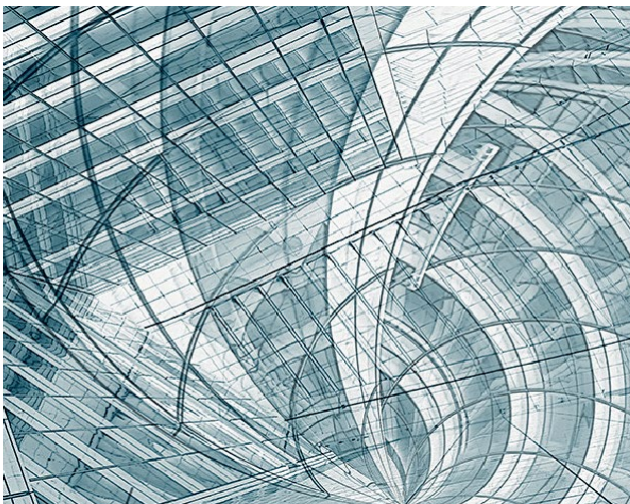




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## **Hollybank Cottage, Holly Bank, Muswell Hill**

**Verification Report**

**JSW Consultants**

**GB727A-VR-AUG-2023**

## Verification Report

### Holly Bank Cottage, Holly Bank, Muswell Hill

#### 1. Introduction

GB Card & Partners (GBCP) has been commissioned by JSW Consultants (JSW) (on behalf of Hollybanks LLP) (the Client) to provide a Verification Report to support the discharge of planning conditions for the development at Holly Bank Cottage, Holly Bank, Muswell Hill (the site).

#### 2. Background

The development at Holly Bank Cottage is understood to have been completed in June 2020. Prior to the development, a ground investigation was completed and the subsequent report<sup>1</sup> identified localised concentrations of lead, beryllium and polycyclic aromatic hydrocarbons (PAH) above generic assessment criteria (GAC) for residential use with plant uptake. As such, the report recommended excavation of 600mm of existing soils and placement of a cover system to mitigate potential risks to future site users to comprise the following:

- A geotextile and/or mesh layer at the base of the excavation.
- 150mm thick layer of gap graded concrete (5-75mm) or the like;
- A second geotextile layer; and
- 450mm thick layer of clean certified topsoil.

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Managing Director: Dr Geoffrey B Card  
BSc PhD CEng FICE Eurlng CGeol FGS CSci  
Registered in England and Wales No. 7453462.  
Registered office at Dixcart House, Addlestone Road,  
Bourne Business Park, Addlestone, KT15 2LE.

<sup>1</sup> Site Analytical Services Limited (2017). Report on a Ground Investigation, Hollybanks, Muswell Hill, London, N19 3TN. Ref: 17/27180. October 2017.



The report also recommended that barrier pipe was used for potable water supply.

The Local Authority has reviewed information provided by the Client to facilitate discharge of condition 3 of the approved planning permission HGY/2023/0562. The Local Authority has requested the following information to support discharge of condition 3:

1. Evidence of verification sampling of the imported topsoil including chemical analysis results and photographs to confirm cover system depth of the soft landscaped areas; and
2. Confirmation from the Water Supplier that appropriate pipe has been installed.

### **3. Verification**

The following sections set out the verification activities undertaken by GBCP and the information provided by the Client.

### **4. Cover system verification**

Verification of the capping material placed in the accessible gardens and soft landscaped areas of the site was undertaken by GBCP on 11 July 2023. The verification locations are shown on a plan in Appendix A and discussed in the following sections.

#### **4.1 Capping layer construction**

The capping layer thicknesses observed at each verification location are detailed in Table 1 with photographs from the site visit included in Appendix B.

**Table 1: Capping layer thickness**

| <b>Verification location</b> | <b>Date inspected</b> | <b>Topsoil thickness (mm)</b> | <b>Reworked natural soils thickness (mm)</b> |
|------------------------------|-----------------------|-------------------------------|----------------------------------------------|
| V01                          | 11/07/23              | 200                           | 450                                          |
| V02                          | 11/07/23              | 200                           | 500                                          |
| V03                          | 11/07/23              | 350                           | 330                                          |



The soils encountered at the verification locations were as follows:

### **V01**

*Topsoil* (0.0m – 0.20m bgl): Brown gravelly clayey SAND. Sand is fine to coarse. Gravel is subrounded to rounded fine and medium flint.

*Reworked soils* (0.20m – 0.45m bgl): Orangish brown gravelly clayey SAND. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse flint with occasional concrete and brick fragments.

*Reworked natural soils* (0.45m – 0.65m bgl): Brownish grey gravelly SAND/CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse flint and occasional brick fragments.

### **V02**

*Turf* (0.00m – 0.10m bgl).

*Topsoil* (0.10m – 0.20m bgl): Light brown clayey gravelly SAND. Sand is fine to coarse. Gravel is subangular to subrounded fine and medium flints. With frequent roots.

*Reworked soils* (0.20m – 0.70m bgl): Brown grey gravelly clayey SAND. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse flint and occasional brick fragments. Occasional 2 to 3mm thick clay bands throughout.

### **V03**

*Bark coverings* (0.00m – 0.05m bgl).

*Topsoil* (0.05m – 0.35m bgl): Dark brown slightly gravelly clayey SAND. Sand is fine to coarse. Gravel is subrounded to subangular fine and medium flint/ bark.

*Natural soils* (0.35m – 0.68m bgl): Soft light grey gravelly CLAY. Gravel is subangular to subrounded fine and medium flint.



No geotextile layer of 150mm gap graded concrete layer were encountered within the verification locations. Photographs have been previously provided to the Local Authority showing installation of a black membrane in areas of soft landscaping which are likely to have been installed below the depths of the verification pits.

As the capping layer has not been constructed in strict accordance with the requirements of the previous report, additional samples were collected from reworked and natural soils in order to provide additional data to assess the quality of the underlying soils.

## **4.2 Chemical testing**

The chemical testing of verification samples was undertaken by DETS which is a United Kingdom Accreditation Service (UKAS) and the Environment Agency's Monitoring Certification Scheme (MCERTS) accredited laboratory for the selected suite of analysis. Samples were tested for metals, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH), phenols, cyanide and asbestos. The laboratory reports are included in Appendix C.

The chemical test results were screened against the GAC which are included in Appendix D. The GAC for residential plant uptake were used in the screening assessment with a soil organic matter (SOM) of 2.5% as a conservative measure as the SOM ranged between 3.60% and 8.60%

Concentrations of all analytes were reported below the GAC with a single exception. Lead was reported at 382mg/kg which is above the GAC of 200mg/kg in the sample of reworked material from V02 at 0.40m bgl. The topsoil sample from the same verification location at 0.10m bgl reported lead below the adopted GAC. As such, there is not considered to be an unacceptable risk from surface soils to human health and the topsoil for planting is suitable for the intended use with a thickness of 350mm over the underlying natural soils. All concentrations of other analytes were below the laboratory limit of detection and/or GAC indicating that this single exceedance is localised and not representative of the material beneath soft landscaped areas.



## 5. Barrier pipe installation

Information previously provided by the Client to the Local Authority confirms that appropriate barrier pipes were sourced from Thames Water with photographs to show that barrier pipes have been installed at the site. GBCP did not inspect the installation of the water supply pipes but there is sufficient information to demonstrate that this work was undertaken in accordance with the previous report and will be signed off by Thames Water.

## 6. Conclusion

The verification inspection by GBCP together with the information supplied by the Client confirms that the outstanding items relating to condition 3 of the approved planning permission HGY/2023/0562 have been addressed. It is considered that following the installation of remedial measures, the site poses no abnormal risk to future occupants and users of the development.

| Author                                                                              |                                   | Author                                                                              |                                                   | Checked                                                                               |                                                              |
|-------------------------------------------------------------------------------------|-----------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------|
|  | Anna Smaje<br>Engineer<br>BSc FGS |  | Kerry Jones<br>Principal Consultant<br>BSc MEnvSc |  | Laura Bacon<br>Director<br>BSc CGeol<br>EurGeol FGS<br>RoGEP |

## Appendices

Appendix A – Trial hole location plan

Appendix B – Site photographs

Appendix C – Laboratory results

Appendix D – Soil screening assessment

# Appendix A

Trial hole location plan





Verification trial  
pit location

Base drawing provided to GB Card and Partners by the Client.

