer	Countryside Properties (UK) Ltd
Project Manager	Andrew Garrity
Conducted By	Sam Juhasz
Date of visit	6 Feb 2024 4:03 PM GMT

Plot Validation		5 / 5 (100%)
Plot Number		92
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	
Media summary		



Photo 1



Photo 2



Photo 3

Plot Validation		5 / 5 (100%)
Plot Number		168
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	

Royle Road
Countryside Partnerships
February 2024

Name

Neil Leadbeater

Site Manager or Representative

Name

Neil Leadbeater

Signature

6 Feb 2024 4:08 PM GMT

Media summary



Photo 1



Photo 2



Photo 3

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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
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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	0.12	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*
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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 unsuitable 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
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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

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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

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
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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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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
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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 - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total



Photo 17



Photo 18



Photo 19



Photo 20

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Analytical Report Number : 23-56111

Project / Site name:	Royle Barn	Samples received on:	12/09/2023
Your job number:	11-778	Samples instructed on/ Analysis started on:	12/09/2023
Your order number:	005945	Analysis completed by:	18/09/2023
Report Issue Number:	1	Report issued on:	18/09/2023
Samples Analysed:	6 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

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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: 23-56111
Project / Site name: Royle Barn
Your Order No: 005945

Lab Sample Number				2809253	2809254	2809255	2809256	2809257
Sample Reference				SS107	SS108	SS109	SS110	SS111
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				11/09/2023	11/09/2023	11/09/2023	11/09/2023	11/09/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	3.7	3.5	3	3.8	2.2
Total mass of sample received	kg	0.001	NONE	0.3	0.2	0.2	0.3	0.2

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.1	7.8	7.2	7.6	7.8
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	150	210	130	120	280
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.024	0.056	0.03	0.032	0.073
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	49	110	59	65	150
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	24.4	56.2	29.6	32.4	72.9
Sulphide	mg/kg	1	MCERTS	1.9	< 1.0	< 1.0	< 1.0	1.3
Total Sulphur	mg/kg	50	MCERTS	73	120	64	73	150
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.5	0.7	0.6	0.6	0.7

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.11
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.06	0.2	< 0.05	< 0.05	0.3
Pyrene	mg/kg	0.05	MCERTS	0.07	0.18	< 0.05	< 0.05	0.25
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.08	< 0.05	< 0.05	0.12
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.09	< 0.05	< 0.05	0.15
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	0.11	< 0.05	< 0.05	0.18
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	0.07
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.05	< 0.05	< 0.05	0.11
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.09
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.09

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	< 0.80	0.81	< 0.80	< 0.80	1.47
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	3.8	4	3.7	3.7	3.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3	0.3	0.4	0.3	0.4
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	22	23	25	23	20
Copper (aqua regia extractable)	mg/kg	1	MCERTS	13	21	20	20	19
Lead (aqua regia extractable)	mg/kg	1	MCERTS	14	16	15	15	17
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

Analytical Report Number: 23-56111
Project / Site name: Royle Barn
Your Order No: 005945

Lab Sample Number				2809253	2809254	2809255	2809256	2809257
Sample Reference				SS107	SS108	SS109	SS110	SS111
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				11/09/2023	11/09/2023	11/09/2023	11/09/2023	11/09/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	24	24	26	24	21
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	66	69	72	67	60

Petroleum Hydrocarbons

TPH (C5 - C6) HS 1D TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C6 - C8) HS 1D TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10) HS 1D TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12) EH CU 1D TOTAL	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16) EH CU 1D TOTAL	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
TPH (C16 - C21) EH CU 1D TOTAL	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH (C21 - C35) EH CU 1D TOTAL	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH (C35 - C40) EH CU 1D TOTAL	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH Total C5 - C40 EH CU+HS 1D TOTAL	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10

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

Analytical Report Number: 23-56111
 Project / Site name: Royle Barn
 Your Order No: 005945

Lab Sample Number				2809258
Sample Reference				SS112
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				11/09/2023
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	6.4
Total mass of sample received	kg	0.001	NONE	0.3

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.0
Total Cyanide	mg/kg	1	MCERTS	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	170
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.062
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	120
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	62
Sulphide	mg/kg	1	MCERTS	1.7
Total Sulphur	mg/kg	50	MCERTS	120
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.6

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	0.09
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.22
Fluorene	mg/kg	0.05	MCERTS	0.15
Phenanthrene	mg/kg	0.05	MCERTS	1.1
Anthracene	mg/kg	0.05	MCERTS	0.28
Fluoranthene	mg/kg	0.05	MCERTS	1.5
Pyrene	mg/kg	0.05	MCERTS	1.2
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.45
Chrysene	mg/kg	0.05	MCERTS	0.5
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.46
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.16
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.35
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.22
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.23

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	6.94
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	4.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	24
Copper (aqua regia extractable)	mg/kg	1	MCERTS	20
Lead (aqua regia extractable)	mg/kg	1	MCERTS	18
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3

Analytical Report Number: 23-56111
Project / Site name: Royle Barn
Your Order No: 005945

Lab Sample Number				2809258
Sample Reference				SS112
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				11/09/2023
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	25
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	72

