

# MICA ENVIRONMENTAL LTD

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Mr William Evans  
c/o Trevor Mennell  
The Gables  
Kendrick Bank  
Bayston Hill  
Shrewsbury  
SY3 0EH

Ref: MENV07141/Rep/MH

13 March 2020

Dear Sirs,

**Land Adjacent to Graig Wen Farm, Bwlchgwyn**

Planning has been granted by the Planning Inspectorate for the establishment of a Traveller site on the above land following an appeal dated 04/07/2019 against an earlier refusal of application reference P/2018/0613. There remained some concern over the presence of contamination in the site as the local area has a history of lead mining and smelting. Given this, the Contaminated Land Officer for Wrexham Council required some details of the proposal to seal the site and the condition of the ground below the site as reassurance that any future development would not have the potential for significant harm to site users. Mica Environmental were engaged to carry out a limited investigation and, following discussions with the Contaminated Land officer, a site visit was made and surface sampling carried out.

The site is located approximately 400m to the north east of the centre of Bwlchgwyn village along an unadopted road that formerly ran through Graig Wen Farm. The nearest lead mining activity was at Minera Lead mines some 2.5km to the south where large-scale mining occurred between 1710 and 1914 with peak production between 1849 and 1890's. Initially the ore was smelted in Swansea but, in 1888 a smelter was constructed at New Brighton to process the ore locally. It is understood that the dressing of the rock also took place at this location. Mining ceased in 1914 when the pumping of the groundwater became uneconomical and there is now a mining museum on the site.



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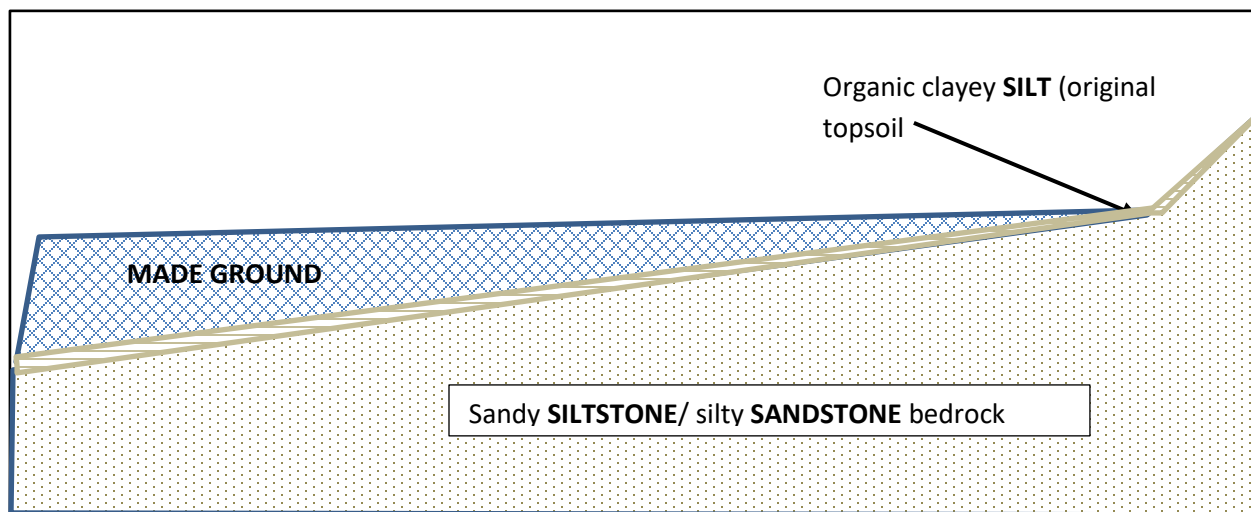
## Site Visit Observations

A site visit was made on 28 February to view the site conditions first hand, meet with the planning consultant and client to discuss the recent site history and the proposals for site development. Surface samples were also collected for laboratory testing.

The planning site comprises an area of approximately 60m by 60m of levelled ground that has had inert clayey waste placed under a Natural Resources Wales exemption licence (ref. NRW-WME030700). The waste material varies in thickness from 0m against natural weathered rock on the southern border of the site, where the slope has been scraped down to the bedrock beneath, to approximately 1.3 m in the northern corner of the site. This has been placed directly onto the natural ground below (Photos 1 to 4).