DO NOT SCALE



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PROJECT

GB727A - Holly Bank Cottage Verification

### Garden verification trial pit locations

CLIENT  
JSW Consultants

STATUS

|          |                |
|----------|----------------|
| FINAL    |                |
| DRAWN HP | DATE 04/08/202 |

|          |     |                 |
|----------|-----|-----------------|
| CHECKED  | BMG | SCALE 1:200 @ A |
| APPROVED | K1  |                 |

|                |          |
|----------------|----------|
| DRAWING NUMBER | REVISION |
| GB727A-DWG-001 | 0        |

# Appendix B

Site photographs





Photo 1: V01 Inspection Pit



Photo 2: V02 Inspection Pit



Photo 3: V03 Inspection Pit

Fig. No.: **Figure 1**

Figure: **Photosheet**

Project ref.: **GB/727A**

Project: **Hollybank Verification**

Notes:

Dwg No.: **GB727A-001** Rev: **0**

Drn: **AS** Chk: **KJ** Date: **11/07/23**

# Appendix C

Laboratory results





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GB Card and Partners  
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Bourne Buisness Park  
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t: 01622 850410

## **DETS Report No: 23-09327**

**Site Reference:** Holly Bank Cottage

**Project / Job Ref:** GB727A

**Order No:** GB727A/KJ

**Sample Receipt Date:** 18/07/2023

**Sample Scheduled Date:** 18/07/2023

**Report Issue Number:** 1

**Reporting Date:** 25/07/2023

**Authorised by:**

Kevin Old  
Operations Director

Dates of laboratory activities for each tested analyte are available upon request.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.



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| Soil Analysis Certificate                 |                        |               |               |               |               |               |
|-------------------------------------------|------------------------|---------------|---------------|---------------|---------------|---------------|
| <b>DETS Report No: 23-09327</b>           | <b>Date Sampled</b>    | 11/07/23      | 11/07/23      | 11/07/23      | 11/07/23      | 11/07/23      |
| <b>GB Card and Partners</b>               | <b>Time Sampled</b>    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Site Reference: Holly Bank Cottage</b> | <b>TP / BH No</b>      | V01           | V02           | V03           | V03           | V03           |
| <b>Project / Job Ref: GB727A</b>          | <b>Additional Refs</b> | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Order No: GB727A/KJ</b>                | <b>Depth (m)</b>       | 0.40          | 0.40          | 0.30          | 0.40          | 0.60          |
| <b>Reporting Date: 25/07/2023</b>         | <b>DETS Sample No</b>  | 664694        | 664697        | 664698        | 664699        | 664700        |

| Determinand                       | Unit     | RL     | Accreditation |              |              |              |              |              |
|-----------------------------------|----------|--------|---------------|--------------|--------------|--------------|--------------|--------------|
| Asbestos Screen <sup>(S)</sup>    | N/a      | N/a    | ISO17025      | Not Detected | Not Detected | Not Detected | Not Detected | Not Detected |
| pH                                | pH Units | N/a    | MCERTS        | 8.0          | 7.8          | 7.8          | 8.0          | 8.4          |
| Total Cyanide                     | mg/kg    | < 1    | NONE          | < 1          | < 1          | < 1          | < 1          | < 1          |
| Total Sulphate as SO <sub>4</sub> | mg/kg    | < 200  | MCERTS        | 1541         | 1439         | 1074         | 987          | 999          |
| Total Sulphate as SO <sub>4</sub> | %        | < 0.02 | MCERTS        | 0.15         | 0.14         | 0.11         | 0.10         | 0.10         |
| Organic Matter (SOM)              | %        | < 0.1  | MCERTS        | 4.7          | 8.6          | 8            | 4.6          | 4.4          |
| Arsenic (As)                      | mg/kg    | < 2    | MCERTS        | 7            | 22           | 8            | 8            | 9            |
| Barium (Ba)                       | mg/kg    | < 2.5  | MCERTS        | 64           | 126          | 55           | 55           | 59           |
| Beryllium (Be)                    | mg/kg    | < 0.5  | MCERTS        | < 0.5        | 0.9          | < 0.5        | < 0.5        | 0.6          |
| W/S Boron                         | mg/kg    | < 1    | NONE          | 1.1          | 1.5          | 1.6          | 1.1          | < 1          |
| Cadmium (Cd)                      | mg/kg    | < 0.2  | MCERTS        | 0.3          | 0.4          | 0.2          | 0.2          | < 0.2        |
| Chromium (Cr)                     | mg/kg    | < 2    | MCERTS        | 12           | 20           | 13           | 15           | 18           |
| Chromium (hexavalent)             | mg/kg    | < 2    | NONE          | < 2          | < 2          | < 2          | < 2          | < 2          |
| Copper (Cu)                       | mg/kg    | < 4    | MCERTS        | 25           | 61           | 29           | 21           | 25           |
| Lead (Pb)                         | mg/kg    | < 3    | MCERTS        | 49           | 382          | 66           | 40           | 53           |
| Mercury (Hg)                      | mg/kg    | < 1    | MCERTS        | < 1          | < 1          | < 1          | < 1          | < 1          |
| Nickel (Ni)                       | mg/kg    | < 3    | MCERTS        | 9            | 17           | 8            | 12           | 15           |
| Selenium (Se)                     | mg/kg    | < 2    | MCERTS        | < 2          | < 2          | < 2          | < 2          | < 2          |
| Vanadium (V)                      | mg/kg    | < 1    | MCERTS        | 23           | 37           | 23           | 30           | 36           |
| Zinc (Zn)                         | mg/kg    | < 3    | MCERTS        | 79           | 196          | 90           | 62           | 68           |
| Total Phenols (monohydric)        | mg/kg    | < 2    | NONE          | < 2          | < 2          | 4.4          | 2.4          | < 2          |

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion  
Subcontracted analysis (S)



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| Soil Analysis Certificate - Speciated PAHs |                 |               |               |               |               |               |
|--------------------------------------------|-----------------|---------------|---------------|---------------|---------------|---------------|
| DETS Report No: 23-09327                   | Date Sampled    | 11/07/23      | 11/07/23      | 11/07/23      | 11/07/23      | 11/07/23      |
| GB Card and Partners                       | Time Sampled    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Site Reference: Holly Bank Cottage         | TP / BH No      | V01           | V02           | V03           | V03           | V03           |
| Project / Job Ref: GB727A                  | Additional Refs | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Order No: GB727A/KJ                        | Depth (m)       | 0.40          | 0.40          | 0.30          | 0.40          | 0.60          |
| Reporting Date: 25/07/2023                 | DETS Sample No  | 664694        | 664697        | 664698        | 664699        | 664700        |