Petroleum Hydrocarbons

TPH (C5 - C6) HS 1D TOTAL	mg/kg	0.1	NONE	< 0.1
TPH (C6 - C8) HS 1D TOTAL	mg/kg	0.1	NONE	< 0.1
TPH (C8 - C10) HS 1D TOTAL	mg/kg	0.1	NONE	< 0.1
TPH (C10 - C12) EH CU 1D TOTAL	mg/kg	2	MCERTS	< 2.0
TPH (C12 - C16) EH CU 1D TOTAL	mg/kg	4	MCERTS	< 4.0
TPH (C16 - C21) EH CU 1D TOTAL	mg/kg	10	MCERTS	< 10
TPH (C21 - C35) EH CU 1D TOTAL	mg/kg	10	MCERTS	< 10
TPH (C35 - C40) EH CU 1D TOTAL	mg/kg	10	NONE	< 10
TPH Total C5 - C40 EH CU+HS 1D TOTAL	mg/kg	10	NONE	< 10

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

Analytical Report Number : 23-56111

Project / Site name: Royle Barn

* 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 *
2809253	SS107	None Supplied	None Supplied	Brown clay and sand with gravel.
2809254	SS108	None Supplied	None Supplied	Brown clay and sand with gravel.
2809255	SS109	None Supplied	None Supplied	Brown clay and sand with gravel.
2809256	SS110	None Supplied	None Supplied	Brown clay and sand with gravel.
2809257	SS111	None Supplied	None Supplied	Brown clay and sand with gravel.
2809258	SS112	None Supplied	None Supplied	Brown clay and sand with gravel.

Analytical Report Number : 23-56111
Project / Site name: Royle Barn

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 °C)	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. Refer to CoA for analyte specific accreditation.	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 diphénylcarbazide 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

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Analytical Report Number : 23-41042

Project / Site name:	Royle Barn Road	Samples received on:	20/06/2023
Your job number:	11 778	Samples instructed on/ Analysis started on:	23/06/2023
Your order number:	005305	Analysis completed by:	29/06/2023
Report Issue Number:	1	Report issued on:	29/06/2023
Samples Analysed:	3 soil samples		


Signed:

Dominika Warjan
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: 23-41042
Project / Site name: Royle Barn Road
Your Order No: 005305

Lab Sample Number				2724508	2724509	2724510
Sample Reference				TS113	TS114	TS115
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				20/06/2023	20/06/2023	20/06/2023
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	13	15	15
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	JBH	JBH	JBH

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7	7.5	7.4
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	400	260	470
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.08	0.07	0.071
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	160	140	140
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	79.7	69.6	71.4
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Total Sulphur	mg/kg	50	MCERTS	340	320	300
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	1.8	2.1	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	0.06	0.06
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	0.42	0.52	0.46
Anthracene	mg/kg	0.05	MCERTS	0.11	0.11	0.09
Fluoranthene	mg/kg	0.05	MCERTS	1.1	1	0.83
Pyrene	mg/kg	0.05	MCERTS	1.2	1.1	0.83
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.68	0.53	0.4
Chrysene	mg/kg	0.05	MCERTS	0.68	0.5	0.44
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.99	0.69	0.53
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.4	0.23	0.24
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.8	0.52	0.46
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.39	0.25	0.23
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.51	0.31	0.28

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	7.38	5.8	4.85
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Analytical Report Number: 23-41042
Project / Site name: Royle Barn Road
Your Order No: 005305

Lab Sample Number				2724508	2724509	2724510
Sample Reference				TS113	TS114	TS115
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				20/06/2023	20/06/2023	20/06/2023
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	8.4	8.5	8.1
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	11	11
Copper (aqua regia extractable)	mg/kg	1	MCERTS	30	31	30
Lead (aqua regia extractable)	mg/kg	1	MCERTS	53	59	68
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	11	12	12
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	44	60	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
TPH (C21 - C35) EH_CU_ID_TOTAL	mg/kg	1	MCERTS	2.6	3.5	3
TPH (C35 - C40) EH_CU_ID_TOTAL	mg/kg	10	NONE	< 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 : 23-41042

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 *
2724508	TS113	None Supplied	None Supplied	Brown loam and clay with gravel and vegetation.
2724509	TS114	None Supplied	None Supplied	Brown loam and clay with gravel and vegetation.
2724510	TS115	None Supplied	None Supplied	Brown loam and clay with gravel and vegetation.

Analytical Report Number : 23-41042
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

Analytical Report Number : 23-41042
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 (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 : 23-44707

Project / Site name: Royle Barn Road

Samples received on: 12/07/2023

Your job number: 11-778

**Samples instructed on/
Analysis started on:** 13/07/2023

Your order number: 005502

Analysis completed by: 19/07/2023

Report Issue Number: 1

Report issued on: 19/07/2023

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: 23-44707
Project / Site name: Royle Barn Road
Your Order No: 005502

Lab Sample Number				2746676	2746677	2746678
Sample Reference				TS116	TS117	TS118
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				11/07/2023	11/07/2023	11/07/2023
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	15	14	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	IZJ	IZJ	IZJ

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7	7.1	8
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Total Sulphate as SO4	mg/kg	50	MCERTS	320	400	550
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.018	0.019	0.065
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	35	39	130
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	17.7	19.4	64.8
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	1
Total Sulphur	mg/kg	50	MCERTS	300	270	350
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	2.2	2	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	0.09	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.9	0.14	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.78	0.1	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	9.2	1.3	0.27
Anthracene	mg/kg	0.05	MCERTS	1.9	0.22	0.06
Fluoranthene	mg/kg	0.05	MCERTS	9	1.8	0.53
Pyrene	mg/kg	0.05	MCERTS	8.5	1.8	0.52
Benzo(a)anthracene	mg/kg	0.05	MCERTS	3.5	0.69	0.29
Chrysene	mg/kg	0.05	MCERTS	3.4	0.71	0.29
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	3.3	0.72	0.4
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	1.5	0.29	0.14
Benzo(a)pyrene	mg/kg	0.05	MCERTS	2.7	0.55	0.3
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.3	0.29	0.19
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.33	0.08	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.6	0.37	0.27

