

### GARDEN VALIDATION – ROYLE ROAD

**Project Name:** Royle Road

**Project Number:** 11-778

**Client:** Countryside Partnerships

**Date:** 24-08-2023

**Project Manager:** A. Garrity

**E3P Engineer:** P. Lavelle

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

**Plots:** 160-162

### OVERVIEW

An E3P engineer attended the above site to validate the thickness of the cover system placed within the rear garden of plots 160-162 at Royal Road, Rochdale.

In total three 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 and 11th July 2023 to obtain 18 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 a greenfield site.

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

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

Chemical analysis results are included within lab report 23-18183, 23-30437, 23-34765, 23-35593, 23-41042 and 23-44707 (attached to this letter).

## SUBSOIL

E3P attended the site on 13th December 2022 to obtain three samples of the stockpiled subsoil deposits and again on the 14th February 2023 which were analysed in accordance with the E3P Remediation Strategy. Chemical analysis confirmed that these subsoil deposits were chemically suitable for use within the proposed garden areas.

The subsoil has been imported from Marchington Stone Quarry, Glossop a greenfield site.

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

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

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

Chemical analysis results are included within lab report 23-18179 (imported) and 22-13385 (site won) (attached to this letter).

## CHEMICAL ANALYSIS

| TOPSOIL/SUBSOIL | SOURCE   | LAB REFERENCE | SAMPLE REFERENCE | PASS/FAIL |
|-----------------|----------|---------------|------------------|-----------|
| Topsoil         | off-site | 23-18183      | TS101 – TS103    | Pass      |
| Subsoil         | off-site | 23-18179      | SS101 – SS103    | Pass      |
| Topsoil         | off-site | 23-30437      | TS104–TS106      | Pass      |
| Subsoil         | on site  | 22-13385      | SS101 – SS103    | Pass      |
| 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      |

The cover system validation photographs are enclosed within this letter.

## Garden Cover System Validation

|                 |                                                                                                                          |
|-----------------|--------------------------------------------------------------------------------------------------------------------------|
| Site Name       | Royle barn                                                                                                               |
| Location        | 31 Broadbent Street<br>Rochdale<br>England<br>OL11 3ET<br>United Kingdom<br>(53.60001143535797, -<br>2.1723323256789806) |
| Project Number  | 11778                                                                                                                    |
| Developer       | Countryside                                                                                                              |
| Project Manager | A. Garrity                                                                                                               |
| Conducted By    | Patrick Lavelle                                                                                                          |
| Date of visit   | 24 Aug 2023 1:36 PM BST                                                                                                  |

Plot Number 160

Is Plot Ready Yes

Installation Standard Pass

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



Photo 5

Depth of Topsoil (mm) 150

Depth of Subsoil (mm) 450

Depth of Cover System at Ground Level (Photo) ☒



Photo 6



Photo 7

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



Photo 8

Soil suitable Yes

Geotextile membrane present N/A

Plot Number 161

Is Plot Ready Yes

Installation Standard Pass

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



Photo 9

Depth of Topsoil (mm) 150

Depth of Subsoil (mm) 450

Depth of Cover System at Ground Level (Photo) ☒



Photo 10



Photo 11

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



Photo 12

Soil suitable Yes

Geotextile membrane present N/A

|             |     |
|-------------|-----|
| Plot Number | 162 |
|-------------|-----|

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

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

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



Photo 13

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

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

|                                               |                                     |
|-----------------------------------------------|-------------------------------------|
| Depth of Cover System at Ground Level (Photo) | <input checked="" type="checkbox"/> |
|-----------------------------------------------|-------------------------------------|



Photo 14

|                                                                                            |                                     |
|--------------------------------------------------------------------------------------------|-------------------------------------|
| Depth of Cover System in Relation to Plot (Ensure the whole plot can be seen in the photo) | <input checked="" type="checkbox"/> |
|--------------------------------------------------------------------------------------------|-------------------------------------|



Photo 15

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

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

Site Manager or Representative

Name N/A

Signature N/A

## Media summary





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## **Analytical Report Number : 23-35593**

|                             |                 |                                                        |            |
|-----------------------------|-----------------|--------------------------------------------------------|------------|
| <b>Project / Site name:</b> | Royle Barn Road | <b>Samples received on:</b>                            | 23/05/2023 |
| <b>Your job number:</b>     | 11 778          | <b>Samples instructed on/<br/>Analysis started on:</b> | 24/05/2023 |
| <b>Your order number:</b>   | 004927          | <b>Analysis completed by:</b>                          | 02/06/2023 |
| <b>Report Issue Number:</b> | 1               | <b>Report issued on:</b>                               | 02/06/2023 |
| <b>Samples Analysed:</b>    | 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<br>(Soil Analysis) | Units | Limit of detection | Accreditation<br>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 <sub>4</sub>                                | mg/kg    | 50      | MCERTS | 430   | 510   | 520   |
| Water Soluble SO <sub>4</sub> (2:1 Leach. Equiv.) 1hr extraction | g/l      | 0.00125 | MCERTS | 0.1   | 0.12  | 0.14  |
| Water Soluble SO <sub>4</sub> (2:1 Leach. Equiv.) 1hr extraction | mg/kg    | 2.5     | MCERTS | 200   | 240   | 280   |
| Water Soluble SO <sub>4</sub> (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 |
|----------------------------|-------|---|--------|-------|-------|-------|