| Determinand            | Unit  | RL    | Accreditation |       |       |       |       |       |
|------------------------|-------|-------|---------------|-------|-------|-------|-------|-------|
| Naphthalene            | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Acenaphthylene         | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Acenaphthene           | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Fluorene               | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Phenanthrene           | mg/kg | < 0.1 | MCERTS        | < 0.1 | 0.16  | < 0.1 | < 0.1 | < 0.1 |
| Anthracene             | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Fluoranthene           | mg/kg | < 0.1 | MCERTS        | 0.24  | 0.47  | 0.13  | < 0.1 | < 0.1 |
| Pyrene                 | mg/kg | < 0.1 | MCERTS        | 0.22  | 0.44  | 0.13  | < 0.1 | < 0.1 |
| Benzo(a)anthracene     | mg/kg | < 0.1 | MCERTS        | 0.15  | 0.30  | < 0.1 | < 0.1 | < 0.1 |
| Chrysene               | mg/kg | < 0.1 | MCERTS        | 0.14  | 0.27  | < 0.1 | < 0.1 | < 0.1 |
| Benzo(b)fluoranthene   | mg/kg | < 0.1 | MCERTS        | 0.17  | 0.32  | < 0.1 | < 0.1 | < 0.1 |
| Benzo(k)fluoranthene   | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Benzo(a)pyrene         | mg/kg | < 0.1 | MCERTS        | 0.16  | 0.34  | < 0.1 | < 0.1 | < 0.1 |
| Indeno(1,2,3-cd)pyrene | mg/kg | < 0.1 | MCERTS        | < 0.1 | 0.20  | < 0.1 | < 0.1 | < 0.1 |
| Dibenz(a,h)anthracene  | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 | < 0.1 | < 0.1 |
| Benzo(ghi)perylene     | mg/kg | < 0.1 | MCERTS        | < 0.1 | 0.26  | < 0.1 | < 0.1 | < 0.1 |
| Coronene               | mg/kg | < 0.1 | NONE          | < 0.1 | 0.15  | < 0.1 | < 0.1 | < 0.1 |
| Total Oily Waste PAHs  | mg/kg | < 1   | MCERTS        | < 1   | 1.4   | < 1   | < 1   | < 1   |
| Total Dutch 10 PAHs    | mg/kg | < 1   | MCERTS        | < 1   | 2     | < 1   | < 1   | < 1   |
| Total EPA-16 PAHs      | mg/kg | < 1.6 | MCERTS        | < 1.6 | 2.8   | < 1.6 | < 1.6 | < 1.6 |
| Total WAC-17 PAHs      | mg/kg | < 1.7 | NONE          | < 1.7 | 2.9   | < 1.7 | < 1.7 | < 1.7 |



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**Soil Analysis Certificate - TPH CWG Banded**

|                                           |                        |               |               |               |               |               |
|-------------------------------------------|------------------------|---------------|---------------|---------------|---------------|---------------|
| <b>DETS Report No: 23-09327</b>           | <b>Date Sampled</b>    | 11/07/23      | 11/07/23      | 11/07/23      | 11/07/23      | 11/07/23      |
| <b>GB Card and Partners</b>               | <b>Time Sampled</b>    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Site Reference: Holly Bank Cottage</b> | <b>TP / BH No</b>      | V01           | V02           | V03           | V03           | V03           |
| <b>Project / Job Ref: GB727A</b>          | <b>Additional Refs</b> | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| <b>Order No: GB727A/KJ</b>                | <b>Depth (m)</b>       | 0.40          | 0.40          | 0.30          | 0.40          | 0.60          |
| <b>Reporting Date: 25/07/2023</b>         | <b>DETS Sample No</b>  | 664694        | 664697        | 664698        | 664699        | 664700        |

| Determinand                                      | Unit  | RL     | Accreditation |        |        |        |        |        |
|--------------------------------------------------|-------|--------|---------------|--------|--------|--------|--------|--------|
| Aliphatic >C5 - C6 :<br>HS_1D_MS_AL              | mg/kg | < 0.01 | NONE          | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Aliphatic >C6 - C8 :<br>HS_1D_MS_AL              | mg/kg | < 0.05 | NONE          | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aliphatic >C8 - C10 :<br>EH_CU_1D_AL             | mg/kg | < 2    | MCERTS        | < 2    | < 2    | < 2    | < 2    | < 2    |
| Aliphatic >C10 - C12 :<br>EH_CU_1D_AL            | mg/kg | < 2    | MCERTS        | < 2    | < 2    | < 2    | < 2    | < 2    |
| Aliphatic >C12 - C16 :<br>EH_CU_1D_AL            | mg/kg | < 3    | MCERTS        | < 3    | < 3    | < 3    | < 3    | < 3    |
| Aliphatic >C16 - C21 :<br>EH_CU_1D_AL            | mg/kg | < 3    | MCERTS        | < 3    | 3      | < 3    | < 3    | < 3    |
| Aliphatic >C21 - C34 :<br>EH_CU_1D_AL            | mg/kg | < 10   | MCERTS        | < 10   | 67     | < 10   | < 10   | < 10   |
| Aliphatic (C5 - C34) :<br>HS_1D_MS+EH_CU_1D_AL   | mg/kg | < 21   | NONE          | < 21   | 70     | < 21   | < 21   | < 21   |
| Aromatic >C5 - C7 :<br>HS_1D_MS_AR               | mg/kg | < 0.01 | NONE          | < 0.01 | < 0.01 | < 0.01 | < 0.01 | < 0.01 |
| Aromatic >C7 - C8 :<br>HS_1D_MS_AR               | mg/kg | < 0.05 | NONE          | < 0.05 | < 0.05 | < 0.05 | < 0.05 | < 0.05 |
| Aromatic >C8 - C10 :<br>EH_CU_1D_AR              | mg/kg | < 2    | MCERTS        | < 2    | < 2    | < 2    | < 2    | < 2    |
| Aromatic >C10 - C12 :<br>EH_CU_1D_AR             | mg/kg | < 2    | MCERTS        | < 2    | < 2    | < 2    | < 2    | < 2    |
| Aromatic >C12 - C16 :<br>EH_CU_1D_AR             | mg/kg | < 2    | MCERTS        | < 2    | < 2    | < 2    | < 2    | < 2    |
| Aromatic >C16 - C21 :<br>EH_CU_1D_AR             | mg/kg | < 3    | MCERTS        | < 3    | < 3    | < 3    | < 3    | < 3    |
| Aromatic >C21 - C35 :<br>EH_CU_1D_AR             | mg/kg | < 10   | MCERTS        | < 10   | < 10   | < 10   | < 10   | < 10   |
| Aromatic (C5 - C35) :<br>HS_1D_MS+EH_CU_1D_AR    | mg/kg | < 21   | NONE          | < 21   | < 21   | < 21   | < 21   | < 21   |
| Total >C5 - C35 :<br>HS_1D_MS+EH_CU_1D_Tot<br>al | mg/kg | < 42   | NONE          | < 42   | 70     | < 42   | < 42   | < 42   |



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| Soil Analysis Certificate - BTEX / MTBE |                 |               |               |               |               |               |
|-----------------------------------------|-----------------|---------------|---------------|---------------|---------------|---------------|
| DETS Report No: 23-09327                | Date Sampled    | 11/07/23      | 11/07/23      | 11/07/23      | 11/07/23      | 11/07/23      |
| GB Card and Partners                    | Time Sampled    | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Site Reference: Holly Bank Cottage      | TP / BH No      | V01           | V02           | V03           | V03           | V03           |
| Project / Job Ref: GB727A               | Additional Refs | None Supplied | None Supplied | None Supplied | None Supplied | None Supplied |
| Order No: GB727A/KJ                     | Depth (m)       | 0.40          | 0.40          | 0.30          | 0.40          | 0.60          |
| Reporting Date: 25/07/2023              | DETS Sample No  | 664694        | 664697        | 664698        | 664699        | 664700        |

| Determinand             | Unit  | RL  | Accreditation |     |     |     |     |     |
|-------------------------|-------|-----|---------------|-----|-----|-----|-----|-----|
| Benzene : HS_1D_MS      | ug/kg | < 2 | MCERTS        | < 2 | < 2 | < 2 | < 2 | < 2 |
| Toluene : HS_1D_MS      | ug/kg | < 5 | MCERTS        | < 5 | < 5 | < 5 | < 5 | < 5 |
| Ethylbenzene : HS_1D_MS | ug/kg | < 2 | MCERTS        | < 2 | < 2 | < 2 | < 2 | < 2 |
| p & m-xylene : HS_1D_MS | ug/kg | < 2 | MCERTS        | < 2 | < 2 | < 2 | < 2 | < 2 |
| o-xylene : HS_1D_MS     | ug/kg | < 2 | MCERTS        | < 2 | < 2 | < 2 | < 2 | < 2 |
| MTBE : HS_1D_MS         | ug/kg | < 5 | MCERTS        | < 5 | < 5 | < 5 | < 5 | < 5 |