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	47.9	9.07	3.26
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Analytical Report Number: 23-44707
Project / Site name: Royle Barn Road
Your Order No: 005502

Lab Sample Number				2746676	2746677	2746678
Sample Reference				TS116	TS117	TS118
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				11/07/2023	11/07/2023	11/07/2023
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	9.1	8.4	8.5
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	16	13	13
Copper (aqua regia extractable)	mg/kg	1	MCERTS	33	34	31
Lead (aqua regia extractable)	mg/kg	1	MCERTS	68	58	66
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	15	13	13
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	58	49	51

Petroleum Hydrocarbons

TPH (C5 - C6) HS_1D_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1
TPH (C6 - C8) HS_1D_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1
TPH (C8 - C10) HS_1D_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1
TPH (C10 - C12) EH_CU_1D_TOTAL	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0
TPH (C12 - C16) EH_CU_1D_TOTAL	mg/kg	4	MCERTS	7.2	9	< 4.0
TPH (C16 - C21) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	22	< 10	< 10
TPH (C21 - C35) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	58	19	< 10
TPH (C35 - C40) EH_CU_1D_TOTAL	mg/kg	10	NONE	< 10	< 10	< 10
TPH Total C5 - C40 EH_CU+HS_1D_TOTAL	mg/kg	10	NONE	94	38	< 10

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



Analytical Report Number : 23-44707
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 *
2746676	TS116	None Supplied	None Supplied	Brown loam and sand with gravel and vegetation.
2746677	TS117	None Supplied	None Supplied	Brown loam and sand with gravel and vegetation.
2746678	TS118	None Supplied	None Supplied	Brown loam and sand with gravel and vegetation.

Analytical Report Number : 23-44707
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 SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
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

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 aravimetrically using the moisture content which is carried out at a maximum of 30oC.



Analytical Report Number : 23-44707
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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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 : 23-73361

Project / Site name:	Royle Barn Road	Samples received on:	06/12/2023
Your job number:	11 778	Samples instructed on/ Analysis started on:	06/12/2023
Your order number:		Analysis completed by:	12/12/2023
Report Issue Number:	1	Report issued on:	12/12/2023
Samples Analysed:	3 soil samples		

Izabela Wójcik
Signed:

Izabela Wójcik
Senior 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: 23-73361
Project / Site name: Royle Barn Road

Lab Sample Number				2902413	2902414	2902415
Sample Reference				TS101	TS102	TS103
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				05/12/2023	05/12/2023	05/12/2023
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	18	19
Total mass of sample received	kg	0.001	NONE	0.3	0.2	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	KSZ	KSZ	KSZ

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.3	7	7.1
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	240	260	270
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.017	0.01	0.014
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	33	20	27
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	16.5	10.2	13.6
Sulphide	mg/kg	1	MCERTS	29	1.4	< 1.0
Total Sulphur	mg/kg	50	MCERTS	190	190	220
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	1.8	1.5	1.8

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	0.46	0.45
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	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 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	< 0.80	< 0.80	< 0.80
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Heavy Metals / Metalloids

Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	5.6	5.6	5.4
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	12	13	14
Copper (aqua regia extractable)	mg/kg	1	MCERTS	9.6	9.5	15
Lead (aqua regia extractable)	mg/kg	1	MCERTS	18	18	23
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	9.3	9.9	9.8
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	28	27	31

Analytical Report Number: 23-73361
Project / Site name: Royle Barn Road

Lab Sample Number				2902413	2902414	2902415
Sample Reference				TS101	TS102	TS103
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				05/12/2023	05/12/2023	05/12/2023
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			



Lab Sample Number				2902413	2902414	2902415
Sample Reference				TS101	TS102	TS103
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				05/12/2023	05/12/2023	05/12/2023
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Petroleum Hydrocarbons						
TPH (C5 - C6) HS_ID_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1
TPH (C6 - C8) HS_ID_TOTAL	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0
TPH (C8 - C10) HS_ID_TOTAL	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0
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	10	MCERTS	< 10	< 10	< 10
TPH (C21 - C35) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	< 10	< 10	< 10
TPH (C35 - C40) EH_CU_ID_TOTAL	mg/kg	10	NONE	< 10	< 10	< 10
TPH Total C5 - C40 EH_CU+HS_ID_TOTAL	mg/kg	10	NONE	< 10	< 10	< 10

This certificate should not be reproduced, except in full, without the express permission of the laboratory.
The results included within the report relate only to the sample(s) submitted for testing.

Analytical Report Number : 23-73361
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 *
2902413	TS101	None Supplied	None Supplied	Brown clay and loam with gravel and vegetation.
2902414	TS102	None Supplied	None Supplied	Brown clay and loam with gravel and vegetation.
2902415	TS103	None Supplied	None Supplied	Brown clay and loam with gravel and vegetation.