#### 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 |
|-----------------------------|-------|-----|------|------|------|-----|

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<br>(Soil Analysis) | Units | Limit of detection | Accreditation<br>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               |

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 |
|----------------------|-------------------------------|-----------------------------|---------------|--------------------|----------------------|
|----------------------|-------------------------------|-----------------------------|---------------|--------------------|----------------------|

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 : 23-41042**

|                             |                 |                                                        |            |
|-----------------------------|-----------------|--------------------------------------------------------|------------|
| <b>Project / Site name:</b> | Royle Barn Road | <b>Samples received on:</b>                            | 20/06/2023 |
| <b>Your job number:</b>     | 11 778          | <b>Samples instructed on/<br/>Analysis started on:</b> | 23/06/2023 |
| <b>Your order number:</b>   | 005305          | <b>Analysis completed by:</b>                          | 29/06/2023 |
| <b>Report Issue Number:</b> | 1               | <b>Report issued on:</b>                               | 29/06/2023 |
| <b>Samples Analysed:</b>    | 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 <sub>4</sub>                                | mg/kg    | 50      | MCERTS | 400   | 260   | 470   |
| Water Soluble SO <sub>4</sub> (2:1 Leach. Equiv.) 1hr extraction | g/l      | 0.00125 | MCERTS | 0.08  | 0.07  | 0.071 |
| Water Soluble SO <sub>4</sub> (2:1 Leach. Equiv.) 1hr extraction | mg/kg    | 2.5     | MCERTS | 160   | 140   | 140   |
| Water Soluble SO <sub>4</sub> (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 |
|----------------------------|-------|---|--------|-------|-------|-------|

#### 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 |
|-----------------------------|-------|-----|-----------|------|-----|------|

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<br>(Soil Analysis) | Units | Limit of detection | Accreditation<br>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

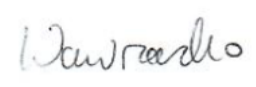
**Analysis completed by:** 19/07/2023

**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

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: 23-44707**  
**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<br>(Soil Analysis) | Units | Limit of detection | Accreditation Status |               |               |               |
|                                         |       |                    |                      |               |               |               |
|                                         |       |                    |                      |               |               |               |
|                                         |       |                    |                      |               |               |               |
| Stone Content                           |       |                    |                      | %             | 0.1           | NONE          |
| Moisture Content                        |       |                    |                      | %             | 0.01          | NONE          |
| Total mass of sample received           |       |                    |                      | kg            | 0.001         | NONE          |

|                     |      |     |           |              |              |              |
|---------------------|------|-----|-----------|--------------|--------------|--------------|
| 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 |
|----------------------------|-------|---|--------|-------|-------|-------|

#### 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 |
|-----------------------------|-------|-----|-----------|------|------|------|



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<br>(Soil Analysis) | Units | Limit of detection | Accreditation<br>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) <small>HS_1D_TOTAL</small>            | mg/kg | 0.1 | NONE   | < 0.1 | < 0.1 | < 0.1 |
| TPH (C6 - C8) <small>HS_1D_TOTAL</small>            | mg/kg | 0.1 | NONE   | < 0.1 | < 0.1 | < 0.1 |
| TPH (C8 - C10) <small>HS_1D_TOTAL</small>           | mg/kg | 0.1 | NONE   | < 0.1 | < 0.1 | < 0.1 |
| TPH (C10 - C12) <small>EH_CU_1D_TOTAL</small>       | mg/kg | 2   | MCERTS | < 2.0 | < 2.0 | < 2.0 |
| TPH (C12 - C16) <small>EH_CU_1D_TOTAL</small>       | mg/kg | 4   | MCERTS | 7.2   | 9     | < 4.0 |
| TPH (C16 - C21) <small>EH_CU_1D_TOTAL</small>       | mg/kg | 10  | MCERTS | 22    | < 10  | < 10  |
| TPH (C21 - C35) <small>EH_CU_1D_TOTAL</small>       | mg/kg | 10  | MCERTS | 58    | 19    | < 10  |
| TPH (C35 - C40) <small>EH_CU_1D_TOTAL</small>       | mg/kg | 10  | NONE   | < 10  | < 10  | < 10  |
| TPH Total C5 - C40 <small>EH_CU+HS_1D_TOTAL</small> | mg/kg | 10  | NONE   | 94    | 38    | < 10  |

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



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**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. |

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**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 <sub>4</sub> 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.**



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| Analytical Test Name | Analytical Method Description | Analytical Method Reference | Method number | Wet / Dry Analysis | Accreditation Status |
|----------------------|-------------------------------|-----------------------------|---------------|--------------------|----------------------|
|----------------------|-------------------------------|-----------------------------|---------------|--------------------|----------------------|

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     |