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#### Soil Analysis Certificate - Sample Descriptions

|                                    |  |
|------------------------------------|--|
| DETS Report No: 23-09327           |  |
| GB Card and Partners               |  |
| Site Reference: Holly Bank Cottage |  |
| Project / Job Ref: GB727A          |  |
| Order No: GB727A/KJ                |  |
| Reporting Date: 25/07/2023         |  |

| DETS Sample No | TP / BH No | Additional Refs | Depth (m) | Moisture Content (%) | Sample Matrix Description                   |
|----------------|------------|-----------------|-----------|----------------------|---------------------------------------------|
| 664694         | V01        | None Supplied   | 0.40      | 13.6                 | Black loamy sand with stones and concrete   |
| 664697         | V02        | None Supplied   | 0.40      | 14.5                 | Black loamy sand with stones and brick      |
| 664698         | V03        | None Supplied   | 0.30      | 24.5                 | Black loamy sand with stones and vegetation |
| 664699         | V03        | None Supplied   | 0.40      | 19.4                 | Brown sandy clay with stones                |
| 664700         | V03        | None Supplied   | 0.60      | 27.1                 | Brown sandy clay with stones                |

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample <sup>1/5</sup>

Unsuitable Sample <sup>u/s</sup>



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# Soil Analysis Certificate - Methodology & Miscellaneous Information

**DETS Report No: 23-09327**

**GB Card and Partners**

**Site Reference: Holly Bank Cottage**

**Project / Job Ref: GB727A**

**Order No: GB727A/KJ**

**Reporting Date: 25/07/2023**

| Matrix | Analysed On | Determinand                                                                                                                                     | Brief Method Description                                                                                                                             | Method No |
|--------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Soil   | D           | Boron - Water Soluble                                                                                                                           | Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES                                                            | E012      |
| Soil   | AR          | BTEX                                                                                                                                            | Determination of BTEX by headspace GC-MS                                                                                                             | E001      |
| Soil   | D           | Cations                                                                                                                                         | Determination of cations in soil by aqua-regia digestion followed by ICP-OES                                                                         | E002      |
| Soil   | D           | Chloride - Water Soluble (2:1)                                                                                                                  | Determination of chloride by extraction with water & analysed by ion chromatography                                                                  | E009      |
| Soil   | AR          | Chromium - Hexavalent                                                                                                                           | Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry | E016      |
| Soil   | AR          | Cyanide - Complex                                                                                                                               | Determination of complex cyanide by distillation followed by colorimetry                                                                             | E015      |
| Soil   | AR          | Cyanide - Free                                                                                                                                  | Determination of free cyanide by distillation followed by colorimetry                                                                                | E015      |
| Soil   | AR          | Cyanide - Total                                                                                                                                 | Determination of total cyanide by distillation followed by colorimetry                                                                               | E015      |
| Soil   | D           | Cyclohexane Extractable Matter (CEM)                                                                                                            | Gravimetrically determined through extraction with cyclohexane                                                                                       | E011      |
| Soil   | AR          | Diesel Range Organics (C10 - C24)                                                                                                               | Determination of hexane/acetone extractable hydrocarbons by GC-FID                                                                                   | E004      |
| Soil   | AR          | Electrical Conductivity                                                                                                                         | Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement                             | E022      |
| Soil   | AR          | Electrical Conductivity                                                                                                                         | Determination of electrical conductivity by addition of water followed by electrometric measurement                                                  | E023      |
| Soil   | D           | Elemental Sulphur                                                                                                                               | Determination of elemental sulphur by solvent extraction followed by GC-MS                                                                           | E020      |
| Soil   | AR          | EPH (C10 - C40)                                                                                                                                 | Determination of acetone/hexane extractable hydrocarbons by GC-FID                                                                                   | E004      |
| Soil   | AR          | EPH Product ID                                                                                                                                  | Determination of acetone/hexane extractable hydrocarbons by GC-FID                                                                                   | E004      |
| Soil   | AR          | EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)                                                                                   | Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS                                        | E004      |
| Soil   | D           | Fluoride - Water Soluble                                                                                                                        | Determination of Fluoride by extraction with water & analysed by ion chromatography                                                                  | E009      |
| Soil   | D           | Fraction Organic Carbon (FOC)                                                                                                                   | Determination of TOC by combustion analyser.                                                                                                         | E027      |
| Soil   | D           | Organic Matter (SOM)                                                                                                                            | Determination of TOC by combustion analyser.                                                                                                         | E027      |
| Soil   | D           | TOC (Total Organic Carbon)                                                                                                                      | Determination of TOC by combustion analyser.                                                                                                         | E027      |
| Soil   | AR          | Exchangeable Ammonium                                                                                                                           | Determination of ammonium by discrete analyser.                                                                                                      | E029      |
| Soil   | D           | FOC (Fraction Organic Carbon)                                                                                                                   | Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate                     | E010      |
| Soil   | D           | Loss on Ignition @ 450oC                                                                                                                        | Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace                                       | E019      |
| Soil   | D           | Magnesium - Water Soluble                                                                                                                       | Determination of water soluble magnesium by extraction with water followed by ICP-OES                                                                | E025      |
| Soil   | D           | Metals                                                                                                                                          | Determination of metals by aqua-regia digestion followed by ICP-OES                                                                                  | E002      |
| Soil   | AR          | Mineral Oil (C10 - C40)                                                                                                                         | Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge                                                  | E004      |
| Soil   | AR          | Moisture Content                                                                                                                                | Moisture content; determined gravimetrically                                                                                                         | E003      |
| Soil   | D           | Nitrate - Water Soluble (2:1)                                                                                                                   | Determination of nitrate by extraction with water & analysed by ion chromatography                                                                   | E009      |
| Soil   | D           | Organic Matter                                                                                                                                  | Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate                                 | E010      |
| Soil   | AR          | PAH - Speciated (EPA 16)                                                                                                                        | Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards                | E005      |
| Soil   | AR          | PCB - 7 Congeners                                                                                                                               | Determination of PCB by extraction with acetone and hexane followed by GC-MS                                                                         | E008      |
| Soil   | D           | Petroleum Ether Extract (PEE)                                                                                                                   | Gravimetrically determined through extraction with petroleum ether                                                                                   | E011      |
| Soil   | AR          | pH                                                                                                                                              | Determination of pH by addition of water followed by electrometric measurement                                                                       | E007      |
| Soil   | AR          | Phenols - Total (monohydric)                                                                                                                    | Determination of phenols by distillation followed by colorimetry                                                                                     | E021      |
| Soil   | D           | Phosphate - Water Soluble (2:1)                                                                                                                 | Determination of phosphate by extraction with water & analysed by ion chromatography                                                                 | E009      |
| Soil   | D           | Sulphate (as SO4) - Total                                                                                                                       | Determination of total sulphate by extraction with 10% HCl followed by ICP-OES                                                                       | E013      |
| Soil   | D           | Sulphate (as SO4) - Water Soluble (2:1)                                                                                                         | Determination of sulphate by extraction with water & analysed by ion chromatography                                                                  | E009      |
| Soil   | D           | Sulphate (as SO4) - Water Soluble (2:1)                                                                                                         | Determination of water soluble sulphate by extraction with water followed by ICP-OES                                                                 | E014      |
| Soil   | AR          | Sulphide                                                                                                                                        | Determination of sulphide by distillation followed by colorimetry                                                                                    | E018      |
| Soil   | D           | Sulphur - Total                                                                                                                                 | Determination of total sulphur by extraction with aqua-regia followed by ICP-OES                                                                     | E024      |
| Soil   | AR          | SVOC                                                                                                                                            | Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS                                               | E006      |
| Soil   | AR          | Thiocyanate (as SCN)                                                                                                                            | Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry  | E017      |
| Soil   | D           | Toluene Extractable Matter (TEM)                                                                                                                | Gravimetrically determined through extraction with toluene                                                                                           | E011      |
| Soil   | D           | Total Organic Carbon (TOC)                                                                                                                      | Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate                                 | E010      |
| Soil   | AR          | TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)         | Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS       | E004      |
| Soil   | AR          | TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44) | Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS       | E004      |
| Soil   | AR          | VOCs                                                                                                                                            | Determination of volatile organic compounds by headspace GC-MS                                                                                       | E001      |
| Soil   | AR          | VPH (C6-C8 & C8-C10)                                                                                                                            | Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID                                                                            | E001      |