The natural ground comprises a poor quality, poorly drained, clayey agricultural field of grass and reeds that may have been used as rough grazing in the past (Photo 5). The soil is generally a soft to very soft, dark to black organic clayey SILT, very poorly drained.

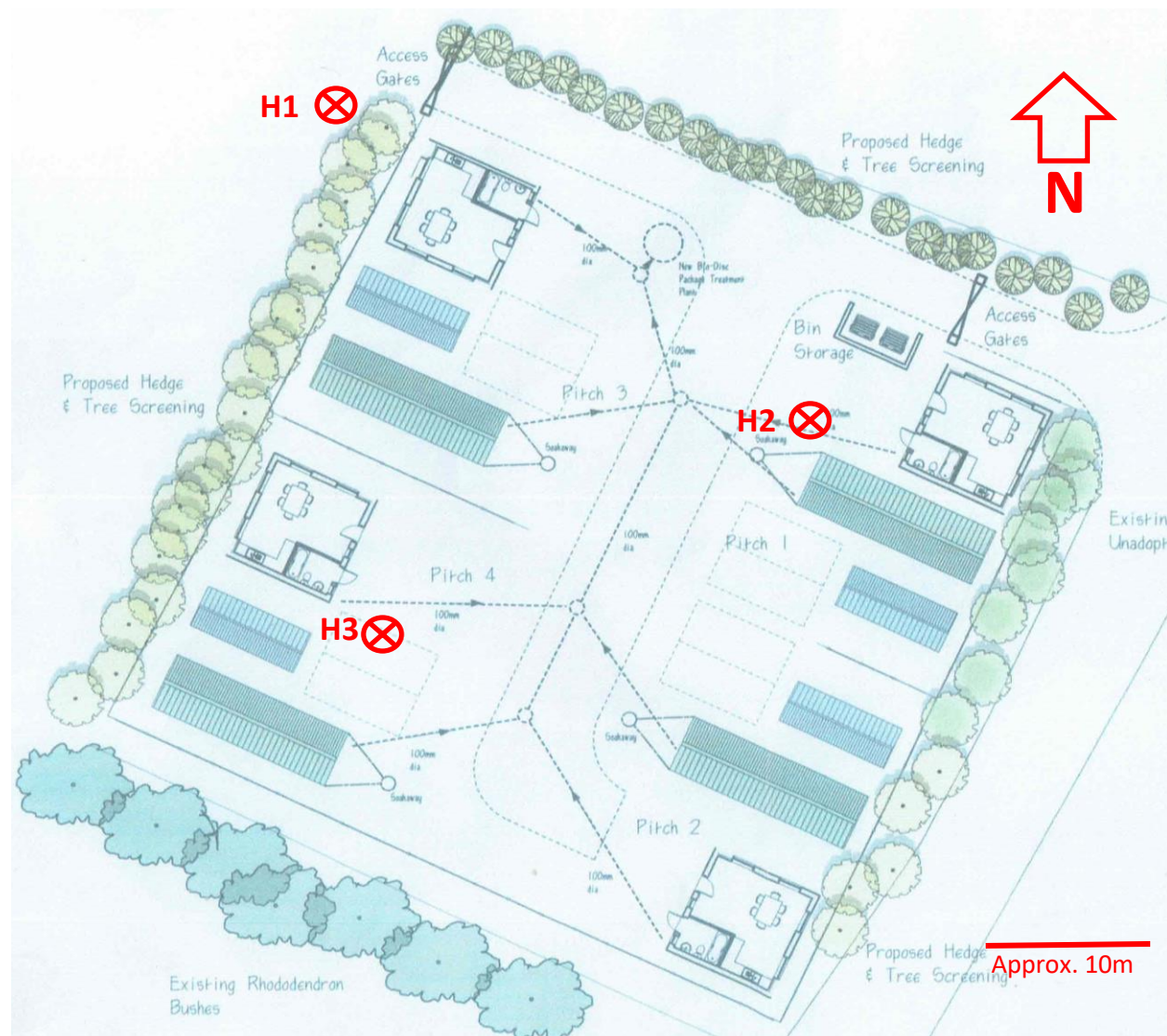
The placed materials were a MADE GROUND comprising a mixture of light brown and grey mottled silty clay with weathered sandy siltstone fragments, concrete fragments, brick fragments and hardcore, generally poorly drained. One area of dumped metals was noted together with a small site hut and a Luton van container used for storage (Photo 3). A conceptual site cross-section north to south is:



A total of three surface samples were taken in order to address the concerns regarding metal contaminants from the lead working in the area; two within the planning site boundary and one just to the west in order to be able to sample the original topsoil. All the samples were scheduled for pH and toxic (9) metals analysis. In addition, as there were no details of the origin of the placed materials made available to Mica Environmental, this material was also scheduled for a semi-volatile organic compound suite (SVOCs) and

asbestos screen analysis to provide additional characterisation. There was no visible or olfactory indication of any hydrocarbon contamination anywhere on the site so these were not tested for as part of this work.

The sample locations are shown on the proposed layout plan below:



The test schedule was as follows:

- |           |                                                                            |
|-----------|----------------------------------------------------------------------------|
| Sample H1 | pH, toxic nine metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Se, Zn).                |
| Sample H2 | pH, toxic nine metals, SVOCs by GCMS including phenols and PAHs, asbestos. |
| Sample H3 | pH, toxic nine metals, SVOCs by GCMS including phenols and PAHs, asbestos. |

The results are attached with this letter and discussed below.

## **Chemical Test Results**

### **Natural Ground** (Sample H1)

#### pH

The pH was 5.78, slightly acidic, as would be typical of the peat-rich and saturated ground.

#### Metals

The majority of the metals were present at concentrations where the level of risk posed is acceptably low, being below Category 4 Screening Levels for residential with plant uptake use (C4SL). However, the exceptions to this were arsenic (84.6mg/kg) and lead (455mg/kg). Given the historical lead mining and smelting in the local area as discussed earlier, it is likely that these moderately elevated concentrations represent fine particle deposition from the historical smelting and wind-blown dust associated with mining operations and mine waste tips at Minera. It is also likely that this represents the normal background levels for this locality.

### **Made Ground** (Samples H2 and H3)

#### pH

The pH levels recorded were 6.75 and 6.13 respectively, closer to neutral than the natural ground below and within normal range.

#### Metals

There are no metals recorded above the C4SL.

#### SVOCs

All individual SVOCs were recorded below the limit of detection (LOD) of 100µg/kg. This LOD is less than half the lowest C4SL of the polyaromatic hydrocarbon group within the SVOC suite, and indicates there is not likely to be an issue with polyaromatic hydrocarbons or wider SVOCs at the site.

#### Asbestos

No asbestos was detected in either of the samples from the Made Ground.

## **Conclusions and Recommendations**

The planning site has had inert materials placed onto it under licence and these have been used to level the area with thicknesses varying from 0m to 1.3m across the site. The material placed has lower concentrations of metals than the natural ground below it and, as a result have formed a clean cover more suitable for residential development than the former farmland.

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It should be noted that the C4SL used are based on residential with plant uptake; however, the materials placed are considered to be unsuitable as growing media due to the presence of inert bricks, concrete and a lack of nutrients/organics, so the numbers used are 'worse-case scenario' and have a high factor of safety. The difficulty of removing the placed material due to the quantities involved will be such that it is unlikely that the natural ground below will ever be exposed and be available as a growing medium on the site.

Due to the clayey nature of the placed Made Ground it is recommended that a sealing layer is placed over the site of suitable clean, inert material that can be compacted and shaped to shed surface water and provide a suitable surface for both traffic and pedestrians.

Given that chemical contamination is not present at the surface of the planning site, a finished layer of 200 to 300mm should be sufficient from an engineering and practical point of view. Records must be kept of the sealing material brought to site – origin, quantity and suitability as an inert layer – in the form of delivery notes that can be inspected as required. Photographs should be taken during the placing and compacting of the materials in order to demonstrate that engineering has been done correctly and to the right thickness.