Analytical Report Number : 23-73361
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. Refer to CoA for analyte specific accreditation.	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 : 23-73361
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 - 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 : 23-18183

Replaces Analytical Report Number: 23-18183, issue no. 1
Result correction by laboratory.
Quality Control Failure Caveat Added for TPH

The report has been updated to the current Schedule of Accreditation issue No: 113 Issue date: 09 May 2023

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:	2	Report issued on:	22/05/2023
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

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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: 23-18183
 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	NONE	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	NONE	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	NONE	0.15	0.21	0.18
Anthracene	mg/kg	0.05	NONE	< 0.05	0.05	< 0.05
Fluoranthene	mg/kg	0.05	NONE	0.21	0.24	0.22
Pyrene	mg/kg	0.05	NONE	0.22	0.23	0.19
Benzo(a)anthracene	mg/kg	0.05	NONE	< 0.05	0.12	0.11
Chrysene	mg/kg	0.05	NONE	< 0.05	0.13	0.11
Benzo(b)fluoranthene	mg/kg	0.05	NONE	0.12	0.13	0.09
Benzo(k)fluoranthene	mg/kg	0.05	NONE	< 0.05	0.06	0.07
Benzo(a)pyrene	mg/kg	0.05	NONE	< 0.05	< 0.05	0.1
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	NONE	< 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	NONE	< 2.0	< 2.0	< 2.0
TPH (C12 - C16) EH_CU_ID_TOTAL	mg/kg	4	NONE	< 4.0	< 4.0	< 4.0
TPH (C16 - C21) EH_CU_ID_TOTAL	mg/kg	1	NONE	< 1.0	1.2	2
TPH (C21 - C35) EH_CU_ID_TOTAL	mg/kg	1	NONE	< 1.0##	1.5###	2.4###
TPH (C35 - C40) EH_CU_ID_TOTAL	mg/kg	10	NONE	< 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	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
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	NONE
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	NONE
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 : 23-18183
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
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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 30°C.

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

- Quality control parameter has a high recovery (outside of limit); however the associated result is below the reporting limit, other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised

- Quality control parameter failure associated with this result; other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and may be compromised.

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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

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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: 23-30437

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
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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	0.1
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
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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
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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 - 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 : 23-34765

Project / Site name:	Royle Barn Road	Samples received on:	18/05/2023
Your job number:	11-778	Samples instructed on/ Analysis started on:	19/05/2023
Your order number:	004899	Analysis completed by:	26/05/2023
Report Issue Number:	1	Report issued on:	26/05/2023
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: 23-34765
Project / Site name: Royle Barn Road
Your Order No: 004899

Lab Sample Number				2685327	2685328	2685329
Sample Reference				TS107	TS108	TS109
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				16/05/2023	16/05/2023	16/05/2023
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	10	13
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	JBH	JBH	JBH

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.2	6.8	6.9
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	350	350	310
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.039	0.035	0.047
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	77	69	93
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	38.6	34.7	46.5
Sulphide	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0
Total Sulphur	mg/kg	50	MCERTS	250	220	200
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	2.1	2	1.8

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	NONE	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	NONE	< 0.05	0.08	< 0.05
Fluorene	mg/kg	0.05	NONE	< 0.05	0.07	< 0.05
Phenanthrene	mg/kg	0.05	NONE	0.26	0.73	0.15
Anthracene	mg/kg	0.05	NONE	0.07	0.15	< 0.05
Fluoranthene	mg/kg	0.05	NONE	0.31	0.73	0.23
Pyrene	mg/kg	0.05	NONE	0.29	0.68	0.22
Benzo(a)anthracene	mg/kg	0.05	NONE	0.17	0.34	0.14
Chrysene	mg/kg	0.05	NONE	0.2	0.4	0.16
Benzo(b)fluoranthene	mg/kg	0.05	NONE	0.22	0.35	0.18
Benzo(k)fluoranthene	mg/kg	0.05	NONE	0.09	0.15	0.08
Benzo(a)pyrene	mg/kg	0.05	NONE	0.19	0.31	0.15
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	NONE	0.11	0.16	0.09
Dibenz(a,h)anthracene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	NONE	0.14	0.21	0.12

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	NONE	2.05	4.36	1.52
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Analytical Report Number: 23-34765
Project / Site name: Royle Barn Road
Your Order No: 004899

Lab Sample Number				2685327	2685328	2685329
Sample Reference				TS107	TS108	TS109
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				16/05/2023	16/05/2023	16/05/2023
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	8.2	8.4	7.3
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	11	11	9.7
Copper (aqua regia extractable)	mg/kg	1	MCERTS	27	26	24
Lead (aqua regia extractable)	mg/kg	1	MCERTS	52	52	46
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	11	12	10
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	41	38	35

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	NONE	< 2.0	< 2.0	< 2.0
TPH (C12 - C16) EH_CU_ID_TOTAL	mg/kg	4	NONE	< 4.0	< 4.0	< 4.0
TPH (C16 - C21) EH_CU_ID_TOTAL	mg/kg	1	NONE	4.2	< 1.0	< 1.0
TPH (C21 - C35) EH_CU_ID_TOTAL	mg/kg	1	NONE	4	< 1.0	< 1.0
TPH (C35 - C40) EH_CU_ID_TOTAL	mg/kg	10	NONE	< 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 : 23-34765

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 *
2685327	TS107	None Supplied	None Supplied	Brown loam with gravel and vegetation.
2685328	TS108	None Supplied	None Supplied	Brown loam with gravel and vegetation.
2685329	TS109	None Supplied	None Supplied	Brown loam with gravel and vegetation.

Analytical Report Number : 23-34765
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
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
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	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
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	NONE
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	NONE
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

Analytical Report Number : 23-34765
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 (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

Analytical Report Number : 23-56111
Project / Site name: Royle Barn

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 (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 30°C.