**D Dried**  
**AR As Received**



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|                                            |
|--------------------------------------------|
| <b>List of HWOL Acronyms and Operators</b> |
| <b>DETS Report No: 23-09327</b>            |
| <b>GB Card and Partners</b>                |
| <b>Site Reference: Holly Bank Cottage</b>  |
| <b>Project / Job Ref: GB727A</b>           |
| <b>Order No: GB727A/KJ</b>                 |
| <b>Reporting Date: 25/07/2023</b>          |

| Acronym | Description                                                         |
|---------|---------------------------------------------------------------------|
| HS      | Headspace analysis                                                  |
| EH      | Extractable Hydrocarbons - i.e. everything extracted by the solvent |
| CU      | Clean-up - e.g. by florisil, silica gel                             |
| 1D      | GC - Single coil gas chromatography                                 |
| 2D      | GC-GC - Double coil gas chromatography                              |
| Total   | Aliphatics & Aromatics                                              |
| AL      | Aliphatics only                                                     |
| AR      | Aromatics only                                                      |
| #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 eg. EH+HS_Total or EH_CU+HS_Total   |

|                                                     |
|-----------------------------------------------------|
| Det - Acronym                                       |
| Benzene - HS_1D_MS                                  |
| Ethylbenzene - HS_1D_MS                             |
| MTBE - HS_1D_MS                                     |
| TPH CWG - Aliphatic >C10 - C12 - EH_CU_1D_AL        |
| TPH CWG - Aliphatic >C12 - C16 - EH_CU_1D_AL        |
| TPH CWG - Aliphatic >C16 - C21 - EH_CU_1D_AL        |
| TPH CWG - Aliphatic >C21 - C34 - EH_CU_1D_AL        |
| TPH CWG - Aliphatic >C5 - C6 - HS_1D_MS_AL          |
| TPH CWG - Aliphatic >C6 - C8 - HS_1D_MS_AL          |
| TPH CWG - Aliphatic >C8 - C10 - EH_CU_1D_AL         |
| TPH CWG - Aliphatic C5 - C34 - HS_1D_MS+EH_CU_1D_AL |
| TPH CWG - Aromatic >C10 - C12 - EH_CU_1D_AR         |
| TPH CWG - Aromatic >C12 - C16 - EH_CU_1D_AR         |
| TPH CWG - Aromatic >C16 - C21 - EH_CU_1D_AR         |
| TPH CWG - Aromatic >C21 - C35 - EH_CU_1D_AR         |
| TPH CWG - Aromatic >C5 - C35 - HS_1D_MS+EH_CU_1D_AR |
| TPH CWG - Aromatic >C5 - C7 - HS_1D_MS_AR           |
| TPH CWG - Aromatic >C7 - C8 - HS_1D_MS_AR           |
| TPH CWG - Aromatic >C8 - C10 - EH_CU_1D_AR          |
| TPH CWG - Total >C5 - C35 - HS_1D_MS+EH_CU_1D_Total |
| Toluene - HS_1D_MS                                  |
| m & p-xylene - HS_1D_MS                             |
| o-Xylene - HS_1D_MS                                 |



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### **DETS Report No: 23-09383**

**Site Reference:** Holly Bank Cottage

**Project / Job Ref:** GB727A

**Order No:** GB727A/KJ

**Sample Receipt Date:** 19/07/2023

**Sample Scheduled Date:** 19/07/2023

**Report Issue Number:** 1

**Reporting Date:** 26/07/2023

**Authorised by:**

Dave Ashworth  
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.



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| Soil Analysis Certificate                 |                        |               |               |               |  |  |
|-------------------------------------------|------------------------|---------------|---------------|---------------|--|--|
| <b>DETS Report No: 23-09383</b>           | <b>Date Sampled</b>    | 11/07/23      | 11/07/23      | 11/07/23      |  |  |
| <b>GB Card and Partners</b>               | <b>Time Sampled</b>    | None Supplied | None Supplied | None Supplied |  |  |
| <b>Site Reference: Holly Bank Cottage</b> | <b>TP / BH No</b>      | V01           | V01           | V02           |  |  |
| <b>Project / Job Ref: GB727A</b>          | <b>Additional Refs</b> | None Supplied | None Supplied | None Supplied |  |  |
| <b>Order No: GB727A/KJ</b>                | <b>Depth (m)</b>       | 0.20          | 0.60          | 0.10          |  |  |
| <b>Reporting Date: 26/07/2023</b>         | <b>DETS Sample No</b>  | 664899        | 664900        | 664901        |  |  |

| Determinand                       | Unit     | RL     | Accreditation | (n)          |              |              |  |  |
|-----------------------------------|----------|--------|---------------|--------------|--------------|--------------|--|--|
| Asbestos Screen <sup>(S)</sup>    | N/a      | N/a    | ISO17025      | Not Detected | Not Detected | Not Detected |  |  |
| pH                                | pH Units | N/a    | MCERTS        | 7.7          | 9.9          | 7.3          |  |  |
| Total Cyanide                     | mg/kg    | < 1    | NONE          | < 1          | < 1          | < 1          |  |  |
| Total Sulphate as SO <sub>4</sub> | mg/kg    | < 200  | MCERTS        | 1242         | 2465         | 606          |  |  |
| Total Sulphate as SO <sub>4</sub> | %        | < 0.02 | MCERTS        | 0.12         | 0.25         | 0.06         |  |  |
| Organic Matter (SOM)              | %        | < 0.1  | MCERTS        | 8.4          | 3.6          | 8            |  |  |
| Arsenic (As)                      | mg/kg    | < 2    | MCERTS        | 10           | 8            | 8            |  |  |
| Barium (Ba)                       | mg/kg    | < 2.5  | MCERTS        | 84           | 99           | 53           |  |  |
| Beryllium (Be)                    | mg/kg    | < 0.5  | MCERTS        | 0.5          | < 0.5        | < 0.5        |  |  |
| W/S Boron                         | mg/kg    | < 1    | NONE          | 1.4          | < 1          | < 1          |  |  |
| Cadmium (Cd)                      | mg/kg    | < 0.2  | MCERTS        | 0.3          | < 0.2        | < 0.2        |  |  |
| Chromium (Cr)                     | mg/kg    | < 2    | MCERTS        | 15           | 13           | 10           |  |  |
| Chromium (hexavalent)             | mg/kg    | < 2    | NONE          | < 2          | < 2          | < 2          |  |  |
| Copper (Cu)                       | mg/kg    | < 4    | MCERTS        | 41           | 24           | 24           |  |  |
| Lead (Pb)                         | mg/kg    | < 3    | MCERTS        | 84           | 57           | 50           |  |  |
| Mercury (Hg)                      | mg/kg    | < 1    | MCERTS        | < 1          | < 1          | < 1          |  |  |
| Nickel (Ni)                       | mg/kg    | < 3    | MCERTS        | 10           | 11           | 7            |  |  |
| Selenium (Se)                     | mg/kg    | < 2    | MCERTS        | < 2          | < 2          | < 2          |  |  |
| Vanadium (V)                      | mg/kg    | < 1    | MCERTS        | 26           | 24           | 17           |  |  |
| Zinc (Zn)                         | mg/kg    | < 3    | MCERTS        | 113          | 64           | 70           |  |  |
| Total Phenols (monohydric)        | mg/kg    | < 2    | NONE          | < 2          | < 2          | < 2          |  |  |