It is further recommended that in the areas of screen planting that the topsoil exposure is kept to a minimum. This could be achieved through the placement of geotextile matting with the new planting then placed through the mat to limit exposure of the natural soils at surface. Alternatively, fresh, clean topsoil could be imported and placed at surface; however, this would require to be sourced from a reputable supplier and test certificates either made available from the source or for further sampling and testing undertaken to demonstrate that it is fit for purpose.

If you have any queries please contact the undersigned on the telephone number below.

Yours sincerely



Miles Hitchcock  
CGeol FGS FIQ  
Director  
Tel: 01743 884746

Attached:

Site Visit Photographs  
Category 4 Screen Levels  
ALS Chemical Test results

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## Site Photographs



Photo 1 View of site from entrance looking South



Photo 2 View of site from entrance looking West



Photo 3 Site showing infill material



Photo 4 Infill thickness at Northern boundary



Photo 5 Natural Ground to West of Site

| Test                   | Units    | Assessment Criterion |
|------------------------|----------|----------------------|
| pH                     | pH units | -                    |
| Arsenic                | mg/kg    | 37 <sup>1,2</sup>    |
| Cadmium                | mg/kg    | 11 <sup>2</sup>      |
| Chromium (total)       | mg/kg    | 910 <sup>2 **</sup>  |
| Copper                 | mg/kg    | 2400 <sup>2</sup>    |
| Lead                   | mg/kg    | 200 <sup>1</sup>     |
| Mercury                | mg/kg    | 40 <sup>2</sup>      |
| Nickel                 | mg/kg    | 180 <sup>2</sup>     |
| Selenium               | mg/kg    | 250 <sup>2</sup>     |
| Zinc                   | mg/kg    | 3700 <sup>2</sup>    |
| Acenaphthene           | ug/kg    | 210000 <sup>2</sup>  |
| Acenaphthylene         | ug/kg    | 170000 <sup>2</sup>  |
| Anthracene             | ug/kg    | 2400000 <sup>2</sup> |
| Benz(a)anthracene      | ug/kg    | 7200 <sup>2</sup>    |
| Benzo(a)pyrene         | ug/kg    | 5000 <sup>1</sup>    |
| Benzo(b)fluoranthene   | ug/kg    | 2600 <sup>2</sup>    |
| Benzo(g,h,i)perylene   | ug/kg    | 320000 <sup>2</sup>  |
| Benzo(k)fluoranthene   | ug/kg    | 77000 <sup>2</sup>   |
| Chrysene               | ug/kg    | 15000 <sup>2</sup>   |
| Dibenzo(a,h)anthracene | ug/kg    | 240 <sup>2</sup>     |
| Fluoranthene           | ug/kg    | 280000 <sup>2</sup>  |
| Fluorene               | ug/kg    | 170000 <sup>2</sup>  |
| Indeno(1,2,3-cd)pyrene | ug/kg    | 27000 <sup>2</sup>   |
| Naphthalene            | ug/kg    | 2300 <sup>2</sup>    |
| Phenanthrene           | ug/kg    | 95000 <sup>2</sup>   |
| Pyrene                 | ug/kg    | 620000 <sup>2</sup>  |

1: C4SL value – SP1010 Development of Final Category 4 Screening Levels for Land Affected by Contamination Policy Companion Document (DEFRA, 2014)

2: LQM/CIEH S4UL Copyright Land Quality Management Limited reproduced with permission; publication number S4UL3470. All rights reserved.