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 : 23-35593

Project / Site name: Royle Barn Road

Samples received on: 23/05/2023

Your job number: 11 778

**Samples instructed on/
Analysis started on:** 24/05/2023

Your order number: 004927

Analysis completed by: 02/06/2023

Report Issue Number: 1

Report issued on: 02/06/2023

Samples Analysed: 3 soil samples



Signed:

Elżbieta Suchy
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

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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: 23-35593
 Project / Site name: Royle Barn Road
 Your Order No: 004927

Lab Sample Number				2690314	2690315	2690316
Sample Reference				TS110	TS111	TS112
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				22/05/2023	22/05/2023	22/05/2023
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	14	13	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	JBH	JBH	JBH

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.6	7.5	7.4
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	430	510	520
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.1	0.12	0.14
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	200	240	280
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	102	118	139
Sulphide	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0
Total Sulphur	mg/kg	50	MCERTS	460	320	650
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	2.1	2	2

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	NONE	0.44	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	NONE	0.46	< 0.05	< 0.05
Fluorene	mg/kg	0.05	NONE	0.29	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	NONE	3.9	0.31	0.32
Anthracene	mg/kg	0.05	NONE	0.55	0.06	0.07
Fluoranthene	mg/kg	0.05	NONE	3.9	0.5	0.75
Pyrene	mg/kg	0.05	NONE	3.7	0.48	0.79
Benzo(a)anthracene	mg/kg	0.05	NONE	1.3	0.22	0.41
Chrysene	mg/kg	0.05	NONE	1.5	0.29	0.46
Benzo(b)fluoranthene	mg/kg	0.05	NONE	1.4	0.35	0.53
Benzo(k)fluoranthene	mg/kg	0.05	NONE	0.48	0.12	0.18
Benzo(a)pyrene	mg/kg	0.05	NONE	1.1	0.26	0.43
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	NONE	0.51	0.16	0.21
Dibenz(a,h)anthracene	mg/kg	0.05	NONE	0.18	< 0.05	0.07
Benzo(ghi)perylene	mg/kg	0.05	NONE	0.67	0.18	0.28

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	NONE	20.3	2.93	4.5
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Analytical Report Number: 23-35593
Project / Site name: Royle Barn Road
Your Order No: 004927

Lab Sample Number				2690314	2690315	2690316
Sample Reference				TS110	TS111	TS112
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				22/05/2023	22/05/2023	22/05/2023
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	8.7	10	8.8
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	12	13	12
Copper (aqua regia extractable)	mg/kg	1	MCERTS	28	35	30
Lead (aqua regia extractable)	mg/kg	1	MCERTS	59	66	57
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	13	15	12
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	45	55	50

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	NONE	< 2.0	< 2.0	< 2.0
TPH (C12 - C16) EH_CU_ID_TOTAL	mg/kg	4	NONE	< 4.0	< 4.0	< 4.0
TPH (C16 - C21) EH_CU_ID_TOTAL	mg/kg	1	NONE	4.7	< 1.0	< 1.0
TPH (C21 - C35) EH_CU_ID_TOTAL	mg/kg	1	NONE	11	< 1.0	< 1.0
TPH (C35 - C40) EH_CU_ID_TOTAL	mg/kg	10	NONE	< 10	< 10	< 10
TPH Total C5 - C40 EH_CU+HS_ID_TOTAL	mg/kg	10	NONE	22	< 10	< 10

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

Analytical Report Number : 23-35593

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 *
2690314	TS110	None Supplied	None Supplied	Brown loam and sand with gravel and vegetation.
2690315	TS111	None Supplied	None Supplied	Brown loam and sand with gravel and vegetation.
2690316	TS112	None Supplied	None Supplied	Brown loam and sand with gravel and vegetation.

Analytical Report Number : 23-35593

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	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
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	NONE
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	NONE
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

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Analytical Report Number : 23-50111-2

Replaces Analytical Report Number: 23-50111, issue no. 1
Client references/information amended.
Sample IDs amended at client request

Project / Site name:	Royle Barn, Rd	Samples received on:	09/08/2023
Your job number:	11778	Samples instructed on/ Analysis started on:	09/08/2023
Your order number:	11778-JJ	Analysis completed by:	15/08/2023
Report Issue Number:	2	Report issued on:	17/08/2023
Samples Analysed:	6 soil samples		

Izabela Wójcik
Signed:

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

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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: 23-50111
Project / Site name: Royle Barn, Rd
Your Order No: 11778-JJ

Lab Sample Number				2776629	2776630	2776631	2776632	2776633
Sample Reference				TS119	TS120	TS121	SS104	SS105
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				09/08/2023	09/08/2023	09/08/2023	09/08/2023	09/08/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	14	15	16	12	12
Total mass of sample received	kg	0.001	NONE	0.3	0.2	0.2	0.2	0.3

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.3	7.5	7.6	10.3	9.4
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	510	460	330	620	580
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.12	0.075	0.071	0.12	0.12
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	230	150	140	240	250
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	117	74.6	70.8	121	124
Sulphide	mg/kg	1	MCERTS	1.1	3.5	< 1.0	15	4.8
Total Sulphur	mg/kg	50	MCERTS	320	300	290	300	270
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	2.4	2.4	2.4	0.5	0.7

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	0.06	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	0.07	< 0.05	< 0.05	0.06
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.29	0.44	0.16	0.23	0.51
Anthracene	mg/kg	0.05	MCERTS	0.05	0.07	< 0.05	0.05	0.09
Fluoranthene	mg/kg	0.05	MCERTS	0.41	0.57	0.27	0.39	0.68
Pyrene	mg/kg	0.05	MCERTS	0.42	0.59	0.28	0.36	0.59
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.21	0.33	0.14	0.19	0.29
Chrysene	mg/kg	0.05	MCERTS	0.25	0.39	0.19	0.21	0.34
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.23	0.4	0.19	0.23	0.32
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.14	0.19	0.08	0.11	0.16
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.23	0.35	0.18	0.2	0.28
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.12	0.17	0.1	0.1	0.13
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.17	0.26	0.13	0.12	0.16