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion

Subcontracted analysis (S)

(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation



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| Soil Analysis Certificate - Speciated PAHs |                 |               |               |               |  |  |
|--------------------------------------------|-----------------|---------------|---------------|---------------|--|--|
| DETS Report No: 23-09383                   | Date Sampled    | 11/07/23      | 11/07/23      | 11/07/23      |  |  |
| GB Card and Partners                       | Time Sampled    | None Supplied | None Supplied | None Supplied |  |  |
| Site Reference: Holly Bank Cottage         | TP / BH No      | V01           | V01           | V02           |  |  |
| Project / Job Ref: GB727A                  | Additional Refs | None Supplied | None Supplied | None Supplied |  |  |
| Order No: GB727A/KJ                        | Depth (m)       | 0.20          | 0.60          | 0.10          |  |  |
| Reporting Date: 26/07/2023                 | DETS Sample No  | 664899        | 664900        | 664901        |  |  |

| Determinand            | Unit  | RL    | Accreditation | (n)   |       |       |  |
|------------------------|-------|-------|---------------|-------|-------|-------|--|
| Naphthalene            | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 |  |
| Acenaphthylene         | mg/kg | < 0.1 | MCERTS        | < 0.1 | < 0.1 | < 0.1 |  |
| Acenaphthene           | mg/kg | < 0.1 | MCERTS        | 0.39  | < 0.1 | < 0.1 |  |
| Fluorene               | mg/kg | < 0.1 | MCERTS        | 0.43  | < 0.1 | < 0.1 |  |
| Phenanthrene           | mg/kg | < 0.1 | MCERTS        | 5.69  | < 0.1 | 0.15  |  |
| Anthracene             | mg/kg | < 0.1 | MCERTS        | 1.62  | < 0.1 | < 0.1 |  |
| Fluoranthene           | mg/kg | < 0.1 | MCERTS        | 6.55  | 0.18  | 0.38  |  |
| Pyrene                 | mg/kg | < 0.1 | MCERTS        | 5.52  | 0.17  | 0.34  |  |
| Benzo(a)anthracene     | mg/kg | < 0.1 | MCERTS        | 2.77  | 0.12  | 0.23  |  |
| Chrysene               | mg/kg | < 0.1 | MCERTS        | 2.45  | 0.11  | 0.27  |  |
| Benzo(b)fluoranthene   | mg/kg | < 0.1 | MCERTS        | 2.39  | 0.17  | 0.38  |  |
| Benzo(k)fluoranthene   | mg/kg | < 0.1 | MCERTS        | 0.75  | < 0.1 | < 0.1 |  |
| Benzo(a)pyrene         | mg/kg | < 0.1 | MCERTS        | 2.04  | 0.14  | 0.26  |  |
| Indeno(1,2,3-cd)pyrene | mg/kg | < 0.1 | MCERTS        | 0.97  | < 0.1 | 0.19  |  |
| Dibenz(a,h)anthracene  | mg/kg | < 0.1 | MCERTS        | 0.23  | < 0.1 | < 0.1 |  |
| Benzo(ghi)perylene     | mg/kg | < 0.1 | MCERTS        | 0.79  | < 0.1 | 0.19  |  |
| Coronene               | mg/kg | < 0.1 | NONE          | 0.24  | < 0.1 | < 0.1 |  |
| Total Oily Waste PAHs  | mg/kg | < 1   | MCERTS        | 11.6  | < 1   | 1.3   |  |
| Total Dutch 10 PAHs    | mg/kg | < 1   | MCERTS        | 23.6  | < 1   | 1.7   |  |
| Total EPA-16 PAHs      | mg/kg | < 1.6 | MCERTS        | 32.6  | < 1.6 | 2.4   |  |
| Total WAC-17 PAHs      | mg/kg | < 1.7 | NONE          | 32.8  | < 1.7 | 2.4   |  |

(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation



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**Soil Analysis Certificate - TPH CWG Banded**

|                                           |                        |               |               |               |  |  |
|-------------------------------------------|------------------------|---------------|---------------|---------------|--|--|
| <b>DETS Report No: 23-09383</b>           | <b>Date Sampled</b>    | 11/07/23      | 11/07/23      | 11/07/23      |  |  |
| <b>GB Card and Partners</b>               | <b>Time Sampled</b>    | None Supplied | None Supplied | None Supplied |  |  |
| <b>Site Reference: Holly Bank Cottage</b> | <b>TP / BH No</b>      | V01           | V01           | V02           |  |  |
| <b>Project / Job Ref: GB727A</b>          | <b>Additional Refs</b> | None Supplied | None Supplied | None Supplied |  |  |
| <b>Order No: GB727A/KJ</b>                | <b>Depth (m)</b>       | 0.20          | 0.60          | 0.10          |  |  |
| <b>Reporting Date: 26/07/2023</b>         | <b>DETS Sample No</b>  | 664899        | 664900        | 664901        |  |  |

| <b>Determinand</b>                               | <b>Unit</b> | <b>RL</b> | <b>Accreditation</b> | <b>(n)</b> |        |        |  |
|--------------------------------------------------|-------------|-----------|----------------------|------------|--------|--------|--|
| Aliphatic >C5 - C6 :<br>HS_1D_MS_AL              | mg/kg       | < 0.01    | NONE                 | < 0.01     | < 0.01 | < 0.01 |  |
| Aliphatic >C6 - C8 :<br>HS_1D_MS_AL              | mg/kg       | < 0.05    | NONE                 | < 0.05     | < 0.05 | < 0.05 |  |
| Aliphatic >C8 - C10 :<br>EH_CU_1D_AL             | mg/kg       | < 2       | MCERTS               | < 2        | < 2    | < 2    |  |
| Aliphatic >C10 - C12 :<br>EH_CU_1D_AL            | mg/kg       | < 2       | MCERTS               | < 2        | < 2    | < 2    |  |
| Aliphatic >C12 - C16 :<br>EH_CU_1D_AL            | mg/kg       | < 3       | MCERTS               | < 3        | < 3    | < 3    |  |
| Aliphatic >C16 - C21 :<br>EH_CU_1D_AL            | mg/kg       | < 3       | MCERTS               | 3          | < 3    | < 3    |  |
| Aliphatic >C21 - C34 :<br>EH_CU_1D_AL            | mg/kg       | < 10      | MCERTS               | < 10       | < 10   | < 10   |  |
| Aliphatic (C5 - C34) :<br>HS_1D_MS+EH_CU_1D_AL   | mg/kg       | < 21      | NONE                 | < 21       | < 21   | < 21   |  |
| Aromatic >C5 - C7 :<br>HS_1D_MS_AR               | mg/kg       | < 0.01    | NONE                 | < 0.01     | < 0.01 | < 0.01 |  |
| Aromatic >C7 - C8 :<br>HS_1D_MS_AR               | mg/kg       | < 0.05    | NONE                 | < 0.05     | < 0.05 | < 0.05 |  |
| Aromatic >C8 - C10 :<br>EH_CU_1D_AR              | mg/kg       | < 2       | MCERTS               | < 2        | < 2    | < 2    |  |
| Aromatic >C10 - C12 :<br>EH_CU_1D_AR             | mg/kg       | < 2       | MCERTS               | < 2        | < 2    | < 2    |  |
| Aromatic >C12 - C16 :<br>EH_CU_1D_AR             | mg/kg       | < 2       | MCERTS               | 4          | < 2    | < 2    |  |
| Aromatic >C16 - C21 :<br>EH_CU_1D_AR             | mg/kg       | < 3       | MCERTS               | 27         | < 3    | < 3    |  |
| Aromatic >C21 - C35 :<br>EH_CU_1D_AR             | mg/kg       | < 10      | MCERTS               | 34         | < 10   | < 10   |  |
| Aromatic (C5 - C35) :<br>HS_1D_MS+EH_CU_1D_AR    | mg/kg       | < 21      | NONE                 | 65         | < 21   | < 21   |  |
| Total >C5 - C35 :<br>HS_1D_MS+EH_CU_1D_Tot<br>al | mg/kg       | < 42      | NONE                 | 68         | < 42   | < 42   |  |