^ assumed 1% soil organic matter

Residential with home-grown produce scenario criteria used for initial screen



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**Attention:** Catherine Hitchcock

## CERTIFICATE OF ANALYSIS

|                                     |                    |
|-------------------------------------|--------------------|
| <b>Date of report Generation:</b>   | 11 March 2020      |
| <b>Customer:</b>                    | Mica Environmental |
| <b>Sample Delivery Group (SDG):</b> | 200228-139         |
| <b>Your Reference:</b>              | MENV07141          |
| <b>Location:</b>                    | BWLCHGWYN          |
| <b>Report No:</b>                   | 545134             |

**This report has been revised and directly supersedes 545023 in its entirety.**

We received 3 samples on Friday February 28, 2020 and 3 of these samples were scheduled for analysis which was completed on Tuesday March 10, 2020. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

**Sonia McWhan**

Operations Manager



## CERTIFICATE OF ANALYSIS

Validated

**SDG:** 200228-139  
**Location:** BWLCHGWYN

**Client Reference:** MENV07141  
**Order Number:**

**Report Number:** 545134  
**Superseded Report:** 545023

### Received Sample Overview

| Lab Sample No(s) | Customer Sample Ref. | AGS Ref. | Depth (m)   | Sampled Date |
|------------------|----------------------|----------|-------------|--------------|
| 21788222         | H1                   |          | 0.00 - 0.10 | 28/02/2020   |
| 21788223         | H2                   |          | 0.00 - 0.10 | 28/02/2020   |
| 21788225         | H3                   |          | 0.00 - 0.10 | 28/02/2020   |

#### Maximum Sample/Coolbox Temperature (°C) :

**8.0**

#### ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

**Only received samples which have had analysis scheduled will be shown on the following pages.**



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SDG: 200228-139  
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## Results Legend



Test



No Determination Possible

## Sample Types -

S - Soil/Solid  
UNS - Unspecified Solid  
GW - Ground Water  
SW - Surface Water  
LE - Land Leachate  
PL - Prepared Leachate  
PR - Process Water  
SA - Saline Water  
TE - Trade Effluent  
TS - Treated Sewage  
US - Untreated Sewage  
RE - Recreational Water  
DW - Drinking Water  
Non-regulatory  
UNL - Unspecified Liquid  
SL - Sludge  
G - Gas  
OTH - Other

## Lab Sample No(s)

21788222  
21788223  
21788225

## Customer Sample Reference

H1  
H2  
H3

## AGS Reference

## Depth (m)

0.00 - 0.10  
0.00 - 0.10  
0.00 - 0.10

## Container

250g Amber Jar (ALE210)  
1kg TUB  
250g Amber Jar (ALE210)  
1kg TUB  
250g Amber Jar (ALE210)

## Sample Type

S  
S  
S  
S  
S

## Asbestos ID in Solid Samples

All

NDPs: 0  
Tests: 2

X  
X

## Metals in solid samples by OES

All

NDPs: 0  
Tests: 3

X  
X  
X

## pH

All

NDPs: 0  
Tests: 3

X  
X  
X

## Sample description

All

NDPs: 0  
Tests: 3

X  
X  
X

## Semi Volatile Organic Compounds

All

NDPs: 0  
Tests: 2

X  
X



## CERTIFICATE OF ANALYSIS

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### Sample Descriptions

#### Grain Sizes

|           |          |      |                 |        |             |        |            |             |       |
|-----------|----------|------|-----------------|--------|-------------|--------|------------|-------------|-------|
| very fine | <0.063mm | fine | 0.063mm - 0.1mm | medium | 0.1mm - 2mm | coarse | 2mm - 10mm | very coarse | >10mm |
|-----------|----------|------|-----------------|--------|-------------|--------|------------|-------------|-------|

| Lab Sample No(s) | Customer Sample Ref. | Depth (m)   | Colour      | Description     | Inclusions | Inclusions 2 |
|------------------|----------------------|-------------|-------------|-----------------|------------|--------------|
| 21788222         | H1                   | 0.00 - 0.10 | Dark Brown  | Silt Loam       | Vegetation | None         |
| 21788223         | H2                   | 0.00 - 0.10 | Light Brown | Sandy Clay Loam | Stones     | Vegetation   |
| 21788225         | H3                   | 0.00 - 0.10 | Light Brown | Sandy Clay      | Stones     | None         |

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



|                    |        |
|--------------------|--------|
| Report Number:     | 545134 |
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# CERTIFICATE OF ANALYSIS

Validated

SDG: 200228-139  
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Client Reference: MENV07141  
Order Number:

Report Number: 545134  
Superseded Report: 545023

## Semi Volatile Organic Compounds

| Results Legend              |                                                                                                                                                                  |        | Customer Sample Ref.                                                                                                      |  | H2                      | H3                      |  |  |  |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------------------------------------------------------------------------------------------------------------------|--|-------------------------|-------------------------|--|--|--|
| #                           | ISO17025 accredited.                                                                                                                                             |        | Depth (m)<br>Sample Type<br>Date Sampled<br>Sample Time<br>Date Received<br>SDG Ref<br>Lab Sample No.(s)<br>AGS Reference |  | 0.00 - 0.10             | 0.00 - 0.10             |  |  |  |
| M                           | mCERTS accredited.                                                                                                                                               |        |                                                                                                                           |  | Unspecified Solid (UNS) | Unspecified Solid (UNS) |  |  |  |
| aq                          | Aqueous / settled sample.                                                                                                                                        |        |                                                                                                                           |  | 28/02/2020              | 28/02/2020              |  |  |  |
| diss.filt                   | Dissolved / filtered sample.                                                                                                                                     |        |                                                                                                                           |  |                         |                         |  |  |  |
| tot.unfilt                  | Total / unfiltered sample.                                                                                                                                       |        |                                                                                                                           |  | 28/02/2020              | 28/02/2020              |  |  |  |
| *                           | Subcontracted - refer to subcontractor report for accreditation status.                                                                                          |        |                                                                                                                           |  | 200228-139              | 200228-139              |  |  |  |
| **                          | % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery |        |                                                                                                                           |  | 21788223                | 21788225                |  |  |  |
| (F)                         | Trigger breach confirmed                                                                                                                                         |        |                                                                                                                           |  |                         |                         |  |  |  |
| 1-3+5@                      | Sample deviation (see appendix)                                                                                                                                  |        |                                                                                                                           |  |                         |                         |  |  |  |
| Component                   | LOD/Units                                                                                                                                                        | Method |                                                                                                                           |  |                         |                         |  |  |  |
| Phenol                      | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| Pentachlorophenol           | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| n-Nitroso-n-dipropylamine   | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| Nitrobenzene                | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| Isophorone                  | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| Hexachloroethane            | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| Hexachlorocyclopentadiene   | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| Hexachlorobutadiene         | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| Hexachlorobenzene           | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| n-Dioctyl phthalate         | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| Dimethyl phthalate          | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| Diethyl phthalate           | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| n-Dibutyl phthalate         | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| Dibenzofuran                | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| Carbazole                   | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| Butylbenzyl phthalate       | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| bis(2-Ethylhexyl) phthalate | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| bis(2-Chloroethoxy)methane  | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| bis(2-Chloroethyl)ether     | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| Azobenzene                  | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| 4-Nitrophenol               | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| 4-Nitroaniline              | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| 4-Methylphenol              | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| 4-Chlorophenylphenylether   | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| 4-Chloroaniline             | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| 4-Chloro-3-methylphenol     | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| 4-Bromophenylphenylether    | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| 3-Nitroaniline              | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| 2-Nitrophenol               | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| 2-Nitroaniline              | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| 2-Methylphenol              | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| 1,2,4-Trichlorobenzene      | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |
| 2-Chlorophenol              | <100 µg/kg                                                                                                                                                       | TM157  |                                                                                                                           |  | <100                    | <100                    |  |  |  |



# CERTIFICATE OF ANALYSIS

Validated

SDG: 200228-139  
Location: BWLCHGWYN

Client Reference: MENV07141  
Order Number:

Report Number: 545134  
Superseded Report: 545023

## Semi Volatile Organic Compounds

| Results Legend               |                                                                                                                                                                  |        | Customer Sample Ref. | H2   | H3   |  |  |  |  |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----------------------|------|------|--|--|--|--|
| #                            | ISO17025 accredited.                                                                                                                                             |        |                      |      |      |  |  |  |  |
| M                            | mCERTS accredited.                                                                                                                                               |        |                      |      |      |  |  |  |  |
| sq                           | Aqueous / settled sample.                                                                                                                                        |        |                      |      |      |  |  |  |  |
| diss.filt                    | Dissolved / filtered sample.                                                                                                                                     |        |                      |      |      |  |  |  |  |
| tot.unfilt                   | Total / unfiltered sample.                                                                                                                                       |        |                      |      |      |  |  |  |  |
| *                            | Subcontracted - refer to subcontractor report for accreditation status.                                                                                          |        |                      |      |      |  |  |  |  |
| **                           | % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery |        |                      |      |      |  |  |  |  |
| (F)                          | Trigger breach confirmed                                                                                                                                         |        |                      |      |      |  |  |  |  |
| 1-3*§@                       | Sample deviation (see appendix)                                                                                                                                  |        |                      |      |      |  |  |  |  |
| Component                    | LOD/Units                                                                                                                                                        | Method |                      |      |      |  |  |  |  |
| 2,6-Dinitrotoluene           | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| 2,4-Dinitrotoluene           | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| 2,4-Dimethylphenol           | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| 2,4-Dichlorophenol           | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| 2,4,6-Trichlorophenol        | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| 2,4,5-Trichlorophenol        | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| 1,4-Dichlorobenzene          | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| 1,3-Dichlorobenzene          | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| 1,2-Dichlorobenzene          | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| 2-Chloronaphthalene          | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| 2-Methylnaphthalene          | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| Acenaphthylene               | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| Acenaphthene                 | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| Anthracene                   | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| Benzo(a)anthracene           | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| Benzo(b)fluoranthene         | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| Benzo(k)fluoranthene         | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| Benzo(a)pyrene               | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| Benzo(g,h,i)perylene         | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| Chrysene                     | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| Fluoranthene                 | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| Fluorene                     | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| Indeno(1,2,3-cd)pyrene       | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| Phenanthrene                 | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| Pyrene                       | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| Naphthalene                  | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| Dibenzo(a,h)anthracene       | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
| Bis(2-chloroisopropyl) ether | <100 µg/kg                                                                                                                                                       | TM157  |                      | <100 | <100 |  |  |  |  |
|                              |                                                                                                                                                                  |        |                      |      |      |  |  |  |  |
|                              |                                                                                                                                                                  |        |                      |      |      |  |  |  |  |
|                              |                                                                                                                                                                  |        |                      |      |      |  |  |  |  |
|                              |                                                                                                                                                                  |        |                      |      |      |  |  |  |  |



# CERTIFICATE OF ANALYSIS

**SDG:** 200228-139  
**Location:** BWLCHGWYN

**Client Reference:** MENV07141  
**Order Number:**

**Report Number:** 545134  
**Superseded Report:** 545023

## Asbestos Identification - Solid Samples

### Results Legend

# ISO17025 accredited.  
M mCERIS accredited.  
\* Subcontracted test.  
(F) Trigger breach confirmed  
1-5&\*\$\$@ Sample deviation (see appendix)

|                                                                                                                           |                                                                                                                  | Date of Analysis | Analysed By          | Comments | Amosite<br>(Brown)<br>Asbestos | Chrysotile<br>(White)<br>Asbestos | Crocidolite<br>(Blue) Asbestos | Fibrous<br>Actinolite | Fibrous<br>Anthophyllite | Fibrous<br>Tremolite | Non-Asbestos<br>Fibre |
|---------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|------------------|----------------------|----------|--------------------------------|-----------------------------------|--------------------------------|-----------------------|--------------------------|----------------------|-----------------------|
| Cust. Sample Ref.<br>Depth (m)<br>Sample Type<br>Date Sampled<br>Date Received<br>SDG<br>Original Sample<br>Method Number | H2<br>0.00 - 0.10<br>MISC_SOLID<br>28/02/2020 00:00:00<br>28/02/2020 13:00:00<br>200228-139<br>21788223<br>TM048 | 02/03/2020       | Marcin<br>Magdziarek | -        | Not Detected<br>(#)            | Not Detected<br>(#)               | Not Detected<br>(#)            | Not Detected<br>(#)   | Not Detected<br>(#)      | Not Detected<br>(#)  | Not Detected          |
| Cust. Sample Ref.<br>Depth (m)<br>Sample Type<br>Date Sampled<br>Date Received<br>SDG<br>Original Sample<br>Method Number | H3<br>0.00 - 0.10<br>MISC_SOLID<br>28/02/2020 00:00:00<br>28/02/2020 13:00:00<br>200228-139<br>21788225<br>TM048 | 02/03/2020       | Marcin<br>Magdziarek | -        | Not Detected<br>(#)            | Not Detected<br>(#)               | Not Detected<br>(#)            | Not Detected<br>(#)   | Not Detected<br>(#)      | Not Detected<br>(#)  | Not Detected          |