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	2.52	3.89	1.72	2.19	3.66
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Analytical Report Number: 23-50111
Project / Site name: Royle Barn, Rd
Your Order No: 11778-JJ

Lab Sample Number	2776629	2776630	2776631	2776632	2776633
Sample Reference	TS119	TS120	TS121	SS104	SS105
Sample Number	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled	09/08/2023	09/08/2023	09/08/2023	09/08/2023	09/08/2023
Time Taken	None Supplied	None Supplied	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	8.5	9.2	8.8	5.1	5.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	0.3	0.3
Chromium (hexavalent)	mg/kg	1.8	MCERTS	U/S**	U/S**	U/S**	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	13	12	12	9.6	11
Copper (aqua regia extractable)	mg/kg	1	MCERTS	30	30	45	23	16
Lead (aqua regia extractable)	mg/kg	1	MCERTS	56	77	56	19	19
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	12	12	12	10	13
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	49	46	45	39	41

Petroleum Hydrocarbons

TPH (C5 - C6) HS 1D TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C6 - C8) HS 1D TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10) HS 1D TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12) EH CU 1D TOTAL	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16) EH CU 1D TOTAL	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
TPH (C16 - C21) EH CU 1D TOTAL	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH (C21 - C35) EH CU 1D TOTAL	mg/kg	10	MCERTS	< 10	20	< 10	< 10	27
TPH (C35 - C40) EH CU 1D TOTAL	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH Total C5 - C40 EH CU+HS 1D TOTAL	mg/kg	10	NONE	14	31	< 10	< 10	42

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

Analytical Report Number: 23-50111
Project / Site name: Royle Barn, Rd
Your Order No: 11778-JJ

Lab Sample Number				2776634
Sample Reference				SS106
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				09/08/2023
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	13
Total mass of sample received	kg	0.001	NONE	0.3

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	9.9
Total Cyanide	mg/kg	1	MCERTS	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	620
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.12
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	230
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	116
Sulphide	mg/kg	1	MCERTS	10
Total Sulphur	mg/kg	50	MCERTS	280
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.6

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.22
Anthracene	mg/kg	0.05	MCERTS	0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.34
Pyrene	mg/kg	0.05	MCERTS	0.31
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.18
Chrysene	mg/kg	0.05	MCERTS	0.17
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.2
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.09
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.18
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.09
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.1

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	1.93
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Analytical Report Number: 23-50111
Project / Site name: Royle Barn, Rd
Your Order No: 11778-JJ

Lab Sample Number				2776634
Sample Reference				SS106
Sample Number				None Supplied
Depth (m)				None Supplied
Date Sampled				09/08/2023
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status	
Heavy Metals / Metalloids				
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	5.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.3
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	13
Copper (aqua regia extractable)	mg/kg	1	MCERTS	19
Lead (aqua regia extractable)	mg/kg	1	MCERTS	19
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	13
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	47

Petroleum Hydrocarbons

TPH (C5 - C6) HS_ID_TOTAL	mg/kg	0.1	NONE	< 0.1
TPH (C6 - C8) HS_ID_TOTAL	mg/kg	0.1	NONE	< 0.1
TPH (C8 - C10) HS_ID_TOTAL	mg/kg	0.1	NONE	< 0.1
TPH (C10 - C12) EH_CU_ID_TOTAL	mg/kg	2	MCERTS	< 2.0
TPH (C12 - C16) EH_CU_ID_TOTAL	mg/kg	4	MCERTS	< 4.0
TPH (C16 - C21) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	< 10
TPH (C21 - C35) EH_CU_ID_TOTAL	mg/kg	10	MCERTS	16
TPH (C35 - C40) EH_CU_ID_TOTAL	mg/kg	10	NONE	< 10
TPH Total C5 - C40 EH_CU+HS_ID_TOTAL	mg/kg	10	NONE	25

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

Analytical Report Number : 23-50111

Project / Site name: Royle Barn, Rd

* 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 *
2776629	TS119	None Supplied	None Supplied	Brown sandy clay with gravel.
2776630	TS120	None Supplied	None Supplied	Brown sand with gravel.
2776631	TS121	None Supplied	None Supplied	Brown sand with gravel and vegetation.
2776632	SS104	None Supplied	None Supplied	Brown sand with gravel.
2776633	SS105	None Supplied	None Supplied	Brown sand with gravel.
2776634	SS106	None Supplied	None Supplied	Brown sand with gravel.

Analytical Report Number : 23-50111
Project / Site name: Royle Barn, Rd

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 °C)	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 diphénylcarbazide 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 : 23-50111
Project / Site name: Royle Barn, Rd

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 - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

**U/S - Unsuitable for analysis due to high colour intensity.

Analytical Report Number : 23-35593
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



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Analytical Report Number : 23-54569

Project / Site name:	Royle Barn Road	Samples received on:	04/09/2023
Your job number:	11778	Samples instructed on/ Analysis started on:	04/09/2023
Your order number:		Analysis completed by:	08/09/2023
Report Issue Number:	1	Report issued on:	08/09/2023
Samples Analysed:	8 soil samples		

Signed: _____

Anna Goc
PL Head of Reporting Team
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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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: 23-54569
Project / Site name: Royle Barn Road

Lab Sample Number				2800470	2800471	2800472	2800473	2800474
Sample Reference				TS101	TS102	TS103	Plot 101	Plot 103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				01/09/2023	01/09/2023	01/09/2023	01/09/2023	01/09/2023
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	10	10	9.8	9.5	8.7
Total mass of sample received	kg	0.001	NONE	0.2	0.3	0.4	0.3	0.2