(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation



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| Soil Analysis Certificate - BTEX / MTBE |                 |               |               |               |  |  |
|-----------------------------------------|-----------------|---------------|---------------|---------------|--|--|
| DETS Report No: 23-09383                | Date Sampled    | 11/07/23      | 11/07/23      | 11/07/23      |  |  |
| GB Card and Partners                    | Time Sampled    | None Supplied | None Supplied | None Supplied |  |  |
| Site Reference: Holly Bank Cottage      | TP / BH No      | V01           | V01           | V02           |  |  |
| Project / Job Ref: GB727A               | Additional Refs | None Supplied | None Supplied | None Supplied |  |  |
| Order No: GB727A/KJ                     | Depth (m)       | 0.20          | 0.60          | 0.10          |  |  |
| Reporting Date: 26/07/2023              | DETS Sample No  | 664899        | 664900        | 664901        |  |  |

| Determinand             | Unit  | RL  | Accreditation | (n) |     |     |  |
|-------------------------|-------|-----|---------------|-----|-----|-----|--|
| Benzene : HS_1D_MS      | ug/kg | < 2 | MCERTS        | < 2 | < 2 | < 2 |  |
| Toluene : HS_1D_MS      | ug/kg | < 5 | MCERTS        | < 5 | < 5 | < 5 |  |
| Ethylbenzene : HS_1D_MS | ug/kg | < 2 | MCERTS        | < 2 | < 2 | < 2 |  |
| p & m-xylene : HS_1D_MS | ug/kg | < 2 | MCERTS        | < 2 | < 2 | < 2 |  |
| o-xylene : HS_1D_MS     | ug/kg | < 2 | MCERTS        | < 2 | < 2 | < 2 |  |
| MTBE : HS_1D_MS         | ug/kg | < 5 | MCERTS        | < 5 | < 5 | < 5 |  |

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| Soil Analysis Certificate - Sample Descriptions |  |
|-------------------------------------------------|--|
| DETS Report No: 23-09383                        |  |
| GB Card and Partners                            |  |
| Site Reference: Holly Bank Cottage              |  |
| Project / Job Ref: GB727A                       |  |
| Order No: GB727A/KJ                             |  |
| Reporting Date: 26/07/2023                      |  |

| DETS Sample No | TP / BH No | Additional Refs | Depth (m) | Moisture Content (%) | Sample Matrix Description                   |
|----------------|------------|-----------------|-----------|----------------------|---------------------------------------------|
| 664899         | V01        | None Supplied   | 0.20      | 13.4                 | Black loamy sand with stones and concrete   |
| 664900         | V01        | None Supplied   | 0.60      | 7.5                  | Brown sandy gravel with stones and concrete |
| 664901         | V02        | None Supplied   | 0.10      | 17.7                 | Brown loamy sand with stones and vegetation |

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample <sup>U/S</sup>

Unsuitable Sample <sup>U/S</sup>



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#### Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 23-09383

GB Card and Partners

Site Reference: Holly Bank Cottage

Project / Job Ref: GB727A

Order No: GB727A/KJ

Reporting Date: 26/07/2023

| Matrix | Analysed On | Determinand                                                                                                                                     | Brief Method Description                                                                                                                             | Method No |
|--------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Soil   | D           | Boron - Water Soluble                                                                                                                           | Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES                                                            | E012      |
| Soil   | AR          | BTEX                                                                                                                                            | Determination of BTEX by headspace GC-MS                                                                                                             | E001      |
| Soil   | D           | Cations                                                                                                                                         | Determination of cations in soil by aqua-regia digestion followed by ICP-OES                                                                         | E002      |
| Soil   | D           | Chloride - Water Soluble (2:1)                                                                                                                  | Determination of chloride by extraction with water & analysed by ion chromatography                                                                  | E009      |
| Soil   | AR          | Chromium - Hexavalent                                                                                                                           | Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry | E016      |
| Soil   | AR          | Cyanide - Complex                                                                                                                               | Determination of complex cyanide by distillation followed by colorimetry                                                                             | E015      |
| Soil   | AR          | Cyanide - Free                                                                                                                                  | Determination of free cyanide by distillation followed by colorimetry                                                                                | E015      |
| Soil   | AR          | Cyanide - Total                                                                                                                                 | Determination of total cyanide by distillation followed by colorimetry                                                                               | E015      |
| Soil   | D           | Cyclohexane Extractable Matter (CEM)                                                                                                            | Gravimetrically determined through extraction with cyclohexane                                                                                       | E011      |
| Soil   | AR          | Diesel Range Organics (C10 - C24)                                                                                                               | Determination of hexane/acetone extractable hydrocarbons by GC-FID                                                                                   | E004      |
| Soil   | AR          | Electrical Conductivity                                                                                                                         | Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement                             | E022      |
| Soil   | AR          | Electrical Conductivity                                                                                                                         | Determination of electrical conductivity by addition of water followed by electrometric measurement                                                  | E023      |
| Soil   | D           | Elemental Sulphur                                                                                                                               | Determination of elemental sulphur by solvent extraction followed by GC-MS                                                                           | E020      |
| Soil   | AR          | EPH (C10 - C40)                                                                                                                                 | Determination of acetone/hexane extractable hydrocarbons by GC-FID                                                                                   | E004      |
| Soil   | AR          | EPH Product ID                                                                                                                                  | Determination of acetone/hexane extractable hydrocarbons by GC-FID                                                                                   | E004      |
| Soil   | AR          | EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)                                                                                   | Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS                                        | E004      |
| Soil   | D           | Fluoride - Water Soluble                                                                                                                        | Determination of Fluoride by extraction with water & analysed by ion chromatography                                                                  | E009      |
| Soil   | D           | Fraction Organic Carbon (FOC)                                                                                                                   | Determination of TOC by combustion analyser.                                                                                                         | E027      |
| Soil   | D           | Organic Matter (SOM)                                                                                                                            | Determination of TOC by combustion analyser.                                                                                                         | E027      |
| Soil   | D           | TOC (Total Organic Carbon)                                                                                                                      | Determination of TOC by combustion analyser.                                                                                                         | E027      |
| Soil   | AR          | Exchangeable Ammonium                                                                                                                           | Determination of ammonium by discrete analyser.                                                                                                      | E029      |
| Soil   | D           | FOC (Fraction Organic Carbon)                                                                                                                   | Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate                     | E010      |
| Soil   | D           | Loss on Ignition @ 450oC                                                                                                                        | Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace                                       | E019      |
| Soil   | D           | Magnesium - Water Soluble                                                                                                                       | Determination of water soluble magnesium by extraction with water followed by ICP-OES                                                                | E025      |
| Soil   | D           | Metals                                                                                                                                          | Determination of metals by aqua-regia digestion followed by ICP-OES                                                                                  | E002      |
| Soil   | AR          | Mineral Oil (C10 - C40)                                                                                                                         | Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge                                                  | E004      |
| Soil   | AR          | Moisture Content                                                                                                                                | Moisture content; determined gravimetrically                                                                                                         | E003      |
| Soil   | D           | Nitrate - Water Soluble (2:1)                                                                                                                   | Determination of nitrate by extraction with water & analysed by ion chromatography                                                                   | E009      |
| Soil   | D           | Organic Matter                                                                                                                                  | Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate                                 | E010      |
| Soil   | AR          | PAH - Speciated (EPA 16)                                                                                                                        | Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards                | E005      |
| Soil   | AR          | PCB - 7 Congeners                                                                                                                               | Determination of PCB by extraction with acetone and hexane followed by GC-MS                                                                         | E008      |
| Soil   | D           | Petroleum Ether Extract (PEE)                                                                                                                   | Gravimetrically determined through extraction with petroleum ether                                                                                   | E011      |
| Soil   | AR          | pH                                                                                                                                              | Determination of pH by addition of water followed by electrometric measurement                                                                       | E007      |
| Soil   | AR          | Phenols - Total (monohydric)                                                                                                                    | Determination of phenols by distillation followed by colorimetry                                                                                     | E021      |
| Soil   | D           | Phosphate - Water Soluble (2:1)                                                                                                                 | Determination of phosphate by extraction with water & analysed by ion chromatography                                                                 | E009      |
| Soil   | D           | Sulphate (as SO4) - Total                                                                                                                       | Determination of total sulphate by extraction with 10% HCl followed by ICP-OES                                                                       | E013      |
| Soil   | D           | Sulphate (as SO4) - Water Soluble (2:1)                                                                                                         | Determination of sulphate by extraction with water & analysed by ion chromatography                                                                  | E009      |
| Soil   | D           | Sulphate (as SO4) - Water Soluble (2:1)                                                                                                         | Determination of water soluble sulphate by extraction with water followed by ICP-OES                                                                 | E014      |
| Soil   | AR          | Sulphide                                                                                                                                        | Determination of sulphide by distillation followed by colorimetry                                                                                    | E018      |
| Soil   | D           | Sulphur - Total                                                                                                                                 | Determination of total sulphur by extraction with aqua-regia followed by ICP-OES                                                                     | E024      |
| Soil   | AR          | SVOC                                                                                                                                            | Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS                                               | E006      |
| Soil   | AR          | Thiocyanate (as SCN)                                                                                                                            | Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry  | E017      |
| Soil   | D           | Toluene Extractable Matter (TEM)                                                                                                                | Gravimetrically determined through extraction with toluene                                                                                           | E011      |
| Soil   | D           | Total Organic Carbon (TOC)                                                                                                                      | Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate                                 | E010      |
| Soil   | AR          | TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)         | Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS       | E004      |
| Soil   | AR          | TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44) | Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS       | E004      |
| Soil   | AR          | VOCs                                                                                                                                            | Determination of volatile organic compounds by headspace GC-MS                                                                                       | E001      |
| Soil   | AR          | VPH (C6-C8 & C8-C10)                                                                                                                            | Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID                                                                            | E001      |