## CERTIFICATE OF ANALYSIS

Validated

**SDG:** 200228-139  
**Location:** BWLCHGWYN

**Client Reference:** MENV07141  
**Order Number:**

**Report Number:** 545134  
**Superseded Report:** 545023

### Table of Results - Appendix

| Method No | Reference                                                                              | Description                                                                                           |
|-----------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| PM024     | Modified BS 1377                                                                       | Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material |
| TM048     | HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures | Identification of Asbestos in Bulk Material                                                           |
| TM133     | BS 1377: Part 3 1990;BS 6068-2.5                                                       | Determination of pH in Soil and Water using the GLpH pH Meter                                         |
| TM157     | HP 6890 Gas Chromatograph (GC) system and HP 5973 Mass Selective Detector (MSD).       | Determination of SVOC in Soils by GC-MS extracted by sonication in DCM/Acetone                        |
| TM181     | US EPA Method 6010B                                                                    | Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES                                      |

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).



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Validated

SDG: 200228-139  
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## Test Completion Dates

| Lab Sample No(s)                | 21788222       | 21788223       | 21788225       |
|---------------------------------|----------------|----------------|----------------|
| Customer Sample Ref.            | H1             | H2             | H3             |
| AGS Ref.                        |                |                |                |
| Depth                           | 0.00 - 0.10    | 0.00 - 0.10    | 0.00 - 0.10    |
| Type                            | Unspecified So | Unspecified So | Unspecified So |
| Asbestos ID in Solid Samples    |                | 02-Mar-2020    | 02-Mar-2020    |
| Metals in solid samples by OES  | 10-Mar-2020    | 10-Mar-2020    | 10-Mar-2020    |
| pH                              | 09-Mar-2020    | 09-Mar-2020    | 09-Mar-2020    |
| Sample description              | 29-Feb-2020    | 29-Feb-2020    | 29-Feb-2020    |
| Semi Volatile Organic Compounds |                | 09-Mar-2020    | 06-Mar-2020    |



# CERTIFICATE OF ANALYSIS

|                  |            |                          |           |                           |        |
|------------------|------------|--------------------------|-----------|---------------------------|--------|
| <b>SDG:</b>      | 200228-139 | <b>Client Reference:</b> | MENV07141 | <b>Report Number:</b>     | 545134 |
| <b>Location:</b> | BWLCHGWYN  | <b>Order Number:</b>     |           | <b>Superseded Report:</b> | 545023 |

## Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH<sub>4</sub> by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

## General

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

### 18. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

|   |                                                                             |
|---|-----------------------------------------------------------------------------|
| 1 | Container with Headspace provided for volatiles analysis                    |
| 2 | Incorrect container received                                                |
| 3 | Deviation from method                                                       |
| § | Sampled on date not provided                                                |
| ◆ | Sample holding time exceeded in laboratory                                  |
| @ | Sample holding time exceeded due to late arrival of instructions or samples |

### 19. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of

#### Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

| Asbestos Type         | Common Name    |
|-----------------------|----------------|
| Chrysotile            | White Asbestos |
| Amosite               | Brown Asbestos |
| Crocidolite           | Blue Asbestos  |
| Fibrous Actinolite    | -              |
| Fibrous Anthophyllite | -              |
| Fibrous Tremolite     | -              |

#### Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

#### Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Standing Committee of Analysts, *The Quantification of Asbestos in Soil* (2107).

**Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.**

**The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.**