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

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.8	7.6	7.2	8.7	8.5
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	470	460	410	200	160
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.069	0.061	0.063	0.038	0.025
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	140	120	130	77	50
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	69.4	61.2	62.9	38.4	25
Sulphide	mg/kg	1	MCERTS	< 1.0	1	< 1.0	< 1.0	< 1.0
Total Sulphur	mg/kg	50	MCERTS	210	230	280	73	61
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	2.2	2.3	2.3	0.4	0.5

Total Phenols

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

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.36	0.29	0.2	0.11	< 0.05
Anthracene	mg/kg	0.05	MCERTS	0.08	0.07	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.59	0.65	0.41	0.13	0.07
Pyrene	mg/kg	0.05	MCERTS	0.6	0.67	0.45	0.13	0.07
Benzo(a)anthracene	mg/kg	0.05	MCERTS	0.26	0.33	0.23	0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	0.33	0.41	0.29	0.06	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.41	0.48	0.32	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	0.13	0.17	0.12	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.32	0.39	0.27	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.19	0.23	0.15	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.05	0.06	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.2	0.27	0.18	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	ISO 17025	3.52	4.02	2.62	< 0.80	< 0.80
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Analytical Report Number: 23-54569
Project / Site name: Royle Barn Road

Lab Sample Number				2800470	2800471	2800472	2800473	2800474
Sample Reference				TS101	TS102	TS103	Plot 101	Plot 103
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				01/09/2023	01/09/2023	01/09/2023	01/09/2023	01/09/2023
Time Taken				None Supplied	None Supplied	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	8.7	8.3	9.1	2.8	2.6
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	0.2	0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	U/S**	U/S**	1.9	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	11	10	11	18	19
Copper (aqua regia extractable)	mg/kg	1	MCERTS	28	28	30	9.9	10
Lead (aqua regia extractable)	mg/kg	1	MCERTS	56	54	60	12	11
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	11	11	12	18	19
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	42	42	46	56	56

Petroleum Hydrocarbons

TPH (C5 - C6) HS_1D_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C6 - C8) HS_1D_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10) HS_1D_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12) EH_CU_1D_TOTAL	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16) EH_CU_1D_TOTAL	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
TPH (C16 - C21) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH (C21 - C35) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH (C35 - C40) EH_CU_1D_TOTAL	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH Total C5 - C40 EH_CU+HS_1D_TOTAL	mg/kg	10	NONE	< 10	< 10	< 10	< 10	< 10

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

Analytical Report Number: 23-54569
Project / Site name: Royle Barn Road

Lab Sample Number				2800475	2800476	2800477
Sample Reference				Plot 105	Plot 95	Plot 92
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				01/09/2023	01/09/2023	01/09/2023
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	8.6	7.3	8.5
Total mass of sample received	kg	0.001	NONE	0.3	0.2	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	EWS	EWS	EWS

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.5	8.5	8.6
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	130	130	140
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.023	0.025	0.023
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	46	49	47
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	23	24.7	23.3
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	1.5
Total Sulphur	mg/kg	50	MCERTS	52	< 50	< 50
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.4	0.4	0.4

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	0.07	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.08	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	0.08	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 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	< 0.80	< 0.80	< 0.80
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Analytical Report Number: 23-54569
Project / Site name: Royle Barn Road

Lab Sample Number				2800475	2800476	2800477
Sample Reference				Plot 105	Plot 95	Plot 92
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				01/09/2023	01/09/2023	01/09/2023
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	2.3	2.1	2.3
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	16	15	16
Copper (aqua regia extractable)	mg/kg	1	MCERTS	8.6	7.4	8.8
Lead (aqua regia extractable)	mg/kg	1	MCERTS	10	8.6	9.9
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17	16	16
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	48	50	48

Petroleum Hydrocarbons

TPH (C5 - C6) HS_1D_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1
TPH (C6 - C8) HS_1D_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1
TPH (C8 - C10) HS_1D_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1
TPH (C10 - C12) EH_CU_1D_TOTAL	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0
TPH (C12 - C16) EH_CU_1D_TOTAL	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0
TPH (C16 - C21) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	< 10	< 10
TPH (C21 - C35) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	< 10	< 10
TPH (C35 - C40) EH_CU_1D_TOTAL	mg/kg	10	NONE	< 10	< 10	< 10
TPH Total C5 - C40 EH_CU+HS_1D_TOTAL	mg/kg	10	NONE	< 10	< 10	< 10

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

Analytical Report Number : 23-54569

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 *
2800470	TS101	None Supplied	None Supplied	Brown loam and clay with gravel and vegetation.
2800471	TS102	None Supplied	None Supplied	Brown loam and clay with gravel and vegetation.
2800472	TS103	None Supplied	None Supplied	Brown loam and clay with gravel and vegetation.
2800473	Plot 101	None Supplied	None Supplied	Brown clay and sand with gravel.
2800474	Plot 103	None Supplied	None Supplied	Brown clay and sand with gravel.
2800475	Plot 105	None Supplied	None Supplied	Brown clay and sand with gravel.
2800476	Plot 95	None Supplied	None Supplied	Brown clay and sand with gravel.
2800477	Plot 92	None Supplied	None Supplied	Brown clay and sand with gravel.