D Dried  
AR As Received



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|                                            |
|--------------------------------------------|
| <b>List of HWOL Acronyms and Operators</b> |
| <b>DETS Report No: 23-09383</b>            |
| <b>GB Card and Partners</b>                |
| <b>Site Reference: Holly Bank Cottage</b>  |
| <b>Project / Job Ref: GB727A</b>           |
| <b>Order No: GB727A/KJ</b>                 |
| <b>Reporting Date: 26/07/2023</b>          |

| Acronym | Description                                                         |
|---------|---------------------------------------------------------------------|
| HS      | Headspace analysis                                                  |
| EH      | Extractable Hydrocarbons - i.e. everything extracted by the solvent |
| CU      | Clean-up - e.g. by florisil, silica gel                             |
| 1D      | GC - Single coil gas chromatography                                 |
| 2D      | GC-GC - Double coil gas chromatography                              |
| Total   | Aliphatics & Aromatics                                              |
| AL      | Aliphatics only                                                     |
| AR      | Aromatics only                                                      |
| #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 eg. EH+HS_Total or EH_CU+HS_Total   |

|                                                     |
|-----------------------------------------------------|
| Det - Acronym                                       |
| Benzene - HS_1D_MS                                  |
| Ethylbenzene - HS_1D_MS                             |
| MTBE - HS_1D_MS                                     |
| TPH CWG - Aliphatic >C10 - C12 - EH_CU_1D_AL        |
| TPH CWG - Aliphatic >C12 - C16 - EH_CU_1D_AL        |
| TPH CWG - Aliphatic >C16 - C21 - EH_CU_1D_AL        |
| TPH CWG - Aliphatic >C21 - C34 - EH_CU_1D_AL        |
| TPH CWG - Aliphatic >C5 - C6 - HS_1D_MS_AL          |
| TPH CWG - Aliphatic >C6 - C8 - HS_1D_MS_AL          |
| TPH CWG - Aliphatic >C8 - C10 - EH_CU_1D_AL         |
| TPH CWG - Aliphatic C5 - C34 - HS_1D_MS+EH_CU_1D_AL |
| TPH CWG - Aromatic >C10 - C12 - EH_CU_1D_AR         |
| TPH CWG - Aromatic >C12 - C16 - EH_CU_1D_AR         |
| TPH CWG - Aromatic >C16 - C21 - EH_CU_1D_AR         |
| TPH CWG - Aromatic >C21 - C35 - EH_CU_1D_AR         |
| TPH CWG - Aromatic >C5 - C35 - HS_1D_MS+EH_CU_1D_AR |
| TPH CWG - Aromatic >C5 - C7 - HS_1D_MS_AR           |
| TPH CWG - Aromatic >C7 - C8 - HS_1D_MS_AR           |
| TPH CWG - Aromatic >C8 - C10 - EH_CU_1D_AR          |
| TPH CWG - Total >C5 - C35 - HS_1D_MS+EH_CU_1D_Total |
| Toluene - HS_1D_MS                                  |
| m & p-xylene - HS_1D_MS                             |
| o-Xylene - HS_1D_MS                                 |

# Appendix D

Soil screening assessment



[illegible]

| Text in <b>bold</b> = Detection above LOD<br><b>Red</b> = GAC exceedance | Residential with<br>homegrown produce:<br>SOM 2.5% | V01 0.20    | V01 0.40    | V01 0.60    | V02 0.10    | V02 0.40    | V03 0.30    | V03 0.40   | V03 0.60   |
|--------------------------------------------------------------------------|----------------------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|------------|
| SOM %                                                                    |                                                    | <b>8.4</b>  | <b>4.7</b>  | <b>3.6</b>  | <b>8.0</b>  | <b>8.6</b>  | <b>8.00</b> | <b>4.6</b> | <b>4.4</b> |
| Chrysene                                                                 | 22                                                 | <b>2.45</b> | <b>0.14</b> | <b>0.11</b> | <b>0.27</b> | <b>0.27</b> | < 0.1       | <0.1       | <0.1       |
| Dibenzo(ah)anthracene                                                    | 0.28                                               | <b>0.23</b> | <0.1        | <0.1        | <0.1        | < 0.1       | < 0.1       | <0.1       | <0.1       |
| Fluoranthene                                                             | 560                                                | <b>6.55</b> | <b>0.24</b> | <b>0.18</b> | <b>0.38</b> | <b>0.47</b> | <b>0.13</b> | <0.1       | <0.1       |
| Fluorene                                                                 | 400                                                | <b>5.69</b> | <0.1        | <0.1        | <0.1        | < 0.1       | <0.1        | <0.1       | <0.1       |
| Indeno(123-cd)pyrene                                                     | 36                                                 | <b>0.97</b> | <0.1        | <0.1        | 0.19        | <b>0.2</b>  | <0.1        | <0.1       | <0.1       |
| Naphthalene                                                              | 5.6                                                | <0.1        | <0.1        | <0.1        | < 0.1       | <0.1        | <0.1        | <0.1       | <0.1       |
| Phenanthrene                                                             | 220                                                | <b>5.69</b> | <b>0.16</b> | <0.1        | <0.1        | <b>0.15</b> | <0.1        | <0.1       | <0.1       |
| Pyrene                                                                   | 1200                                               | <b>5.52</b> | <b>0.22</b> | <b>0.17</b> | <b>0.34</b> | <b>0.44</b> | <b>0.13</b> | <0.1       | <0.1       |



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