Analytical Report Number : 23-54569

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 SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
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 : 23-54569

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

**U/S - Unsuitable for analysis due to high colour intensity.

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Analytical Report Number : 24-78757

Project / Site name:	Royal Barn Rd	Samples received on:	17/01/2024
Your job number:	11778	Samples instructed on/ Analysis started on:	17/01/2024
Your order number:	11778	Analysis completed by:	23/01/2024
Report Issue Number:	1	Report issued on:	23/01/2024
Samples Analysed:	3 soil samples		

Signed:

Izabela Wójcik
Izabela Wójcik
Senior 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: 24-78757
Project / Site name: Royal Barn Rd
Your Order No: 11778

Lab Sample Number				2931051	2931052	2931053
Sample Reference				TS101	TS102	TS103
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				16/01/2024	16/01/2024	16/01/2024
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	21	17	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	MJN	MJN	MJN

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.7	7.7	7.7
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	380	380	450
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.032	0.019	0.031
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	63	38	63
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	31.5	18.8	31.3
Sulphide	mg/kg	1	MCERTS	< 1.0	7.6	26
Total Sulphur	mg/kg	50	MCERTS	180	170	170
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	1.9	1.9	1.8

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	0.39	0.4	0.57
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	0.06	< 0.05	0.11
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.08	< 0.05	0.12
Pyrene	mg/kg	0.05	MCERTS	0.07	< 0.05	0.11
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.06
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.06
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	0.05	< 0.05	0.07
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.06
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	< 0.80	1.16
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Analytical Report Number: 24-78757
Project / Site name: Royal Barn Rd
Your Order No: 11778

Lab Sample Number	2931051	2931052	2931053
Sample Reference	TS101	TS102	TS103
Sample Number	None Supplied	None Supplied	None Supplied
Depth (m)	None Supplied	None Supplied	None Supplied
Date Sampled	16/01/2024	16/01/2024	16/01/2024
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	4.8	5.8	4.8
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	11	12	11
Copper (aqua regia extractable)	mg/kg	1	MCERTS	11	11	9.7
Lead (aqua regia extractable)	mg/kg	1	MCERTS	19	20	18
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	9.1	9.4	8.3
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	30	28	27

Petroleum Hydrocarbons

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

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

Analytical Report Number : 24-78757

Project / Site name: Royal Barn Rd

* 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 *
2931051	TS101	None Supplied	None Supplied	Brown loam and clay with gravel and vegetation.
2931052	TS102	None Supplied	None Supplied	Brown loam and clay with gravel and vegetation.
2931053	TS103	None Supplied	None Supplied	Brown loam and clay with gravel and vegetation.

Analytical Report Number : 24-78757
Project / Site name: Royal Barn Rd

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
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
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 °C)	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. Refer to CoA for analyte specific accreditation.	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 diphénylcarbazide 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 : 24-78757
Project / Site name: Royal Barn Rd

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 30°C.

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 : 24-79200

Project / Site name:	Royle Barn Rd	Samples received on:	19/01/2024
Your job number:	11-778	Samples instructed on/ Analysis started on:	19/01/2024
Your order number:		Analysis completed by:	26/01/2024
Report Issue Number:	1	Report issued on:	26/01/2024
Samples Analysed:	3 soil samples		

Signed: *A. Czerwińska*

Agnieszka Czerwińska
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: 24-79200
Project / Site name: Royle Barn Rd

Lab Sample Number				2933587	2933588	2933589
Sample Reference				SS101	SS102	SS103
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				18/01/2024	18/01/2024	18/01/2024
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	9.3	12	10
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	KSZ	KSZ	KSZ

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	6.9	7.5	7.3
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Total Sulphate as SO ₄	mg/kg	50	MCERTS	100	170	180
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.014	0.016	0.01
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	28	31	20
Water Soluble SO ₄ (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	14.2	15.6	10
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Total Sulphur	mg/kg	50	MCERTS	< 50	< 50	< 50
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.4	0.4	0.4

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	0.08
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	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	ISO 17025	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 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	< 0.80	< 0.80	< 0.80
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Analytical Report Number: 24-79200
Project / Site name: Royle Barn Rd

Lab Sample Number				2933587	2933588	2933589
Sample Reference				SS101	SS102	SS103
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied
Date Sampled				18/01/2024	18/01/2024	18/01/2024
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	2.4	3.1	3.1
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.2	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	17	21	19
Copper (aqua regia extractable)	mg/kg	1	MCERTS	8.4	12	9
Lead (aqua regia extractable)	mg/kg	1	MCERTS	9.2	12	11
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	17	21	19
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	48	57	56

Petroleum Hydrocarbons

TPH (C5 - C6) HS_1D_TOTAL	mg/kg	0.1	NONE	< 0.1	< 0.1	< 0.1
TPH (C6 - C8) HS_1D_TOTAL	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0
TPH (C8 - C10) HS_1D_TOTAL	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0
TPH (C10 - C12) EH_CU_1D_TOTAL	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0
TPH (C12 - C16) EH_CU_1D_TOTAL	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0
TPH (C16 - C21) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	< 10	< 10	< 10
TPH (C21 - C35) EH_CU_1D_TOTAL	mg/kg	10	MCERTS	18	< 10	< 10
TPH (C35 - C40) EH_CU_1D_TOTAL	mg/kg	10	NONE	< 10	< 10	< 10
TPH Total C5 - C40 EH_CU+HS_1D_TOTAL	mg/kg	10	NONE	28	< 10	< 10

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

Analytical Report Number : 24-79200

Project / Site name: Royle Barn Rd

* 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 *
2933587	SS101	None Supplied	None Supplied	Brown loam and clay with gravel and vegetation.
2933588	SS102	None Supplied	None Supplied	Brown sandy clay with gravel and vegetation.
2933589	SS103	None Supplied	None Supplied	Brown sandy clay with gravel and vegetation.

Analytical Report Number : 24-79200

Project / Site name: Royle Barn Rd

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. Refer to CoA for analyte specific accreditation.	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 SO ₄ in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
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 : 24-79200

Project / Site name: Royle Barn Rd

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